



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

February 16, 1996

The Honorable Shirley Ann Jackson
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Jackson:

SUBJECT: COMMENTS ON HIGH-LEVEL WASTE PRELICENSING PROGRAM
STRATEGY AND KEY TECHNICAL ISSUES

This letter communicates our recommendations and suggestions on the "Revised Prelicensing Program Strategy for the U. S. Nuclear Regulatory Commission High-Level Waste Repository Program ('Vertical Slice Approach')" and the NRC staff's plans for resolving key technical issues (KTIs) dealing with the proposed high-level waste (HLW) geologic repository at Yucca Mountain, Nevada. These remarks are based on presentations by the NRC staff to the Committee concerning the vertical slice approach at the 77th ACNW meeting, September 1995; on key technical uncertainty integration and resolution of KTIs at the 79th ACNW meeting, November 1995; and subsequent deliberations of the Committee.

The Committee is aware of the changing emphasis and scope of the NRC's HLW prelicensing strategy as a result of modifications in the Department of Energy's (DOE's) site suitability investigations and prelicensing programs and the reductions in resources to both DOE and NRC. Although there are uncertainties in implementing plans and projecting strategies, we wish to support the general approach of the NRC staff in dealing with both the program strategy and the KTIs.

The ACNW commends the staff for its development of a vertical slice concept designed to focus the HLW program on the most critical licensing issues. In particular, we are pleased to learn of the emphasis on risk to repository performance in identifying elements of the prelicensing strategy and plans for conducting the program. We support the emphasis on issue resolution, but not to the point of compromising legitimate concerns that could impact the health and safety of the public. Other concerns include the need to develop review and acceptance criteria to determine the adequacy of bounding analyses, an apparent lack of emphasis on coupled processes, and the need to maintain sharp focus on risk to the predicted performance of the repository.

Revised Prelicensing Program Strategy

The revisions in the NRC HLW prelicensing program strategy (vertical slice approach) incorporate a comprehensive review of critical issues in the DOE program that have the highest risk of noncompliance with regulations for licensing an HLW geologic repository at Yucca Mountain, Nevada. An important objective of the program is to provide DOE with timely information required for a substantially complete license application. The program is designed to increase the efficiency and effectiveness of NRC's prelicensing activities in view of the changes being made in the DOE prelicensing program and the decreasing resources available to the HLW programs of both agencies. The Committee notes many strengths of the vertical slice approach, including: its focus on the key licensing problems, recognition of the need for flexibility in designing and implementing the program, the integration of disparate key technical uncertainties (KTUs) into KTIs, the integration across and within scientific/technical disciplines, the emphasis on resolving issues with DOE, and the potential for efficiency in utilizing scarce resources.

The NRC staff acknowledges and discusses potential weaknesses of the vertical slice approach in the September 1, 1995 draft of the revised "Prelicensing Program Strategy" document. We support the concern raised in this document that a less than comprehensive approach to prelicensing has some inherent risks. The currently identified list of key issues may not be complete. Our ability to specify these issues is limited by the technical and scientific complexity of the unprecedented effort to license the potential HLW repository at Yucca Mountain. A focused prelicensing program that eliminates substantial issues from review or that is inflexible with regards to selection of KTIs is possibly open to problems. The Committee urges the staff to remain flexible with regard to the selection of KTIs. Performance assessment, expert judgment, experimental programs, and special studies are all valuable procedures for evaluating existing KTIs and identifying new ones.

The Committee has developed the following observations and recommendations on the basis of its evaluation of the NRC's HLW prelicensing program:

1. Issue resolution, which is an important objective of the vertical slice approach, is also important to the progress of licensing the HLW repository. The issue resolution approach should focus on health and safety to the public, reduction of uncertainties in meeting reasonable assurance criterion, and decreasing the risk of noncompliance with the regulations. This requires a cautious approach to issue resolution. In view of the complexity of the problems involved in the repository, it is likely that differences will remain between DOE and NRC on some issues. These differences, and the

evidence supporting them, need to be fully documented with the expectation that these matters will be presented before a licensing board. Resolution should not be required by NRC, and DOE should not be required to conduct data acquisition and analysis it believes to be unwarranted.

The design of the vertical slice approach regarding the actual procedures to resolve issues continues to evolve. The Committee notes that the NRC recently proposed to DOE a process for resolving issues, entailing interactions, documentation, and generic criteria. This process includes the disaggregation of KTIs into subissues. The Committee believes this process needs to assure that the disaggregation mechanism maintains the integral nature of the KTIs and their impact on health and safety. An NRC/DOE task force will be established to review the process. Instruments for specifying and documenting resolution, such as the NRC Issue Resolution Reports, letter reports, Prelicensing Evaluation Reports, and Safety Evaluation Reports, will be developed. But, it is unclear how actual resolution of the KTIs will be achieved between DOE and NRC.

In the interest of achieving the efficiency that is central to the vertical slice approach, criteria should be developed to determine when activities should be terminated within a specific vertical slice. DOE is planning to rely on bounding analyses for decision making. We urge the staff to expeditiously develop methods and acceptance measures to review bounding analyses by using the iterative performance assessment framework. We anticipate that these measures will be significant in establishing termination criteria.

2. The NRC will receive numerous data synthesis and process model reports from DOE in 1996. These reports will synthesize the information available on a topic and will provide a source of reference for the related data. Such reports appear especially important to prelicensing activities because they presumably will contain DOE's approach to bounding analyses. The Committee recommends that the NRC give high priority to reviewing these reports as rapidly and thoroughly as possible so that DOE is informed of any NRC licensing concerns and data needs before it completes its prelicensing activities and makes a decision about repository viability.
3. The vertical slice approach should involve an iterative process within and among vertical slices. We believe the iterative process is important to successfully complete a review and needs more emphasis in the description and implementation of the vertical slice approach. The Committee believes it important to have a process for guiding the

iterations of the KTIs in concert with the iterations of the performance assessment.

4. NRC must ensure that its schedule to conduct priority activities is synchronized with DOE's revised schedule of activities and milestones. Given the uncertainties in DOE's program and budget, NRC should review previously defined time constraints in the prelicensing program. Modifications may be necessary because of current and anticipated funding and staffing limitations and the need to maintain the highest quality products from the NRC.

Key Technical Issues

The Committee supports the important activity of recognizing KTIs through the process of integration of KTUs previously identified through the Systematic Regulatory Analysis Program. We generally agree with the criteria the staff used in this process. We especially support the use of risk to repository performance as the prime criterion wherein both probability of occurrence and consequence are considered. We have the following observations and recommendations pertinent to the identification of KTIs and their investigation in the vertical slice approach:

1. We note that DOE has taken exception to identifying Igneous Activity and Structural Deformation and Seismicity as significant KTIs. We believe that these issues should continue to be subject to review in the vertical slice approach because of the controversy regarding their potential risk to the repository performance. Igneous Activity is important as a KTI because of the uncertainties associated with the probability of occurrence of igneous events and their impact on the repository. Structural Deformation and Seismicity is also significant as a KTI because of the need to determine the level of seismic hazard and to evaluate direct effects on waste containers and engineered barriers. In addition, indirect effects on repository performance resulting from modifications in near- and far-field flow and transport properties of geologic strata and water table elevation changes need further consideration.
2. The Committee is not satisfied that the issue of Thermal-Mechanical-Hydrological-Chemical Coupled Processes is moving toward resolution. Elements of this issue are treated only within individual KTIs. The process by which they are integrated and evaluated as a total system is unclear. Presumably, it will be considered in the Total Systems Performance Assessment (TSPA) and Technical Integration KTI. However, the strong possibility exists that the interaction of phenomena and their resulting modifications of parameters and processes may be neglected in the face of the major emphasis

on TSPA in this KTI. The Committee is concerned with the issue of coupled processes and supports a strong program to resolve this issue with the vertical slice approach.

3. The Committee has long had a major interest in the integration of site characterization activities and their conclusions. We are pleased to see a KTI that considers integration. However, it is unclear at what level(s) integration will be considered in the KTI and how the results of other individual KTIs will be brought into the integration KTI. Further, it is unclear whether components involved in integration will be available in a timely manner. TSPA and Technical Integration is a particularly significant KTI because it will play a key role in establishing the importance of issues and subissues to overall repository performance.
4. The priority rankings assigned to KTIs by staff are open to question. In view of the central role of repository design on DOE's proposed viability assessment, we encourage the staff to place high priority on all KTIs that are closely tied to repository design considerations, since we believe that mixing of scientific/technical issues with management/policy issues has the potential to confuse priorities.
5. The Committee has a longstanding interest in performance assessment and the veracity of the attendant codes and models. DOE will be attaching major importance to its TSPA-1997/1998 results in the conclusions of the viability assessment. In view of the drastic reduction of the site characterization and related studies, it will be particularly important for NRC to conduct confirmatory performance assessments and to evaluate the performance assessment codes and models used by DOE. We note that the latter activity has been removed from the TSPA KTI. This decision should be reconsidered.
6. The NMSS staff has considered preparation of a yearly status report on KTI activities and results. This excellent proposal will prove useful to NRC and DOE. We urge that it be implemented.

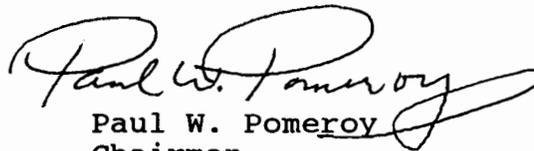
Summary

The ACNW commends the staff for its revised HLW Prelicensing Program Strategy (vertical slice approach) and the identification of KTIs that will be the subject of prelicensing activities. The Committee recommends that the staff ensure that there is a mechanism to provide rapid and continued input to DOE to influence the site viability decision, data collection, testing, and TSPA. In addition, the staff needs to periodically reevaluate the list of KTIs on the bases of new information, new analyses, and issue

resolution while staying focused on issues impacting repository performance.

The Committee has made several suggestions which, if accepted, should sharpen the vertical slice approach and its implementation. The Committee wishes to be kept informed of the progress of the vertical slice program and to be included in review of the staff's related products, such as Implementation Plans, Issue Resolution Reports, and the Performance Evaluation Reports.

Sincerely,


Paul W. Pomeroy
Chairman

Reference:

U. S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, "Revised Prelicensing Program Strategy for the U. S. Nuclear Regulatory Commission High-Level Waste Repository Program ('Vertical Slice Approach')," September 1, 1995