



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

ACNWR-0099

PDR

September 30, 1994

The Honorable Ivan Selin
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Selin;

SUBJECT: GENERAL COMMENTS ON THE IMPACT OF THE DEPARTMENT OF ENERGY'S PROPOSED PROGRAM APPROACH ON THE NRC'S HIGH-LEVEL RADIOACTIVE WASTE LICENSING ACTIVITIES

The Advisory Committee on Nuclear Waste (ACNW) has reviewed information on the Department of Energy's (DOE) Proposed Program Approach (PPA). This subject was discussed during our 66th and 67th meetings and included presentations by staff members of the NRC and DOE. The information obtained from the DOE and the NRC staff was supplemented by draft documents and responses to specific questions posed in writing to DOE by other organizations such as the Nuclear Waste Technical Review Board. This letter provides general comments on the broad outlines of the PPA program as we understand it.

DOE's PPA for the Yucca Mountain area will result in a change of the scope of the repository program to closely match the level of funding and the expected schedules for this program. In general, the Committee is impressed with the objectives of the PPA and in particular with the site characterization process that sharply focuses on the most important issues for site suitability and licensing.

The DOE PPA has not been fully exposed or developed but currently reveals the following attributes.

1. The program seeks to reduce the near-term site characterization studies to a level sufficient to make general findings on the site suitability that can be used to make a recommendation to the President about a repository at Yucca Mountain.
2. In the absence of comprehensive data and model development, DOE plans to use bounding assumptions to bracket the missing data but still allow site suitability findings to be made. It appears that the development and application of models will be based on these assumptions and that estimates necessary for the high-level findings by DOE (i.e., that no significant changes in the "outcome" of the models are expected after

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additional data are obtained) will be based on the results of the use of bounding assumptions.

3. The DOE site characterization process will appropriately involve the qualifiers and disqualifiers in 10 CFR Part 960. The NRC regulations concerning siting (10 CFR 60.122) will not play a direct role in forming the conclusions derived by DOE about the site qualification. Present indications are that DOE plans to proceed with site qualification substantially without compelling input from the NRC staff, but DOE has indicated its intent to keep the NRC staff fully informed. Nonetheless, NRC, according to the Nuclear Waste Policy Act, is to provide preliminary comments on the sufficiency of DOE's waste form proposal and at-depth site characterization analysis when DOE recommends a repository site to the President. The protocols for resolving conflicts that arise as a result of this process are not clear.
4. DOE plans to use external peer review panels and is currently negotiating with the National Academy of Sciences (NAS) to organize these panels. The panels are to be assigned to review the technical merits of conclusions formulated from bounding assumptions and codified into topical reports. Whether such reviews may constrain subsequent regulatory actions of the NRC staff is not clear.

We believe that the PPA will substantially affect the activities of the NRC staff and may require changes in focus, schedules, and effort levels. Some of the considerations are as follows.

1. The planned reduction of data acquisition and the accelerated schedule for the submission of an application for a construction authorization following the determination of the suitability of the site as a repository will require greatly increased reliance on the use of expert judgment to support the models used for a description of the performance of the site. In addition, the planned use in the PPA of bounding assumptions when data are not available also places great reliance on the use of expert judgments as the source of estimates for the parameters necessary for the models. Neither the DOE nor the NRC staff has published or implemented validated protocols for the elicitation of such judgments. The site suitability process is developing information that will also be used in the preparation of the license application. We recommend that the NRC staff expeditiously develop generic and detailed protocols for the elicitation of expert judgments. The staff should develop guidelines or even more compelling documents that define acceptable methods of resolving conflicts and uncertainties that arise during the elicitation of expert judgments and are manifested in significant divergences in the resulting estimates.

2. Results from the PPA will be utilized in the license application (LA) for construction authorization which is to be submitted to the NRC once the site has been certified by DOE to be suitable for a repository. Although DOE apparently intends to continue to acquire site-related data after the submittal of the LA, the planned use of bounding assumptions will place new and significant burdens on the NRC staff in its review of the LA. The Committee recommends that the role of the high-level radioactive waste (HLW) research program be significantly modified to concentrate on the need to support the NRC staff in the evaluation of the quality, sufficiency, and appropriateness of the assumptions introduced into models in lieu of results derived from data. We recommend that the entire HLW research program be reevaluated and additional resources allocated to ensure that the projects in the program are sharply focused, planned for timely completion, and the scope is sufficiently narrowed to bear directly on information necessary to qualify the model assumptions used by DOE. Similar concerns are appropriate for the technical assistance program.
3. A part of the PPA plan is the use of and reliance on a more robust waste package (i.e., multipurpose canisters with appropriate overpacks) than had been heretofore planned. It is also likely that the LA will be submitted in the absence of a detailed design for the rest of the engineered barrier system (EBS) and much of the repository. Comprehensive information on the performance of the near- and far-field geology in the retardation of radionuclide transport may also be lacking. We believe that the NRC staff should be alert to and prepared to comment on a possible reduction in the reliance on the defense-in-depth approach, which is an important part of the regulatory philosophy for the HLW program. Although we do not believe that the overall safety of the repository needs to be compromised by changes in approach to the defense-in-depth philosophy, the NRC staff should be prepared to defend in regulatory terms its adherence to the original philosophy should it decide to do so.
4. Owing to the close relationship between the repository design (including the design of the EBS) and the performance of the repository system under the full range of likely scenarios, we recommend that NRC strongly urge DOE to prepare, at a significantly accelerated schedule, a reference design of the repository system. This should include, but not be limited to, information on the expected areal heat loading, details of the statistics and physical phenomena on which substantially complete containment is to be based, the use and efficacy of barriers to the migration of waste constituents, the planned geometry and disposition of the waste packages, and the control of processes that could lead to the dispersion of

gaseous waste components. Such a reference design should become available at the earliest possible time but at least before the initial high-level decisions about any of the Part 960 technical guidelines are completed. In the absence of such a design, NRC should convey to DOE its concern about its ability to evaluate the quality of the lower level decisions on any topic pertinent to site qualification.

5. The use of performance assessment (PA) has been fundamental for evaluating the significance of selected phenomena and scenarios and evaluating if the planned repository would meet regulatory requirements. However, the PPA makes it difficult to ensure that PA can be applied in the future in a meaningful manner, particularly since some of the phenomena that are expected to affect the repository will not be sufficiently explored to provide assurance that the basic physical processes are known, pertinent data have not been obtained, or models developed. We recommend that the NRC staff reexamine the role of PA and the development of PA procedures under these circumstances and prepare plans to supplement reviews of the PA results with more sharply focused inquiry into the bases of conclusions reached about the performance of the site.

As more detailed information becomes available (e.g., the DOE five-year plan and the technical implementation plans) for our review, we plan to supplement this letter with additional discussions and more detailed comments. In addition, the Committee will consider the question of issue resolution at a later time.

Sincerely,



Marcia J. Steindler
Chairman

References:

1. Preliminary Draft dated 8/3/94, U.S. Department of Energy, Office of Civilian Radioactive Waste Management, "Process for Evaluating the Suitability of the Yucca Mountain Site for Development as a Repository for High-Level Radioactive Waste and Spent Nuclear Fuel"
2. Letter dated June 30, 1994, from Daniel A. Dreyfus, DOE, to Dr. John E. Cantlon, NWTRB. re: Department of Energy's response to the questions contained in the Nuclear Waste Technical Review Board's letter dated May 17, 1994