



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, DC 20555 - 0001

ACNWR-0201

October 1, 2003

The Honorable Nils J. Diaz
Chairman
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: WORKING GROUP SESSION ON PERFORMANCE CONFIRMATION FOR
YUCCA MOUNTAIN

Dear Chairman Diaz:

During its 144th meeting on July 29-30, 2003, the Advisory Committee on Nuclear Waste (ACNW or the Committee) held a working group session (WGS) on performance confirmation (PC) for the proposed high-level waste repository at Yucca Mountain, Nevada. PC refers to the tests, experiments, and analyses that will be performed to evaluate the adequacy of the information used to show compliance with performance objectives in 10 CFR Part 63.

The purposes of the WGS were to (1) increase ACNW's technical knowledge of plans to develop and conduct PC work, (2) understand NRC staff expectations for PC, (3) review examples of PC work being planned, (4) identify aspects of PC that may warrant further study, and (5) complement the previous working group session on performance assessment. The WGS included a panel of six distinguished experts from academia and various government and private institutions. Representatives of the U.S. Department of Energy (DOE), the U.S. Nuclear Regulatory Commission (NRC), and the State of Nevada made presentations, as did various other stakeholders.

DOE's PC program is undergoing significant change at this time. DOE is preparing a revised PC plan that will supersede its earlier plan. A new "portfolio" of PC activities has been selected using a multiattribute utility analysis. The selected portfolio is now being reviewed for approval by DOE's management. When approved, Revision 1 of the plan will be provided to the NRC. It is expected that a Revision 2, to be published in 2004, will include a full description of each PC activity. The staff intends to use the review methods in the Yucca Mountain Review Plan to perform pre-licensing reviews of Revisions 1 and 2 of DOE's PC plan.

Observation

A PC plan is required to be a part of a license application; therefore it is clear that this element of DOE's program should receive appropriate pre-licensing guidance. Based on NRC's presentations to the Committee, however, the PC program has not been treated proactively by NRC. The staff is waiting for DOE to propose a structure for a PC plan and to suggest criteria for deciding whether deviations from baseline are significant enough to warrant actions. We

believe that PC is an area that deserves more interaction between DOE and NRC than has occurred to date.

Recommendations

The Committee recommends that the Commission require the NRC staff to provide additional pre-licensing guidance to DOE concerning PC plans. These communications should focus on:

1. Ways to develop the PC program that are based primarily on risk insights and testing assumptions about key performance factors;
2. How performance assessments can or should be updated using performance confirmation data;
3. How performance confirmation should be used in making decisions; and
4. How to resolve any differences in NRC and DOE approaches to PC.

Attributes of a Successful PC Program

The PC Program Should Be Informed by Performance Assessments

The PC program must be risk-based, focusing on parameters and processes that are important to safety. PC needs to be linked to total system performance assessments (TSPA for DOE and TPA for NRC), which means these assessments have to be maintained during PC. Also, PC monitoring should focus on areas where TSPA is based more on assumptions than on evidence. To the extent that TSPA and TPA indicate that performance is insensitive to some systems and processes, monitoring of associated parameters may not be needed. A risk-based PC program would allocate resources to those areas that are most important for performance, thus providing the greatest support for future decisions.

NRC's review of DOE's PC Plan may identify elements that are unnecessary and not risk informed. The staff normally focuses licensing reviews on activities that are needed but have not been proposed by an applicant. The NRC staff seldom comments on unnecessary activities that an applicant may propose. However, in a risk-informed, performance-based arena, it is appropriate to provide guidance to a potential licensee regarding both necessary and unnecessary activities.

To avoid the pitfall of having the PC program become a de facto site characterization or basic research program, there should be a clear mapping between performance assessment and PC.

The PC Program Should be Flexible and Responsive

Considerable advances in technology can be expected to occur over many decades. A successful PC program should be flexible, with a process to reevaluate, reexamine, and modify PC activities as the state of understanding changes. New tests may be needed, or may become possible with new technology, and tests that are no longer providing useful

information could be discontinued. Some parameters are difficult to measure but nonetheless may be important to safety. The Committee advises an approach to develop and correlate new data, to the extent feasible, to build a body of evidence that will improve the safety-related knowledge base.

Objective Criteria Are Needed To Decide on Future Actions

The PC plan should address what happens if some results are unexpected and potentially at odds with assumptions used in development of the safety case. PC is not aimed at detecting performance failures per se. However, the PC program may detect parameters that deviate from an expected range of values. Yucca Mountain is a complex project, so that some deviations from expectations may occur. PC should have a logical pathway to determine whether any of the deviations are significant to safety. The criteria to make this determination should be developed as part of the PC plan.

Appropriate Accuracy or Precision Should be Part of the Measurement Design

Parameters to be monitored under PC will require varying degrees of accuracy and precision to support decisionmaking. The appropriate metric should be whether significant deviations important to safety have been detected. Requiring unnecessary accuracy or precision may be misleading regarding the importance of the parameter.

Plan Should Include Appropriate Involvement of the Public in PC Activities

The PC plan should address how the public will be involved in the PC process. The public could be involved in identifying those aspects of a PC program that may provide increased confidence. The Committee believes that the PC plan needs to be risk informed. However, some activities may be planned to address issues of unusual public concern, though they may not be high-risk safety issues. The public should be kept informed of any problems revealed by the PC process and of any subsequent mitigation.

Summary

This WGS provided an excellent forum in which to exchange views on the technical issues associated with PC. It appears to the Committee that, within the high-level waste program, PC planning is relatively immature. The Committee has provided specific recommendations to enhance the pre-licensing guidance so that DOE can improve its PC plan. NRC and DOE have not yet finalized any agreement items related to PC. Continued communication between the NRC and DOE staffs is essential, and must stay focused on matters important to safety.

Sincerely,

/RA/

B. John Garrick
Chairman