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NOTE TO EDITORS:

The Nuclear Regulatory Commission has received the four attached reports from its Advisory Committee on Nuclear Waste (ACNW). The reports, in the form of letters, provide comments on:

-- A "road map" to the ACNW's recommendation for establishing a time of compliance for the proposed high-level waste repository at Yucca Mountain, Nevada.

-- Comments on coupled processes in the NRC high-level waste prelicensing program.

-- Screening methodology for assessing prior land burials of radioactive waste authorized under former regulations.

-- 1997 priority issues for the ACNW.

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Attachments:
As stated

November 14, 1996

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

Dear Chairman Jackson:

SUBJECT: A "ROAD MAP" TO THE ACNW'S RECOMMENDATION FOR TIME SPAN FOR COMPLIANCE OF THE PROPOSED HIGH-LEVEL WASTE REPOSITORY AT YUCCA MOUNTAIN, NEVADA

Introduction

On June 7, 1996, the ACNW sent a letter to Chairman Jackson laying out a procedure for establishing a time of compliance (TOC) for the proposed high-level waste (HLW) repository at Yucca Mountain, Nevada. This letter outlined a general two-part approach in defining a compliance period for nuclear waste facilities and recommended a site-specific approach to the Yucca Mountain Repository compliance period that is based upon scientific and technical insights gained from site studies. The recommended approach deviates from the generic TOC established in 10 CFR Part 60, which the Committee found to be without strong scientific basis, and also deviates from the peak dose compliance period suggested in the report of the National Research Council, "Technical Basis for Yucca Mountain Standards." As a result, several questions have arisen regarding the ACNW's recommendations, especially as related to implementing a TOC. To answer these questions and improve understanding of the advantages and limitations of the recommendations, the Committee has prepared this brief explanatory memo, which provides a "road map" to its proposal.

Time of Compliance - Definition and Problem

The TOC is the period of time over which the risk of adverse consequences from a repository must comply with a specified standard. Over this stipulated time span, the integrity of the whole repository system must be maintained. In itself, the TOC is not a measure of safety; rather dose (or risk) is the appropriate indicator of safety for a repository. The TOC specifies the minimum time span over which the repository system must meet the dose limits.

The dilemma in developing a TOC is that the time span must be sufficiently long to permit evaluation of potential processes and events leading to the loss of integrity of the repository and transport of radionuclides to the critical population. Yet the period must be short enough that inherent uncertainties in processes and events and in the biosphere and critical population group, which will increase with time, will not invalidate the results of the evaluation. Reasonable confidence must exist that the

uncertainties in the reference calculation for the time span can be identified and quantified in a probabilistic format.

The ACNW Recommendation

The Committee recommends a generic two-part approach for determining the TOC. The first part involves determining the TOC on a repository-specific basis, that is, on the basis of an analysis using modeling, analogs, and experiments to specify the time for release and transport of radionuclides to the critical population group. This analysis considers site and waste characteristics, site design, and engineered barriers. The TOC must confirm the ability of the total repository system, including the geosphere, to prevent radionuclides from reaching the biosphere for a minimum of several thousand years.

The second part of the recommendation requires a point estimate calculation of the time for the potential release of radionuclides to reach peak dose. Performance assessment is used to determine the magnitude of the dose at this time. Comparison of the calculated peak dose with the standard will indicate whether the repository performance complies and will identify deficient performance factors that may require redesign or reconsideration of the repository. This part does not require a definitive measure of compliance in the sense of a numeric evaluation between the standard and the calculated dose because of the limitations in the calculations imposed by the breadth of the uncertainties in processes and events.

Implementation of the Recommendation

The enclosed flow chart provides a road map for implementing the Committee's recommendation on TOC for the proposed HLW repository at Yucca Mountain. Implementation flows from the top of the chart downward. The process is based on input provided by the site characterization, the engineering design of the repository, the waste characteristics, and the design of the waste containment. Part #1 involves determination of the TOC and evaluation of the repository in terms of the specified standard. Part #2 also is a requirement but does not involve a numerical evaluation. It is an advisory component, not a de facto regulation.

The implementation process should be defined in the regulation, but the actual TOC need not be specified. The time span only can be determined when the site characterization and repository design are completed.

The steps in the implementation of the TOC are indicated on the flow chart:

Input

1) Site characterization, the engineering design of the repository, the waste characteristics, and the waste containment design provide input to the first part of the TOC. The engineering, waste characteristics, and waste containment are subject to redesign, depending on the results of the performance evaluation for the TOC. In addition, it may be necessary to further investigate specific components of the natural setting as a result of

the assessment of the performance and the range of uncertainties in the performance of the repository.

Part #1

2) Analysis of the input characteristics using empirical and theoretical modeling, analog studies, and results from laboratory and in situ experiments will determine the anticipated time for release and transport of radionuclides to the critical population group on the basis of the defined reference biosphere. The critical population group and the reference biosphere should be delineated in the regulation. Note that this time is not the ground water travel time, but, tying it to the dose standard, it is the time for transport of radionuclides from the repository to the critical population group. This time should be based for example on the peak dose or the beginning of the decrease from the peak dose of the most mobile (i.e., high-solubility, low-retardation) radionuclides such as ^{129}I and ^{99}Tc that are anticipated from possible leakage of the repository.

3) A base-level TOC is required to eliminate the consideration of a low-integrity repository system. If the anticipated TOC is less than a few thousand years (e.g., ~3×10^3 years) the repository is rejected or the engineered system and waste containment are redesigned to increase time for release and transport of radionuclides to the critical population.

4) If the calculated time is greater than a few thousand years, total systems performance assessment is used to compare repository performance with the anticipated Yucca Mountain standard (40 CFR Part 197).

5) If comparison of the calculated performance with the standard shows that the repository performance is deficient, the repository should be rejected or redesigned. However, if the repository performance complies with the standard at the TOC the repository evaluation process should continue with Part #2.

Part #2

6) The performance assessment analysis used in Part #1 to establish the TOC should be continued until peak dose is obtained and repository performance should be evaluated at that time. The uncertainties in the system should be identified and quantified in a probabilistic format on the basis of the best available information, and their effect should be determined through bounding calculations.

7) If the comparison of the calculated performance shows that at the time of peak dose the repository is significantly deficient, for example, an order of magnitude or more, compared to the anticipated standard, the major sources of the deficiency should be identified and possible remedial actions designed and

carried out. If these actions are not possible or ineffective the repository may be rejected. However, if the bounding calculations indicate that the repository complies with in an order of magnitude of the standard, the proposed repository performance is deemed acceptable.

Sincerely,

/s/

Paul W. Pomeroy
Chairman, ACNW

November 8, 1996

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

Dear Chairman Jackson:

Subject: COMMENTS ON COUPLED PROCESSES IN THE NRC HIGH-LEVEL WASTE PRELICENSING PROGRAM

SUMMARY

The Advisory Committee on Nuclear Waste (ACNW) is impressed by the progress that the NRC staff and the Center for Nuclear Waste Regulatory Analyses (CNWRA) have made in developing a strong program to study potential coupled processes at the site of the proposed repository at Yucca Mountain, Nevada. Furthermore, we are pleased with the plans for integrating coupled processes among the vertical slice investigations of key technical issues (KTIs). The Committee has provided observations and suggestions to strengthen NRC's approach to coupled processes.

We want to emphasize the following recommendations:

(1) Performance assessment needs to have a more prominent role in guiding the prioritization of coupled processes studies.

(2) The NRC should revise its decision to not participate in DECOVALEX, a multidisciplinary international program dedicated to the Development of Coupled Models and their Validation against Experiments.

(3) The coupled processes studies are "data starved." Changes are needed in the program to rectify this situation.

(4) The modeling studies in thermal-hydrological (TH) processes need to be expanded.

(5) Greater attention is needed on near-field chemistry, with particular emphasis on thermal-hydrological-chemical (T-H-C) processes that affect contaminant release and transport.

INTRODUCTION

In February 1996, we communicated 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 KTIs dealing with the proposed high-level waste (HLW) geologic repository at Yucca Mountain, Nevada. In that letter, we made suggestions for improving the strategy and investigation of the KTIs, but we were, and continue to be, supportive of the work of the NRC staff in this regard. We see this program as an excellent response to maintaining a prelicensing program focused on critical issues in the face of limited resources. In our February 1996 letter we expressed our concern that within the specified strategy and program, it was unclear if the issue of in situ thermal-mechanical-hydrological-chemical (T-M-H-C) coupled processes was moving toward resolution. This letter provides further comments on that concern.

Construction of the proposed repository will perturb the stress pattern in Yucca Mountain, thus resulting in mechanical deformation of the surrounding rock and the emplaced HLW will cause a significant heat pulse to the rock. The resulting thermal and mechanical effects are interrelated and may significantly affect the movement of water and the nature of related hydrologic properties, as well as the chemical processes acting on the waste, canisters, and surrounding engineered and natural materials of the repository. These coupled processes may have an important impact on the performance of the repository over the course of its history. The algorithms used in modeling the performance of the repository system are influenced strongly by the analytical descriptions of the various coupled relationships among physical and chemical phenomena. The Committee is concerned that the "vertical slice" approach to the KTIs could lead to neglect of interaction of phenomena and their resulting modifications of parameters and processes. To evaluate the current validity of this concern, the ACNW reviewed the status of the investigation of coupled processes by the NRC staff and the integration of these activities among and within KTIs through a working group on T-M-H-C coupled processes at the 85th meeting of the Committee. Comments were made by representatives of the NRC staff, the CNWRA, Lawrence Berkeley Laboratory, the U.S. Geological Survey, the Department of Energy (DOE), academia, and private industry.

The Committee learned of the significant progress in the T-M-H-C coupled processes investigations and was impressed by studies being performed by the NRC and CNWRA. Effort has been put into the related KTI investigations and the integration of elements of the coupled processes among the KTIs. Below are our observations and suggestions regarding coupled processes, which should focus future activities on the potentially most critical elements.

TECHNICAL OBSERVATIONS AND SUGGESTIONS

I. General

(1) The NRC staff, with the support of the CNWRA, has developed a strong program for studying the impact of selected coupled processes on the performance of the potential repository at Yucca Mountain. This is especially true in T-H coupled processes, which have been ranked consistently as high priority in reviews of both the NRC's and the DOE's programs.

(2) A key to coupled processes studies and the development of supporting data is understanding their overall importance to repository performance. The Committee is pleased to see the increasing role of performance assessment (PA) in this regard. It is critical that the PA activity be used to provide the necessary insights and understanding of physical processes to maximize the return on investment of investigative resources. The Committee looks forward to the increased use of PA to guide the scope of analysis and research activities.

(3) We understand the continued need to reassess the allocation of HLW funding in the face of shrinking resources. However, the Committee is concerned about NRC's withdrawal from Phase II of the multidisciplinary international program DECOVALEX. The Committee sees the results of the DECOVALEX project to date as meaningful to the NRC HLW program. The testing of mathematical models and computer codes for predicting the effects of coupled processes, which is the aim of the project, is a most critical aspect of the study of coupled processes. In the tasks outlined for the continuing project, a variety of models and codes, developed largely independently by investigators in several countries, will be tested against each other and against experimental results from international nuclear waste test facilities. Although these test sites will not duplicate exactly the proposed unsaturated-tuff geologic repository at Yucca Mountain, the results should be useful in the NRC scoping studies and testing of models and codes. For these reasons, the Committee urges the staff to reverse its decision to withdraw from the DECOVALEX project.

(4) The coupled processes studies of the NRC and the CNWRA appear to be "data starved." The primary emphasis of the studies has been on developing models and related codes. This is an important element of the program but is only one of the necessary ingredients to bringing the program to fruition. The termination of the HLW research program in this topic apparently has reduced access to experimental and geologic analog information useful in validating the models and codes and in providing bounding data. This is true over a range of processes but is especially important to thermal processes and their effect on properties and other processes. In the face of this problem, both the NRC and the CNWRA should make specific efforts to obtain all relevant data from the DOE and its contractors. Further, the Committee believes that there is important information to be gained from studies of current and ancient geologic regions, with thermal anomalies for which data are available.

For example, existing data from the Nevada Test Site operations may be useful. Also, the Committee has learned of recent studies on the properties, chemistry (mineralogy), and mechanical characteristics of rocks similar to those at Yucca Mountain surrounding an igneous intrusion in the Nevada Test Site. This and similar analogs are potentially a valuable source of T-H-M-C information.

Limitations on data from thermal testing are exacerbated by the current timing of the thermal tests being conducted and organized by the DOE at Yucca Mountain. The high thermal inertia of the rock precludes significant acceleration of the studies. Currently, the single heater test in the Exploration Study Facility and the large block test will provide thermal input before the DOE's Viability Assessment (VA), but these tests will not give the bulk properties of Yucca Mountain. The plan is to obtain these properties from the drift scale thermal tests, but data from this test will not be available in time for the VA decisions. Furthermore, it is unclear how the results of these tests will be used to evaluate alternative models for describing thermally induced phenomena in highly fractured rock. The NRC should consider how these data limitations will affect their response to the DOE's VA.

II. Specific

(1) The Committee concurs with the emphasis placed by the NRC staff on the T-H coupled processes, but we note that in the CNWRA's assessment of the importance of post-closure processes, the combination of T-H processes on chemical processes is deemed most important. We agree with this conclusion because of the potential effect on release, transport, and retardation of radionuclides. However, we note only limited, albeit important, attention directed to the chemical portion of the coupled processes equation. Studies are largely limited to model and code development using simplified matrix mineralogy (chemistry). We believe greater attention is warranted on near-field, contaminant-related chemistry, for example, the effect of temperature on the chemistry of glasses, of sorption of radionuclides by zeolites and other minerals, of redox changes, and so on. We encourage scoping studies to determine the potential impact of temperature and hydrology on chemistry as this will affect NRC decisions that have to be made in the near term related to the VA. For example, mineral precipitation and dissolution may profoundly alter the rock permeability in the near-field region. The required thermodynamic data at elevated temperatures currently are inadequately known and the effects of such attributes as grain size and fracture filling on chemical reactions need clarification.

(2) The NRC and the CNWRA note potential shortcomings in the Equivalent Continuum Model (ECM), which is the current focus of T-H studies. Of critical concern is the effectiveness of the ECM in predicting flow through fractured rock and the possible development of the "heat pipe" associated with the thermal pulse caused by the decaying HLW. The DOE Peer Review Team on Thermohydrologic Testing and Modeling also identifies potential shortcomings. The Executive Summary of the DOE

report states that the ECM quantitative predictions, particularly where they impact design of the underground structures, should be accepted with a great deal of caution. The Executive Summary also states the following:

> The main computational codes. . .have undergone extensive development and verification. The next step in their use, however, should involve investigations, primarily in underground tests, where the efficacy of ECM can be carefully examined. Given the apparent limitations of the ECM, further application of these models would appear to be inappropriate without such confirmation.

We encourage the CNWRA to expand its studies of T-H to include testing the ECM models and codes through studies of current and ancient geothermal regions. These geologic analogs, at a minimum, should identify the effects and relative importance of the principal processes.

(3) We encourage studies of T-H-C processes between the repository and the location of the critical group. We understand that a study has been initiated at the CNWRA to study hydrological chemical (H-C) effects in the Calico Hills formation, which is rich in cation exchange minerals. We believe this and related studies are warranted. The staff needs to be aware of nonreversible processes in the near field, such as thermal effects on permeability, and their impact upon far-field processes.

(4) The program to study the effect of natural disruptive processes, for example, igneous activity, was not the subject of our current review. Nonetheless, we were pleased to learn that the study of the effect of natural disruption of the repository is included in future plans for coupled processes investigations by the NRC.

(5) We believe it is important to conduct scoping studies to aid in the assessment of the potential effects from coupled processes that are not deemed important on the basis of literature review. Specifically, we suggest that scoping calculations be performed to address the concerns regarding "indirect flow" processes or "Onsager processes."

(6) We believe the mechanical aspects of the T-H-M-C processes are less problematic than the other components, and, thus, at this time, related studies can be minimized or eliminated.

III. Related Issues

(1) Our original concerns about the investigation of coupled processes in the "vertical-slice" approach to key issues during the prelicensing studies by NRC were focused on the integration among the various processes. We are pleased that the NRC management has proceeded beyond the KTI dealing with Total Systems Performance Assessment and Integration by developing a management integration task force. We congratulate the staff on this action, which goes a long way toward alleviating our concern. This "top-down" approach has many advantages.

Nonetheless, we encourage the staff at all levels to be sensitive to the need to communicate across discipline and KTI boundaries and thus to implement integration meaningfully and in a timely manner. In addition, we encourage management to continue support of the Integration Task Force in the important studies leading to decisions at the time DOE completes its VA process and in the years beyond the VA in the prelicensing and licensing periods.

(2) We have referred to many of the coupled processes investigations as "data starved." Resource limitations mandate limited opportunity for experimentation and field studies, and, thus, this lack of data is likely to remain unremedied, without special efforts on the part of management. We believe joint programs with other nations that have parallel interests are a worthwhile investment. In addition, every effort must be made to apply the considerable data collected by DOE and its contractors to the NRC programs. Furthermore, we suggest that important data on critical coupled processes problems exist in peer-reviewed journals and industrial and government literature. Management should work toward developing a climate that fosters using these low-cost data in the NRC program.

(3) The Staff is encouraged to be sensitive to the developing DOE strategy for waste emplacement in the repository so that the potential effects on thermal loading are included in scoping and sensitivity studies as part of the coupled processes program. Because of limited thermal testing at the time of the VA, the NRC should evaluate the impact of these studies at that time and develop strategies for minimizing their impact. Limitations imposed by an incomplete understanding of thermal properties and processes because of restricted in situ testing even in the post-VA period remains a possibility that needs to be considered by the NRC.

We believe the NRC staff has a strong program to examine the importance of coupled processes and trust that these suggestions will be helpful in further focusing the program.

Sincerely,

/s/

Paul W. Pomeroy
Chairman, ACNW

November 20, 1996

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

Dear Chairman Jackson:

SUBJECT: SCREENING METHODOLOGY FOR ASSESSING PRIOR LAND BURIALS OF RADIOACTIVE WASTE AUTHORIZED UNDER FORMER 10 CFR 20.304 AND 20.302

During its 87th meeting, October 22-23, 1996, the Advisory Committee on Nuclear Waste (ACNW) reviewed staff plans relevant to the decommissioning of sites in which radioactive waste had been buried as authorized under former 10 CFR 20.304 and 20.302. In addition to receiving information on the history and background leading to the development of the screening criteria to be promulgated in a branch technical position (BTP), the ACNW was briefed on related agency rules and information notices. The BTP, which was not available for ACNW review during its 87th meeting, will be finalized when more directly related field experience is obtained and public and licensee comments are evaluated.

These screening criteria are directed at potentially hundreds of onsite, non-reactor burial locations that will require an evaluation or screening process to determine if further remediation is required. The NRC staff has prepared a simple, conservative three-step method to evaluate the risk from these burial sites:

1. review burial records,

2. estimate the dose from ingestion of the total inventory in groundwater (a conservative approach), or

3. estimate the dose to a resident farmer from all pathways.

If the estimated dose from Step 2 or Step 3 is less than 100 mrem/yr, no further site work is required, and the site can be released for unrestricted use. The ACNW agrees with the NRC staff approach.

The ACNW offers the following comments and recommendations:

1. The NRC staff does have a responsibility to assure itself through independent audits and reviews that the risks are reasonably assessed. These reviews are especially important where, for example, the burials may include greater than anticipated inventories of uranium; disposed wastes that contain isotopes, such as chlorine-36, which at the time of disposal were not perceived to be a significant problem; the location

and distribution of wastes are imprecisely recorded (or, in some instances, unrecorded).

2. In those situations requiring review and approval of the NRC staff prior to final site decommissioning, the staff must be certain that the risks and contributors to the risks are understood, and should not rely only on an assessment of how the input parameters were either measured or calculated.

3. We concur with the staff's position that licensees not be allowed to use Step 3 of the BTP screening process for isotopes with atomic numbers of 88 or higher due to the lack of confidence in the dose equivalent factors in the current version of NUREG-1500, "Working Draft Regulatory Guide on Release Criteria for Decommissioning: NRC Staff's Draft for Comment," August 1994.

The ACNW recognizes the benefit in providing a simple, relatively straightforward approach to resolving the problems extant from these past burials. We note that this issue might provide the Commission with an opportunity to advance its risk-informed, performance-based decision-making process. The ACNW anticipates further discussions on this specific issue with the NRC staff as the staff completes its evaluation of public comments and gains applicable field experience. Further, the ACNW intends to explore the compatibility of various screening criteria and methodology currently used by the NRC in the decommissioning process.

Sincerely

/s/

Paul W. Pomeroy
Chairman, ACNW

Reference:

Draft Branch Technical Position, "Screening Methodology for Assessing Prior Land Burials of Radioactive Waste Authorized Under Former 10 CFR 20.304 and 20.302," October 1996.

November 20, 1996

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

Dear Chairman Jackson:

SUBJECT: 1997 PRIORITY ISSUES FOR THE ADVISORY COMMITTEE ON NUCLEAR WASTE

CRITERIA FOR PRIORITIZATION

The Advisory Committee on Nuclear Waste (ACNW) has adopted and implemented criteria for assigning priorities to issues it will consider. Priorities are assigned and updated annually on the basis of the criteria presented below. Of course, priorities are subject to change at any time on the basis of the needs of the Commission and developing events.

The overarching criterion for assigning priorities to issues is the protection of the public, workers, and the environment from any adverse effects of the management of nuclear waste, especially in regard to disposal facilities.

Other criteria applied in the prioritization process are listed below:

- **NRC's strategic plan, including trends and directions in regulatory practice, such as the adoption of a risk-informed, performance-based method of regulation and decision-making**

  This criterion for establishing priorities includes the consideration of the Commission's own thinking and judgment concerning nuclear waste issues. In particular, it includes a clear understanding of the Commission's view of what the priorities are. However, the ACNW does not restrict the issues to only those of immediate concern to the Commission.

- **The strategy and activities of licensees and applicants**

  Special emphasis should be placed on the Department of Energy's (DOE's) licensing strategy and activities, including the program plan, the site characterization program, and the performance assessment for the proposed Yucca Mountain repository. The idea is that priorities are dependent not only on the regulatory process but also on the intentions of the licensee and applicant.

- **The scientific and technical basis of information supporting the safety and performance assessments of nuclear waste disposal facilities, including the quality and level of technical expertise involved**

The importance of an issue is clearly dependent on the quality of the supporting information, such as basic data, and the analyses performed.

- **The timeliness of the advice provided by the ACNW with respect to effective decision-making in the regulatory process**

  The licensing process involves the systematic and incremental development of information. Timely regulatory decision-making depends strongly on an effective match of information development and regulatory involvement.

The application of these criteria has resulted in the following priority issues, not listed in order of importance. It should be pointed out that not all of these issues will be considered. In the final analysis, current events will determine the course of our reviews.

PRIORITY ISSUES

1. Regulatory Framework

   The ACNW will continue to focus on the framework for high-level waste disposal. Environmental Protection Agency (EPA) standards (40 CFR Part 197) and NRC's conforming regulations are scheduled for development. The ACNW will monitor the interaction between the EPA staff and the NRC staff as they consider these standards and regulations. In 1997 DOE will provide for agency and public comment, their HLW siting regulation (10 CFR Part 960). The ACNW will review and comment on the DOE document. Subissues under this topic are the following: regulatory time of compliance, consideration of the critical group and reference biosphere, and whether consideration should be given to risk discounting as an element of a standard. We will consider the defense-in-depth philosophy, the use of subsystem requirements, and the treatment of uncertainty.

2. Waste Isolation Strategy

The ACNW will monitor and comment on DOE's final Waste Isolation Strategy and the NRC staff's response to this document, once these become available. The Waste Isolation Strategy document is expected toward the end of 1996 from the DOE. This issue will focus on the source term and will consider container design. As part of this review, we will examine the NRC staff's Key Technical Issues (KTI) effort and its interface with the DOE's Waste Isolation Strategy.

3. Viability Assessment and Site Characterization

The DOE is scheduled to complete the viability assessment (VA) of the Yucca Mountain repository site in 1998. The principal objective of the VA is to address the major unresolved technical questions and the technical and economic feasibility of constructing and operating a geologic repository at the Yucca Mountain site. The ACNW will review DOE's conclusions and the NRC staff's review of the VA. The ACNW will also be able to determine if the KTI process (the basis of the staff's review effort) will produce sound regulatory decisions. The ACNW will provide advice to the Commission and guidance to the staff on site characterization and analysis activities related to DOE's studies and NRC's KTIs.

4. Repository Design

The ACNW will continue to focus its attention on the repository design, including thermal loading issues. Additional details of the design will be developed as part of the viability assessment determination, but will not be finalized. The ACNW has unresolved concerns on coupled thermal-hydrological-mechanical-chemical processes and will continue to evaluate progress in this area. Other design elements that could affect the overall behavior of the repository, due to their effects on overall system chemistry, are concrete tunnel liners and iron from steel sets and fuel canisters. The ACNW will evaluate the adequacy of models that have been developed to predict repository behavior. Issues such as retrievability and canister design would be considered under this topic. The ACNW will examine the proposed location of the repository within Yucca Mountain and the impact that the repository "foot print" will have on the facility design.

5. Low-Level Radioactive Waste (LLW) Disposal

In December 1995, the ACNW commented on SECY-95-201 in which the NRC staff listed three options for NRC's LLW program (eliminate, reduce, or keep the status quo). In July 1996, the ACNW produced a report titled "Elements of an Adequate LLW Program," which suggested that, as a minimum, the current program be retained. Our advice is consistent with the Commission's preliminary preferred option in Direction Setting Issue Paper 5. Agreement State programs and the progress of compacts and individual States in developing new disposal facilities remain an issue with ACNW. We remain concerned about the final disposal strategy for

mixed wastes and will continue to monitor developments. The ACNW will continue its review of an NRC staff Branch Technical Position on Low-Level Waste (LLW) Performance Assessment and the related time of regulatory compliance associated with LLW disposal.

6. Decommissioning

The ACNW continues to have a strong interest in waste disposal issues related to decommissioning. In the past, the ACNW has advised the Commission on streamlining the Site Decommissioning Management Plan (SDMP) and on the lessons learned from decommissioning the Pathfinder power plant. The ACNW anticipates commenting further on the use of performance assessment in determining priorities for cleanup in SDMP sites. We have several concerns in this area, including residual levels of contamination, mixed waste, greater-than-Class C waste, and consistency of screening criteria and methodology.

7. Expert Judgment in Regulatory Decision Making

The ACNW issued a report in August 1996 on the NRC's Branch Technical Position (BTP) on Expert Elicitation in the High-Level Radioactive Waste Program. In its advice on the BTP, the ACNW identified four areas of concern: (1) the selection of subject matter experts and participation of the experts in refining the problem definition, (2) aggregation of the results, (3) interpretation of the results, and (4) application of expert elicitation. The ACNW will continue to monitor the application of the BTP to specific expert elicitations being conducted by DOE and on the generic applications of the BTP guidance.

8. Risk-Informed and Performance-Based Regulation

The ACNW expects to support an effort designed to help move the agency from deterministic regulations toward risk-informed and performance-based regulation. The goal is to link adequate assurance of safety more closely with the regulations. Our effort will consider practices in other nations that are implementing risk-informed and performance-based regulations. Efforts toward risk harmonization with the EPA will be considered.

9. Performance Assessment (PA)

The ACNW will continue to monitor DOE's total system performance assessment (TSPA) and review the staff's Iterative Performance Assessment Program including NRC's audit review of TSPA. We will continue to consider whether PA is being used to its full advantage in prioritizing issues. The ACNW will investigate the treatment of uncertainty in the use of bounding analyses. Uncertainty analyses are important in determining the adequacy of site characterization and abstracting geologic information for PA models. The ACNW will continue to monitor progress in these areas, and will comment on the advisability of the NRC staff producing a separate guidance document on the treatment of uncertainty.

10. Uranium Mill Tailings

The ACNW will review NRC regulations pertaining to uranium mill tailings. Considerations will include a determination of the risk and practical remediation methods such as the stabilization of tailings piles and groundwater protection monitoring in the vicinity of the tailings pile, as well as radon emissions control. We are interested in the impact on NRC regulations of (1) the current Congressional requirement for perpetual government custody of tailings sites and (2) the EPA standards for the cleanup of uranium and thorium mill sites after permanent closure.

11. Interim Surface Storage Facilities for Spent Fuel

The ACNW will address NRC concerns with a central interim HLW storage facility. We will identify issues that need consideration in surface HLW facilities, including handling operations, cask requirements, comparative risk of various options, and alternatives to dry storage.

We look forward to discussing this 1997 list of priority issues with you and the other Commissioners in the near future. We would welcome any comments and suggestions regarding additions, deletions, or changes in emphasis that you might wish to make.

Sincerely,

/s/

Paul W. Pomeroy
Chairman, ACNW