NUREG-1423
Volume 11

A Compilation of
Reports of

The Advisory Committee on Nuclear Waste

July 2000 - June 2001

U. S. Nuclear Regulatory
Commission

September 2001

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ABSTRACT

This compilation contains 18 reports issued by the Advisory Committee on Nuclear Waste (ACNW) during the Thirteenth year of its operation. The reports were submitted to the Chairman and Commissioners of the U. S. Nuclear Regulatory Commission (NRC). All reports prepared by the Committee have been made available to the public through the NRC Public Document Room, or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS) which is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room); the U. S. Library of Congress, and the Committee's Web site at http://www.nrc.gov/ACRSACNW.

PREFACE

The enclosed reports are the recommendations and comments of the U. S. Nuclear Regulatory Commission's Advisory Committee on Nuclear Waste during the period between July 1, 2000 and June 30, 2001. NUREG-1423 is published annually. Volumes 1 through 10 contain the Committee's recommendations and comments from July 1, 1988 through June 30, 2000.

ACNW MEMBERSHIP (JULY 1, 2000 - JUNE 30, 2001)

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

August 2, 2000

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Meserve:

Subject: BRANCH TECHNICAL POSITION ON A PERFORMANCE ASSESSMENT METHODOLOGY FOR LOW-LEVEL RADIOACTIVE WASTE DISPOSAL FACILITIES

At the 119th meeting of the Advisory Committee on Nuclear Waste (ACNW), June 13-15, 2000, the NRC staff presented a summary of the final draft of NUREG-1573, "Branch Technical Position (BTP) on a Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities." The ACNW supports the general effort to prepare a document that presents a rigorous and consistent method for performance assessment. We commend the staff for the work and thought that went into this document. The NRC is a leader in the development of risk-informed, performance-based (RIPB) regulatory approaches. We believe that the BTP is a valuable document that continues this tradition of leadership, identifies significant technical and policy issues in performance assessment modeling, and advances RIPB methods and approaches to help resolve these issues. The ACNW does have some concerns about the document, however, and we present these below.

We were disappointed to learn that the document was now scheduled to be released as a "NUREG" and not as a "BTP." We interpret this decision as a lack of confidence by the staff in the position expressed. We also think that the value of the document would be diminished if it is issued as a NUREG. The ACNW knows that there are currently no licenses for low-level waste (LLW) facilities pending and that the NRC involvement in LLW is minimal. There is no guarantee that this minimal involvement will continue indefinitely, however. Thus, we believe that care should be taken to provide a sound RIPB foundation for any future activity. We think that the staff should state its position and stand by it.

Recommendation

The document should be issued as a Branch Technical Position.

We have several comments on the material contained in the document. We have focused on a few key areas and have not included an analysis of public comments and responses. We note, however, that these same issues are also raised in many of the public comments. Most of our comments address the notion that the BTP should reflect current knowledge about probabilistic performance assessment within the

regulatory framework. That is, we believe that the BTP should indicate the position of the staff on performance assessment given current knowledge.[1]

1. In the document, the NRC staff indicates that either a deterministic or a probabilistic analysis is acceptable. In fact, the statement in footnote 3 – that the staff does not recommend a probabilistic, scenario-driven approach – is antithetical to accepted practices of risk analysis. Although the Committee realizes that there may be situations in which it is possible to bound the risk clearly and convincingly, as a matter of principle a risk-informed finding requires a risk assessment, however simple or complex it may be. Of course, a risk assessment does not have to be any more complicated than is warranted. We concur with the staff's recommendation of an iterative approach, starting with simple models and becoming complex only as needed. The Committee prefers that simplicity be achieved in the scope of the risk assessment rather than by a substitute analysis that is not risk informed.

   Recommendation

   The staff should indicate in the Branch Technical Position that a risk assessment is the acceptable method of safety analysis the scope of which should be commensurate with the complexity of the facility.

2. The staff recommends the use of conservative assumptions and ranges of parameters that could effectively bound the reference geologic setting for the site. The ACNW does not agree with this approach in the context of a probabilistic risk assessment. A performance assessment should aim to display the best information available, including uncertainties, about how the system will perform. Conservatism should enter at the point of deciding what it means to "meet the standard."

   Recommendation

   The staff should provide guidance to the applicant to use realistic ranges and distributions of parameter values and conceptual models when conducting risk analyses.

3. For a probabilistic analysis, the staff recommends that the dose standard be evaluated by requiring that the peak of the mean doses (the mean taken across multiple realizations of the model with randomly sampled parameters) be less than 25 mrem and that the 95th percentile be less than 100 mrem. Although this approach aims to incorporate uncertainty in the evaluation, it disregards all information about the distribution of the results except the mean and 95th

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[1] The BTP has been in production for a long time, mainly because of limitations on staff time to devote to the effort. Our technical understanding and the policy framework have evolved since 1995, however, and the document should be edited to reflect this fact. For example, the literature cited is deficient in post-1995 references.

percentile. A more satisfactory approach is to use the complementary cumulative distribution function (CCDF). This distribution, when presented as a family of percentile curves, shows all aspects of the uncertainty and is extremely useful for deciding how to employ conservatism into regulating exposures. For example, the standard could be set by requiring that there be less than 1 chance in 10, or 1 chance in 100, or 1 chance in 1,000 that the dose will exceed 25 mrem over the compliance period.

Recommendation

The staff should consider recommending a complementary cumulative distribution function approach to treating uncertainty in a probabilistic interpretation of the dose standard.

4. The draft NUREG-1573 suggests that a 500-year lifetime for engineered barriers may be appropriate. The ACNW previously questioned this particular issue in a letter dated June 28, 1995, and still thinks that 500 years is too prescriptive. An RIPB approach would allow a license applicant to establish a case for whatever lifetime was defensible and place the responsibility of evaluating the claim on the NRC.[2] An implied requirement for any specific lifetime is inconsistent with existing and draft regulations for high-level waste.

Recommendation

The staff should consider eliminating the suggestion of a 500-year engineered barrier lifetime.

Finally, we understand that one of the points of greatest contention about the draft position is the 10,000-year time of compliance. We understand the reasons for choosing a fixed time for evaluation. We also appreciate that a time frame longer than several hundred years may be needed in cases in which LLW contains significant quantities of uranium, plutonium, and other long-lived isotopes. One possible resolution to arguments about whether the time frame should be 500 years or 10,000 years would be to make the decision on a case-by-case basis. In a letter from the ACNW to the Commission dated February 11, 1997, the Committee advocated the use of a time frame for compliance based on a calculation of time to peak dose. The staff may want to reconsider the Committee's advice on a time frame for compliance offered in the February 11 letter.

Sincerely,

B. John Garrick
Chairman

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[2] The document allows for a license applicant to use a different lifetime with a credible analysis. If this is to be the intent of the staff's position, however, why have the 500-year specification at all?

References:

1. ACNW letter dated February 11, 1997, from Paul W. Pomeroy, Chairman, to Shirley Ann Jackson, Chairman, NRC, Subject: Time of Compliance for Low-Level Nuclear Waste Disposal Facilities.
2. ACNW letter dated June 28, 1995, from Martin J. Steindler, Chairman, to Ivan Selin, Chairman, NRC, Subject: Regulatory Issues in Low-Level Radioactive Waste Performance Assessment.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

August 2, 2000

Dr. William D. Travers
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Dr. Travers:

SUBJECT: ADVISORY COMMITTEE ON NUCLEAR WASTE 2000 ACTION PLAN

This memorandum responds to the questions and suggestions in your response to the ACNW 2000 Action Plan (see references). Thank you for your response and attention to the Committee's annual planning document. We are pleased to hear that our priorities are consistent with those of the staff. This result can be attributed to effective communications between the Committee, its staff, and the NRC staff. We address each comment in the same order as your response.

Under First-Tier Priority Issue 2, "Risk-Informed, Performance-Based Regulatory Framework," the staff suggests a number of areas in which ACNW review will be beneficial. These topics are being addressed by the Joint ACRS/ACNW Subcommittee. The ACNW had the lead in providing advice to the Commission following the subcommittee meeting on May 4, 2000. Specific topics addressed by the Subcommittee included risk-informed fuel cycle programs, integrated safety assessments, byproduct risk analysis, dry cask storage risk analysis, and the results of a public workshop on the use of risk information in regulating the use of nuclear materials. The Committee heard an introduction to the staff's plans on training initiatives and will comment on the development of safety goals and guiding principles. Comments based on the Joint Subcommittee review are contained in an ACNW letter, "Development of Risk-Informed Regulation in the Office of Nuclear Material Safety and Safeguards," dated July 27, 2000.

Under First-Tier Priority Issue 3, "Decommissioning," the ACNW is currently planning to hold a working group meeting next year. Those issues suggested in your comment letter – institutional control, partial site releases, and restricted release for material and reactor licensees – will be candidates for Committee review, subject to resource availability. We are aware of the relevant staff activities associated with these issues. In mentioning residual contamination issues, the Committee had in mind restricted site release criteria. The Committee will continue to focus its reviews to ensure that an appropriate risk-informed and performance-based philosophy is being implemented. The Committee will bring a risk informed and performance based perspective to its review of future revisions of the Decommissioning Standard Review Plan. We understand the term "clearance" has been replaced by the "control of solid materials."

Under First-Tier Priority Issue 5, "Transportation," the ACNW again expects to focus its attention through a working group meeting in the future. To the extent time and resources

allow, the Committee will monitor public interactions on the Package Performance Study (PPS) and Part 71 compatibility rulemaking. We look forward to receiving the PPS Issues and Resolution Options Report, which will focus public interactions on spent fuel transportation risks, and the Part 71 Issues Paper. These topics will become candidates for discussion during that future working group session.

Regarding Second-Tier Priority Issue 2, "Low-level Radioactive Waste and Agreement States Program," the Committee has reviewed NUREG-1573 and provided comments in our report of August 2, 2000, "Branch Technical Position on a Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities." The ACNW will consider reviewing the results of the two NRC/Environmental Protection Agency mixed-waste rulemakings. Specifically, ACNW will examine the NRC rule that results from this effort and decide whether to review it in detail. During its 119th meeting on June 13-15, 2000, the Committee heard a presentation by the staff on the status of the NRC's LLW program, including a discussion of options for disposal under 10 CFR Part 61. The Committee will review such LLW disposal related issues as time, resources, and future developments warrant, consistent with public health and safety considerations.

The ACNW will continue to interact with industry groups when they can make a contribution to the Committee's deliberations. As in the past, the Committee will remain a forum for stakeholder participation.

We noted your observations on our goals and objectives and will consider these suggestions in the next revision of our Action Plan.

Finally, the ACNW performs a self-assessment to measure the impact of its advice. The Committee looks for evidence that its advice has had a positive effect on how the NRC regulates. As part of this self-assessment, the Committee's staff has conducted surveys to ascertain how stakeholders perceive the value of ACNW advice. Stakeholders are defined in the broadest sense and include both internal and external parties.

Even though the Committee's advice is sought in many areas, the ACNW must be judicious in deciding which review topics to consider. Those areas outlined in the Action Plan, as modified by Commission requests, properly represent the Committee's best judgment of the reviews for the next year to year and a half.

Again, thank you for your comments on the ACNW's 2000 Action Plan.

Sincerely,

B. John Garrick
Chairman

References:

1. Letter dated June 1, 2000, from William D. Travers, Executive Director for Operations, NRC, to B. John Garrick, Chairman, ACNW, Subject: Advisory Committee on Nuclear Waste 2000 Action Plan.
2. Letter dated April 18, 2000, from B. John Garrick, ACNW, to Richard A. Meserve, Chairman, NRC, Subject: Advisory Committee on Nuclear Waste 2000 Action Plan and Priority Issues.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

August 18, 2000

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Meserve:

SUBJECT: ACNW VISITS TO NUCLEAR SITES AND INFORMATION EXCHANGES IN THE UNITED KINGDOM AND FRANCE, MAY 15-19, 2000

During the week of May 15–19, 2000, the Advisory Committee on Nuclear Waste (ACNW) visited nuclear waste management sites and attended information exchanges in the United Kingdom (UK) and France. This letter discusses some of our key observations that are relevant to issues of interest to the Commission, such as the critical role of clearing materials resulting from facility decommissioning activities, stakeholder involvement in repository siting, risk-informed regulation, and the management and disposal of low-level radioactive waste.

Background

On May 15, 2000, in the UK, the Committee visited decommissioning sites and waste processing facilities at Sellafield and the low-level waste (LLW) disposal facility at Drigg, Cumbria, which are operated by British Nuclear Fuels, Ltd. (BNFL). The Committee also met with the leader of the Cumbria County Council[1] and the Council's Environmental Planning Manager. On May 16 and 17, 2000, the Committee participated in a technical information exchange hosted by the UK Environment Agency in London with representatives of a variety of regulatory agencies, licensees, developers, and oversight groups.[2] On May 18, 2000, in France, the Committee participated in an all-day technical information exchange at the Paris headquarters of the National Radioactive Waste Management Agency (ANDRA)[3] with a variety of participants.[4] On May 19, 2000, the Committee visited the ANDRA-operated Centré de l'Aube LLW disposal facility and the site of the future high-level waste (HLW) underground research laboratory (URL) at Bure, Haute-Marne. Attached is a list of the handouts received during the May 15-20, 2000, foreign trip to the UK and France, which are available upon request..

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1 The Council Leader is also chairman of the Sellafield Liaison Committee.

2 Participants included representatives from the UK Environmental Agency; the UK Department of Transport and the Regions; the UK Department of Trade and Industry; the UK Health and Safety Executive; the UK Atomic Energy Agency; the Scottish Environmental Protection Agency; UK NIREX, Ltd.; The Royal Society; the Radioactive Waste Management Advisory Committee; and the Parliamentary Office of Science and Technology.

3 ANDRA is a quasi-governmental agency responsible for radioactive waste disposal programs in France. Decommissioning of nuclear power plants is not included in its scope.

4 Participants included representatives from the Nuclear Installations Safety Directorate, the chief of decommissioning for Electricité de France (EdF), and researchers from the Institute National de Recherche en Informatique et en Automatique and the Université St. Etienne.

Observations on Decommissioning

In both the UK and France, an integrated approach to decommissioning includes the clearance of material that meets certain limits for either disposal in conventional waste disposal facilities or unrestricted use. To facilitate their decommissioning activities, both countries have developed a category of radioactive waste called very low-level waste (VLLW) that is not required to be disposed of in LLW sites.

The UK allows the practice of freely releasing decontaminated material that was slightly and surficially contaminated after it has passed a series of tests and specifications to show that it meets the release criteria. At Sellafield, the Committee members toured decommissioning activities at the "Windscale Piles." Concrete "rubble" is broken up into a small aggregate size to facilitate monitoring for radioactivity. Material that meets specified limits is "released" and used as fill for repairing roads on BNFL property. Metal materials are bead blasted to provide assurance that the pieces are free of contamination and meet release requirements. Components that have features that could potentially mask contamination (such as riveted pieces) are segregated out and are not released.

In France, EdF is following the three-stage International Atomic Energy Agency process for nine shutdown reactor sites. The EdF current strategy is to decommission all nine reactors within 20-25 years to a green field state. France is currently developing methodologies and requirements to differentiate large volumes of reactor decommissioning waste into LLW, VLLW, and non-radioactive material. Waste in the latter two categories would go to conventional disposal sites or be cleared for unrestricted use, respectively.

Recommendations

- The NRC should consider development of regulatory classifications that clearly differentiate between LLW, VLLW, and non-radioactive waste.

- The UK method of rubblizing concrete to an aggregate of small pieces seems to solve the problem of how to monitor the interior of concrete. We suggest that the NRC consider this process as a method of demonstrating compliance with a radiation standard.

- In the UK, the unrestricted use of surficially decontaminated solid metal pieces is only allowed for objects with external surfaces that can be readily monitored. Complex shapes are reduced to simple shapes for ease of monitoring. We suggest that the NRC consider this process as a method of demonstrating compliance with surficial contamination limits.

Observations on Repository Facility Siting

Quasi-governmental agencies in both countries have responsibilities for waste management and repository development: NIREX[5] in the UK and ANDRA in France.

In the UK, the intermediate-level waste (ILW)[6] repository siting program is on hold. Stakeholder issues played a significant role in the Cumbria County Council's rejection of the proposed rock characterization facility (RCF) at Sellafield to study potential host rock for an ILW repository.[7] Although the Cumbria County Council is generally supportive of Sellafield operations, the Council expressed a number of technical and policy concerns about the RCF. There was also a need, we were told, for the presentation of technical material in a format that can be understood by the public. In our meetings in London, it was noted that there were problems with understanding the decisionmaking process followed by NIREX, and also there was a need to define processes and the roles of stakeholders. Currently, long-term storage (25-50 years) is envisioned for vitrified HLW and grouted ILW in the UK. The national policy on radioactive waste management and disposal is being re-evaluated.

France operates an integrated program for nuclear waste management set up under a law that emphasizes research and specifies processes, organizational responsibilities, and schedules. Early active involvement and agreement of stakeholders, with specific emphasis on local governments and communities, are mandated as an integral part of France's waste program. The law clearly defines the composition and roles of committees and the processes to be followed. The act requires openness in conducting the research program, including consultations (with the communities) before site selection, creation of a National Reviewing Board and a Public Interest Grouping to manage supporting measures, and establishment of Local Information Committees. Starting from 30 potential sites, ANDRA identified three candidate URL sites (two granite, one clay). Currently, work on the clay site is proceeding and the two granite sites have been rejected. ANDRA is looking for a new granite site.

In both countries, the ACNW noticed a significant openness in both the government and licensee interactions with the public, principally via elected public representatives such as local councils. They also make extensive use of public tours to communicate with the public. The result seems to be a long-term relationship from which trust and confidence can develop.

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5 UK NIREX, Ltd., was originally founded as the "Nuclear Industry Radioactive Waste Executive."

6 ILW in the UK is defined as non-heat-generating radioactive waste that exceeds 12 GBq/tonne ($\beta\gamma$) and/or 4 GBq/tonne (α).

7 Technically, the RCF review was conducted as a planning application by NIREX to the Cumbria County Council, which is required under the UK Town and Country Planning Act of 1990. The adversarial style proceedings, however, delved into a variety of siting and safety issues that might normally be considered in a safety case review (or by a hearing board) in the U.S).

Recommendation

- The NRC should consider as part of its public outreach effort issuing a document that defines specific roles, activities, and opportunities for elected representatives and other stakeholders to participate in the regulatory process.

Observations on Risk-Informed Regulation

Probabilistic risk assessments (PRAs) are used extensively in the UK by both developers and regulators, whereas in France the use of PRAs is not generally accepted or required by regulatory policy. A significant concern expressed to us in both countries was the difficulty in communicating to the public highly technical reports and safety assessments. Despite differences in approach, both countries focus much effort on understanding the underlying features, events, and processes that contribute significantly to the safety case for a repository system. The regulatory frameworks in both countries invoke the ALARA (as low as reasonably achievable) concept and require some system of multiple barriers (natural and engineered) to isolate nuclear waste.

Risk assessments are conducted in the UK by licensees, applicants, and regulators using probabilistic approaches. These state-of-the-art approaches are similar in some ways to the risk-informed approaches being implemented by the NRC, but the criterion for postclosure compliance is a numerical measure of risk rather than dose.[8] Areas of continuing concern include the transparency of risk assessments, the level of confidence that can be attached to the level of risk, and approaches to broaden stakeholder participation in the risk assessment process.

Although there is some use of probabilistic information in risk and safety analyses in France, it is not used in a formalized fashion. The French regulations invoke dose limits as the criteria for compliance.[9] The safety demonstration, which takes into account both qualitative and quantitative analyses, is focused on understanding the system and identifying disruptive events. Performance assessments are deterministic and include both bounding and best estimate calculations. The ANDRA representatives believe that the public will not understand probabilistic approaches to performance assessment.

Recommendation

- The NRC should ensure that important technical points and key documents related to public concerns are presented clearly and concisely and are simplified so that stakeholders can appreciate the key issues, results, and uncertainties.

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8 In the UK, regulatory guidance specifies an individual risk "target" of 1×10^{-6} for post-institutional control. During institutional control, the dose limit to a representative member of the critical group is 0.3 mSv/yr (30 mrem) for a "source-related dose" and 0.5 mSv/yr (50 mrem) for a "site-related dose."

9 The French regulations limit doses to the public to 1 mSv/yr (100 mrem) for the "normal evolution" (of the repository), with .25 mSv/yr (25 mrem) constraint over the time scale of interest (10,000 yrs). Disruptive events (incidental or accidental scenarios) are considered on a case-by-case basis, according to the probability of the scenario. Doses to workers are limited to 100 mSv (10 rem) over 5 years with a maximum of 50 mSv (5 rem) in 1 year. Transportation worker doses are limited to 20 mSv/yr (2 rem).

Observations on LLW Disposal

Both the UK and France have operating LLW disposal facilities sized to deal with the anticipated wastes for the next 50 or so years. This situation is helping to establish a base of public confidence in waste management that may be carried over into the HLW disposal area.

At the Drigg site in the UK, the disposal methodology has evolved over time to the current system of concrete entombments. There is an ongoing development of a postclosure safety assessment with regulatory oversight by the Environment Agency. One of the aspects of the regulatory review is an issue resolution process similar to NRC's issues resolution approach.

France is operating a sophisticated LLW disposal facility at Centre de l'Aube. Although, by United States standards, what they are doing is more than is required for similar Class A[10] LLW, France has thereby moved toward gaining public confidence in its waste management program.

Finally, we observed at l'Aube the use of a color-coded[11] radiation hazard symbol rather than the "universal" magenta. The l'Aube employees seem to be more sensitive to the distinction. As a result, the signs seem more effective than the single color signs used in the United States.

Recommendation

- The color-coded "standard" radiation warning signs used in France seemed very effective, and we recommend that the NRC consider adopting such a system.

It is clear to the Committee that the UK and France have valuable experience in radioactive waste management for the NRC to consider. This experience relates to many of the Committee's tier one priorities on the regulation of nuclear wastes, including decommissioning, risk-informed practices, and public (and stakeholder) participation.

Sincerely,

B. John Garrick
Chairman

Attachment: List of Handouts Received During the May 15-20, 2000 ACNW Foreign Trip to the UK and France.

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10 10 CFR 61.55, "Waste Classification."

11 Green for suspect areas, yellow for very low levels, orange for intermediate levels, and red or magenta for high levels.

HANDOUTS RECEIVED DURING THE MAY 15-20, 2000 ACNW FOREIGN TRIP TO THE UK AND FRANCE

1. LA GESTION DES DÉCHETS RADIOACTIFS - CATALOGUE DES PUBLICATIONS

2. ETAT et LOCALISATION des - DECHETS RADIOACTIFS en FRANCE
   7eme EDITION 1999

3. LeCENTRE DE L'AUBE

4. CUMBRIA COUNTY COUNCIL - ECONOMY FORUM - 9TH JUNE 1999
   "A NUCLEAR FUTURE"
   BACKGROUND PAPER - THE STORY OF RADIOACTIVE WASTE MANAGEMENT IN THE UK - JOHN HETHERINGTON, ENVIRONMENTAL PLANNING MANAGER

5. COMMITTED TO BECOMING THE LEADING GLOBAL NUCLEAR COMPANY
   BNFL ANNUAL REPORT & ACCOUNTS 1999

6. RESPONSIBLE FOR SAFETY AND CARE FOR THE ENVIRONMENT - BNFL ENVIRONMENT, HEALTH & SAFETY REPORT 1998/99

7. BNFL - SELLAFIELD VISTORS INFORMATION - MAP

8. BRIEFING NOTES ON ASPECTS OF BNFL - NUCLEAR WASTE

9. BRIEFING NOTES ON ASPECTS OF BNFL - SELLAFIELD AND THE IRISH SEA

10. BRIEFING NOTES ON ASPECTS OF BNFL - REPROCESSING

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29. JOURNAL du CENTRE DE l'AUBE 8 SEPTEMBER 98 EXPOSITION - LES VITRAUX

30. CETTE FEUILLE DE PAPIER PERMANENT est conforme a la definition de la NF ISO 9706 de NOVEMBRE 1994:

31. CENTRE DE LA MANCHE DISPOSAL FACILITY

32. WHAT IS RADIOACTIVE WASTE, WHAT IS ANDRA

33. CENTRE DE l' AUBE - DISPOSAL FACILITY

34. WHERE, WHEN, HOW: THE PLACE OF RADIOACTIVE WASTE IN FRANCE. ACTIVITY REPORT 1998

35. PREPARING FOR WELL-INTEGRATED LABORATORIES - PREREQUISITE ADMINISTRATIVE PROCEDURES FOR THE IMPLEMENTATION OF THE ANDRA'S UNDERGROUND RESEARCH LABORATORIES

36. RESEARCH IN RADIOACTIVE WASTE MANAGEMENT - LAW OF DECEMBER 30, 1991

37. UNDERGROUND RESEARCH LABORATORY - STATE OF KNOWLEDGE AND EXPERIMENTAL PROGRAM

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

November 1, 2000

The Honorable Richard A. Meserve
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Meserve:

SUBJECT: COMMENTS ON NRC DRAFT POLICY STATEMENT ON DECOMMISSIONING CRITERIA FOR THE WEST VALLEY DEMONSTRATION PROJECT AND WEST VALLEY SITE

During its 122nd meeting held October 17-19, 2000, the Advisory Committee on Nuclear Waste (ACNW) heard presentations from representatives of the NRC staff and of the West Valley Demonstration Project (WVDP). These presentations were also video teleconferenced with stakeholders and representatives of WVDP in New York.

The West Valley Site is unusually, perhaps uniquely, complex. While Department of Energy (DOE) sites such as Hanford and Savannah River have similar technical cleanup problems, they contain no major NRC-licensed facilities and do not have such divided regulatory responsibilities as does the WVDP.

The December 3, 1999 Decommissioning Criteria for the West Valley Demonstration Project and West Valley Site specifies that the License Termination Rule (LTR) be used as the criterion for the decommissioning of the WVDP. The Committee has not had the opportunity to review the revised final Draft Policy Statement. The Committee has reservations about whether the LTR is flexible enough for application to a site like West Valley in a risk-informed, performance-based framework. We remain concerned that a risk-informed approach may be precluded. For example, is it safer to remove buried waste or leave it in place? If risks are substantially lowered by permitting some portion of the waste to remain in place with long-term site stewardship to assure safety, is the LTR flexible enough to allow this option? Although the LTR has an exemption process, it is not clear to us that this process can be used effectively at West Valley. It is also not clear to the Committee whether the time of compliance specified in the LTR is appropriate for this unusual case.

Our review of the Draft Policy Statement and the comments received also identified what the Committee believes is an overarching issue. A number of laws, including the WVDP Act (Public Law 96-368) appear to limit the regulatory responsibility of the NRC for the site without clearly identifying who has the responsibility. The Commission's role for this site appears to be less than that for other licensed facilities.

Clear lines of regulatory responsibility are important so that in spite of the complex nature of the site, public health and safety is assured. Public comments on the Draft Policy Statement make it clear that the limited role of the NRC at the site is neither understood nor accepted. This misunderstanding could lead to loss of public confidence in the NRC. Those who commented, both the public and the state agencies, expect the Commission to have its usual oversight role in protecting the health and safety of the public for the entire site. The lack of a clear assignment of responsibility for the site could be resolved by an agency such as the Environmental Protection Agency (EPA) or a regulatory agency of the State of New York assuming all responsibilities not clearly assigned to NRC. Another solution could be a Memorandum of Understanding (MOU) among DOE, NRC, EPA, New York State Energy Research and Development Authority, and the appropriate New York State regulatory agencies. A third solution could be a clarification by Congressional action.

Recommendation

We recommend that the Commission consider taking a leadership role in ensuring that the overall site safety is the basis for project termination. This could be accomplished by a request to Congress, by convening a meeting to develop an MOU or other means of clarifying the regulatory responsibilities.

Sincerely,

B. John Garrick
Chairman

Reference:
Federal Register Notice, "Decommissioning Criteria for the West Valley Demonstration Project (M-32) and West Valley Site; Draft Policy Statement and Notice of Public Meeting (64 FR 67952)," dated December 3, 1999.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

November 1, 2000

The Honorable Richard A. Meserve
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Meserve:

SUBJECT: ADVISORY COMMITTEE ON NUCLEAR WASTE —YUCCA MOUNTAIN STAKEHOLDERS MEETING

The Advisory Committee on Nuclear Waste (ACNW) hosted a public comment session during its 121st meeting on September 19, 2000, in Las Vegas, Nevada. The media covered this meeting. A major objective in holding this session was to continue our dialogue with stakeholders and get feedback on issues from the State, affected counties, Native American groups, and other Yucca Mountain project stakeholders. We use these sessions to develop ideas about how to improve effective public participation in and the public's understanding of the NRC's regulatory process.

The session was opened with a teleconference call from Nevada Congresswoman Shelley Berkley. In her comments, which are in the transcript, she discussed the presence of aquifers, the potential for volcanic and seismic activity, the hazards associated with transportation, and possible alternative sites outside Nevada. Congresswoman Berkley stated that the site will not qualify and further development should cease. Other speakers included representatives from the State of Nevada's Agency for Nuclear Projects, Nevada's Clark, Eureka, Nye, Mineral, and Lincoln counties, the Western Shoshone Tribe, the Nevada Nuclear Waste Task Force, and members of the public.

As in previous public meetings that we have held in Nevada, members of the public expressed a number of strong opinions (see Appendix for a sample of comments). Many of the issues noted in our report on our public meeting last year were raised again this year. These include socioeconomic impacts associated with the proposed repository, the transportation of spent fuel, and the need to involve the public throughout the site sufficiency review and licensing process. Among the other areas of concern are problems associated with communicating with the NRC. Criticism of the NRC web site was lodged. There is confusion about "which NRC" to talk to on high-level waste-related issues (the Yucca Mountain project, the licensing activities for the Private Fuel Storage (PFS) site in Utah, or transportation of high-level waste are each under different groups within the agency).

OBSERVATION One concern expressed at the meeting was that the NRC would rely on performance assessment to make a decision about the Yucca Mountain site, but results from these assessments are obscure. Considerable skepticism that the results from performance

assessment were valid was evident. The ACNW thinks that at least part of this skepticism is because the results from performance assessments presented thus far are not easily understood by the public and therefore not trusted.

RECOMMENDATION The Commission should ask the staff to evolve a strategy to convey in a clear and transparent way the role performance assessment will play in evaluating a license application. If a license application for Yucca Mountain is submitted, the staff should implement this strategy to inform the public about the role of performance assessment.

OBSERVATION The ACNW believes that public participation is an essential element of risk-informed, performance-based regulation. We think that our meetings with the public in Nevada are important. The stakeholders have expressed appreciation that ACNW and others from the NRC do hold meetings in Nevada. Stakeholders particularly noted their recent discussions with individual Commissioners and looked forward to further opportunities to explain their concerns and express their views and suggestions.

RECOMMENDATION The Commissioners should consider holding a Commission meeting in Nevada. The meeting would provide a forum for the State, counties, and other affected parties to bring their concerns directly to the Commission. The meeting might also be organized to have the ACNW and other technical groups make presentations to the Commission so that the stakeholders could observe Commission consideration of technical material.

Sincerely,

B. John Garrick
Chairman

APPENDIX

EXAMPLES OF PUBLIC COMMENTS

- There are alternatives to the disposition of waste in Nevada.
- The site has seismic and volcanic history; there must be a less active site.
- The rules (10 CFR Part 63, 10 CFR Part 963, 40 CFR 197) are being changed to accommodate the site. Use of existing regulations and standards would disqualify the site.
- Department of Energy's (DOE's) Performance Confirmation should be used to increase confidence in the reasonable assurance decision—not to provide data to make that determination.
- DOE is relying on ongoing site characterization throughout the licensing period. Question: Will the NRC be able to conduct a meaningful license application review?
- Since only about 10 percent of the total cost estimate has been expended thus far, should one consider stopping the project now in light of the uncertainties?
- The transportation part of the Draft Environmental Impact Statement is vague and incomplete.
- The only reason DOE is selecting a robust waste package is because the site will fail.
- Reliance on performance assessment is not acceptable. No one knows what can go wrong, the likelihood of something going wrong, or the consequences.
- The Treaty of 1863 (Ruby Valley) is still valid. The United States has no title to the land.
- Many people will die solely because of transportation accidents (not radiation effects).
- The Package Performance Study is flawed. What does NRC consider to be an acceptable transportation risk?
- The NRC web site is difficult to access.
- Inconsistencies exist in the Yucca Mountain references in the DEIS for the proposed Private Fuel Storage facility in Utah.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

December 6, 2000

The Honorable Richard A. Meserve
Chairman
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Meserve:

SUBJECT: ALLOY C-22 CORROSION STUDIES

During its 122nd meeting on October 18, 2000, the Advisory Committee on Nuclear Waste (ACNW) heard presentations on the corrosion resistance of the nickel-based alloy C-22 from consultants to Nevada.[1] The Committee also heard presentations from the Center for Nuclear Waste Regulatory Analyses (CNWRA) and from the Department of Energy (DOE) on their C-22 studies during the 123rd ACNW meeting on November 28, 2000, in San Antonio, Texas. The ACNW has previously reviewed and discussed NRC/CNWRA and DOE studies of the corrosion of C-22 in a June 10–11, 1998, working group meeting on the Near-field Environment and the Performance of Engineered Barriers at Yucca Mountain.

The longevity of waste packages is a key attribute of DOE's repository safety strategy. According to DOE's current calculations, the putative resistance of C-22 to corrosion will prevent any significant releases of radioisotopes from the waste package to the repository for more than 10,000 years. Thorough study of the alloy's potential degradation modes and corrosion resistance in the Yucca Mountain environment is obviously important to NRC's analyses of a license application for the site.

Conclusions and Recommendations

1. Preliminary experiments conducted by the State of Nevada consultants demonstrated that C-22 corrodes rapidly under extreme conditions. These conditions are not representative of those expected at Yucca Mountain.

2. Neither DOE nor NRC has yet thoroughly investigated the role of trace elements, such as mercury and lead, in the corrosion of C-22.

3. NRC and CNWRA staffs are identifying conditions in which the presence of trace elements could promote corrosion. They should verify that the absence of trace elements in previous work did not bias the conclusions about the susceptibility of C-22 to corrosion.

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[1] This project is part of Nevada's Oversight Assessment Program of the Engineered Barrier System for the proposed Yucca Mountain high-level waste repository.

4. NRC and CNWRA staffs should proceed with plans to evaluate the performance of C-22 under the full range of conditions that occur or may occur at Yucca Mountain. The ACNW believes that it is essential to understand the mechanisms of corrosion to allow extrapolation of performance over 10,000 years.

Background

A key concern of the Committee, expressed in a 1998 letter, is the need to bound the extreme environments that C-22 may encounter in Yucca Mountain over the long term [Reference1]. More recently the Committee commented on corrosion issues in a letter report on the Importance of Chemistry in the Near Field [Reference 2]. The ACNW noted that pit, crevice, and stress corrosion are still concerns. NRC needs to understand the mechanisms of these corrosion processes better before credit can be taken for the very long-term protection that DOE may postulate in its License Application (LA). The Committee recommended in the letter that the NRC staff continue collecting as much confirmatory data as possible on the corrosion rates and mechanisms over the range of expected conditions. The NRC staff agreed with these recommendations.

Issues from Nevada-Sponsored Research

The State's consultants presented research results of accelerated testing of C-22 corrosion in the presence of minor contaminants (e.g., lead and mercury) known or suspected to cause local corrosion, such as pitting and stress corrosion cracking (SCC). The research, which is being done by chemists and materials scientists from The Catholic University of America and Dominion Engineering, shows that C-22 experiences pitting corrosion and SCC under extreme conditions. One fundamental issue is whether these conditions can be extrapolated to conditions more representative of the waste packages in the repository environment.

Presentations by Geosciences Management Institute addressed the presence of mercury and lead in the geologic strata surrounding the proposed Yucca Mountain high-level waste (HLW) repository site. From the presentations it appears likely that both mercury and lead are present in low concentrations in the rock above the proposed repository. Both of these elements may also be found in the pore water and perched water of the unsaturated zone and in other ground water at the site. It is unknown whether these or other potentially harmful elements exist in either sufficient concentrations or appropriate chemical forms to be detrimental to long-term performance of the waste packages and other engineered barriers in the near-field environment at Yucca Mountain.

Another consultant to Nevada reviewed SCC failures of nickel-based alloys in nuclear power plant steam generators. These failures were caused by small concentrations of lead (a few ppm) in cooling water. He also discussed scenarios that could lead to enhanced corrosion of C-22 and titanium alloys inside the disposal drifts of a Yucca Mountain repository. A key issue is the relevance of the lead-induced corrosion in steam generators to waste package corrosion in the HLW repository. On the basis of these experimental results, the State of Nevada's consultants concluded that the presence of mercury and lead in the Yucca Mountain environment could significantly shorten the period DOE could expect protection from C-22.

It is the opinion of the Committee that the experiments described by the consultants to Nevada were not representative of the conditions likely to occur at Yucca Mountain. Furthermore, the work did not include sufficient control experiments. The experiments showed C-22 corrodes rapidly under extreme conditions and at least suggest that under some conditions mercury, lead, and possibly other minor or trace chemicals can affect corrosion. The Committee concludes that the nature and extent of this effect need to be elucidated under realistic conditions.

The role of stress in the corrosion of C-22 also needs to be studied further. NRC particularly needs to understand the residual stresses on the C-22 waste package and how DOE will ensure that significant tensile stresses are not left on the surface of the finished waste package.

Planned NRC and DOE Activities

On November 28, 2000, the Committee heard from NRC/CNWRA and DOE about planned confirmatory studies to address a number of significant corrosion issues, including those discussed above. The DOE has agreed, as part of the issue resolution process, to do tests to establish the window of susceptibility of C-22 to SCC and to understand the role of trace metals in the corrosion of C-22. The NRC staff has also planned studies to illuminate mechanisms of corrosion of C-22. The Committee strongly supports tests and studies planned by both NRC and DOE.

Sincerely,

B. John Garrick
Chairman

References:

1. ACNW letter dated September 9, 1998, to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, from B. John Garrick Chairman, ACNW, Subject: Issues and Recommendations Concerning the Near-field Environment and the Performance of Engineered Barriers at Yucca Mountain
2. ACNW letter dated January 11, 2000, to Richard A. Meserve, Chairman, U.S. Nuclear Regulatory Commission, from B. John Garrick Chairman, ACNW, Subject: Comments on the Importance of Chemistry in the Near-Field to DOE's Yucca Mountain Repository License Application

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

December 11, 2000

The Honorable Richard A. Meserve
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Meserve:

SUBJECT: EXEMPTION IN 10 CFR PART 40 FOR MATERIALS LESS THAN 0.05 PERCENT SOURCE MATERIAL — OPTIONS AND OTHER ISSUES CONCERNING THE CONTROL OF SOURCE MATERIAL

During its 122nd meeting held October 17–19, 2000, the Advisory Committee on Nuclear Waste (ACNW) heard a presentation from the NRC staff on issues concerning the control of low concentration source material. The Committee considered this issue further during its 123rd meeting held November 27–29, 2000.

OBSERVATIONS

The control of low levels of naturally occurring radioactive material is closely related to the control of solid material, which the Commission referred to the National Academies for study. The Commission may wish to consider expanding the scope of that study to include the release of naturally occurring radioactive material.

The concentration of naturally occurring radioactive material may be increased in commercial processing. As the staff moves forward with its study of this issue and the complexities of the problem become known, a separate study may be warranted by an independent institution such as the National Academies.

DISCUSSION

In the original Atomic Energy Act, source material that was less than 0.05 percent by weight in uranium or thorium was excluded from regulation. The apparent reason for this limit was that such source material was not strategically important for the production of special nuclear material. It was also believed that such small amounts of source material would not pose a health hazard.

As it turns out, low concentration source material in large enough quantities can produce doses to the public above the 10 CFR Part 20 dose limits. The Commission has initiated rulemaking to require Commission approval for transfers of previously licensed source material. The problem extends beyond the nuclear fuel cycle to operations NRC has not regulated, for example, mineral extraction from ores containing copper, lead, zinc, and the production of

fertilizer. In these operations uranium and thorium can be concentrated above the 0.05 percent limit. Other naturally occurring radioactive material such as radium may also be present, posing a greater health risk than the NRC regulated material. In certain situations it is possible that source material below the exempt concentration limit could result in radiation exposures to the public exceeding 100 mrem/yr.

The agency appears to be taking reasonable actions to address this concern. The staff intends to address this matter in a risk-informed and performance-based fashion, focusing on possible exposures rather than a concentration limit for the source material. The staff is also organizing working groups composed of federal agencies and the States to delineate the regulatory responsibilities of the various parties. We realize the process is still in an early stage. This is an opportunity to establish national consistency in the regulation of source and other naturally occurring radioactive material. We suggest that once responsibilities of individual agencies and the States are decided, a consistent regulatory framework be established and dual regulation avoided.

We intend to follow progress on this issue and wish to be kept informed of developments.

Sincerely,

B. John Garrick
Chairman

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

February 5, 2001

The Honorable Richard A. Meserve, Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: UPDATE TO ADVISORY COMMITTEE ON NUCLEAR WASTE REPORT ON NUCLEAR WASTE-RELATED RESEARCH

Dear Chairman Meserve:

The Advisory Committee on Nuclear Waste (ACNW) is charged with reviewing the NRC's safety research and development activities in the Nuclear Waste Safety Arena. The Office of Nuclear Material Safety and Safeguards (NMSS) handles work related to the disposal of spent fuel and high-level waste (HLW). NMSS contracts with the Center for Nuclear Waste Regulatory Analyses (CNWRA) for HLW technical assistance. Part of the $15.5M in FY 2000 funding allocated for HLW technical assistance is for work that the Committee considers to be "research." The Office of Nuclear Regulatory Research (RES) conducts and contracts for research in all areas not related to the disposal of HLW at Yucca Mountain. The waste-related research program in RES is small, $2.3M for research on radionuclide transport and decommissioning and $1.5M for radiation protection and health effects (including clearance work).

Observations and Recommendations

- The ACNW judges CNWRA's work on Yucca Mountain to be of very high quality. The RES-supported research that the ACNW reviewed this year involves excellent scientists, is timely, and of high quality.

- Although the partitioning of the HLW work in NMSS and the non-HLW work in RES generally causes no major problems, more coordination between the two offices is needed on issues that overlap the HLW and non-HLW areas.

- The HLW program needs to be expanded to have a modest long-term, "anticipatory" research component, perhaps through collaboration between NMSS and RES.

- The Analytical Hierarchy Program used by RES to prioritize projects fails to account properly for the importance of waste-related research; the prioritization method should be revised to overcome this failure.

- The RES waste-related program is not large enough to support the full spectrum of NRC needs. The RES staff should develop a comprehensive plan, including realistic budget estimates, to support the case for either increasing the size of the program and/or focusing the program. Strong leadership will be needed to ensure that the program is coherent and integrated.

Discussion

The ACNW reviewed specific projects and obtained general information on the Radionuclide Transport program in RES at its 118th, 120th, and 123rd meetings. We heard presentations on the leaching of radionuclides from slag, on the treatment of uncertainty in modeling radionuclide transport in the unsaturated zone, and on strategic planning for waste-related research in RES. We are favorably impressed with the research, which engages some of the best people in the field outside the NRC. We view the work as timely and of high quality. The ongoing planning process for waste-related research in RES is also encouraging. We understand that the staff will soon have a Research Program Plan available for public comment.

We are well aware of the work done by NMSS because our charge to advise on matters related to Yucca Mountain leads us to frequent interactions with the NMSS staff. We visited CNWRA during the 123rd ACNW meeting and observed some of the work being done on the coupled flow of water and heat in partially saturated rocks, on radionuclide sorption in alluvium, and on corrosion of Alloy 22. All of this work, done within relatively tight budget constraints, significantly improves the ability of the NRC staff to evaluate the Department of Energy's (DOE's) Yucca Mountain work.

We have concern about the partitioning of high-level waste work in NMSS and non-HLW work in RES. In general, we have found no major problems with this arrangement, but more coordination is necessary. An example is the area of sorption of radionuclides on mineral surfaces. An understanding of sorption is important to assessments of the performance of Yucca Mountain. The CNWRA has done and continues to do work on this topic. Understanding sorption is also important for analyzing a host of non-HLW issues, and RES has a major effort under way on the topic. We believe that it is essential to coordinate these two programs to obtain the most value for the NRC.

Another aspect of the partitioning of HLW and non-HLW issues is the potential for ignoring anticipatory research needs in the HLW area. NMSS focuses on the relatively short-term goal of analyzing what the DOE is doing. RES, on the other hand, is prohibited from doing any work on HLW, even if it is anticipatory and arguably focused on the long term. There is a potential for a gap in the NRC program because of the separation of the NMSS and RES programs. For example, work on secondary phases[1] at Yucca Mountain may be very important to demonstrating compliance. Quantitatively, the process of radionuclide incorporation into secondary phases is poorly

[1]Secondary phases are mineral precipitates, such as uranium oxides, that form after percolating water reacts with spent fuel and other materials in the repository environment. The main issue is the potential for secondary phases to incorporate certain radionuclides in their molecular structure as they precipitate out of solution.

understood, but it could be a significant factor in retaining key radionuclides in close proximity to the repository. Recognizing the potential importance of the issue, the ACNW strongly recommended that work to collect the data necessary for understanding the process continue (letters dated September 9, 1998, and January 11, 2000). The CNWRA has done considerable work on this topic.

This work has now been suspended because DOE does not currently plan to take credit for radionuclide incorporation in its performance assessment. This may be a sensible decision for the short term, given the amount of work that NMSS needs to accomplish to be ready for a license application, but it is not necessarily a good decision for assessing long-term safety nor is it a good decision in the spirit of defense in depth. If DOE changes its approach and credits the incorporation of radionuclides into secondary minerals in its analyses, NRC may not have time to develop its own confirmatory data. It may be useful to introduce a long-term, "anticipatory" perspective into the HLW program, perhaps by improved coordination between NMSS and RES.

In past years we have been critical of the RES program in three areas: (1) lack of sound methods of prioritization, (2) the smallness of the program, and (3) the need to focus the program sharply because of its smallness. We continue to be concerned about these issues.

The Analytical Hierarchy Process devised for RES favors research projects on reactor safety. The process should be revised to reflect the importance of waste-related research. We understand that NRC staff has proposed modest changes to the prioritization process to address our concern. We support this effort by the staff.

The research program is too small to accomplish all NRC needs in the waste arena. The staff should develop a plan, including a realistic budget, to address the critical needs of the NRC so it will be prepared if funding is increased. A plan will also help determine priorities within the current resource-limited environment. Strong leadership should be exercised to ensure that a coherent, integrated program evolves. In our report for FY 1998 (NUREG-1635, Vol. 1), we cited the small, tightly focused, and successful program run by the Electric Power Research Institute as an example of what can be done with limited funding.

Summary

In summary, we think that the agency's research activities for the Nuclear Waste Safety Arena are fundamentally sound. We remain concerned about the adequacy of the resources available to the programs in RES and NMSS. We believe the staff should carefully design research and implementation plans to efficiently use available

resources. The staff should address coordination issues. We think that the staff should also address anticipatory research needs in HLW.

Sincerely

B. John Garrick
Chairman

References:

1. Letter dated September 9, 1998, to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, from B. John Garrick, Chairman, ACNW, Subject: Issues and Recommendations Concerning the Near-field Environment and the Performance of Engineered Barriers at Yucca Mountain.

2. Letter dated January 11, 2000, to Richard A. Meserve, Chairman, U.S. Nuclear Regulatory Commission, from B. John Garrick, Chairman, ACNW, Subject: Comments on the Importance of Chemistry in the Near-Field to DOE's Yucca Mountain Repository License Application.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

February 7, 2001

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: COMMENTS ON IMPROVEMENTS IN NRC STAFF'S CAPABILITY IN PERFORMANCE ASSESSMENT

Dear Chairman Meserve:

During its 123rd meeting, November 27-29, 2000, the Advisory Committee on Nuclear Waste (ACNW) heard presentations from the NRC and the Center for Nuclear Waste Regulatory Analyses (CNWRA) on the status of the NRC's performance assessment (PA) capability in the high-level waste program. The presentations focused on NRC's Total-system Performance Assessment (TPA) code and the methodologies used by the staff to address uncertainty, sensitivity, and importance ranking.

We have been following developments in the staff's performance assessment capability for several years and have offered numerous observations and recommendations. Some of our recommendations (see references) were as follows:

- Strengthen staff capability in engineering analysis, materials science, and chemistry;
- Improve the methods for exposing the contribution to the performance of individual barriers;
- Develop the means to rank contributors to risk by importance;
- Seek peer review of the NRC's TPA code to enhance acceptance of the analytical methods;
- Use realistic models and parameters to the extent possible that can be supported by the evidence; and
- Generally improve the transparency and comprehensiveness of the analysis tools.

We are pleased with the progress that has been made. While many of our recommendations are still "works in progress," it is clear that a major effort has been made to address our

concerns and to improve the staff's overall capability in PA. The TPA code has been improved and structured so that in the near term it should be an effective tool for evaluating the U.S. Department of Energy's Total System Performance Assessment of the proposed Yucca Mountain high-level waste repository.

We were especially pleased that the staff obtained a peer review of the TPA code. We considered especially important the peer review group's comments on the need for the code to assess and track the composition of water that could contact the waste package. We were pleased to hear that the staff intends to modify the TPA code to calculate the chemical composition of water at various locations in the repository system. The staff is considering its responses to the other recommendations of the external peer review group members.

The Committee would have preferred a peer review group consensus report rather than independent reports from each reviewer. We believe that the group kick-off meeting involving several days of briefings and discussions and subsequent teleconferences helped offset the lack of consensus deliberation on the issues.

We have reviewed the capability, guidance, and tools associated with performance assessment issues over the past several years and are satisfied that the NRC staff is responding to the various recommendations made by the Committee. We believe these staff activities are helping to improve its overall PA capability.

Sincerely,

B. John Garrick
Chairman

References:

1. Letter dated October 8, 1997 from B. John Garrick, ACNW Chairman, to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, Subject: Comments on Performance Assessment Capability in the NRC High-Level Radioactive Waste Program.

2. Letter dated October 31, 1997, from B. John Garrick, ACNW Chairman, to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, Subject: Application of Probabilistic Risk Assessment Methods to Performance Assessment in the NRC High-Level Waste Program.

3. Letter dated July 29, 1998, from B. John Garrick, ACNW Chairman, to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, Subject: Comments on NRC's Total System Sensitivity Studies for the Proposed High-Level Radioactive Waste Repository at Yucca Mountain, Nevada.

4. Letter dated September 9, 1998, from B. John Garrick, ACNW Chairman, to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, Subject: Issues and

Recommendations Concerning the Near-field Environment and the Performance of Engineered Barriers at Yucca Mountain.

5. Letter dated January 12, 1999, from B. John Garrick, ACNW Chairman, to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, Subject: Comments on the Regulatory Uses of Importance Measures for Waste Management and Possible Application to the Proposed High-Level Radioactive Waste Repository at Yucca Mountain, Nevada.

6. Letter dated April 8, 1999, from B. John Garrick, ACNW Chairman, to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, Subject: Comments on the Department of Energy's Viability Assessment for the Proposed High-Level Radioactive Waste Repository at Yucca Mountain, Nevada.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

February 8, 2001

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: NRC HIGH LEVEL RADIOACTIVE WASTE KEY TECHNICAL ISSUE RESOLUTION PROCESS

Dear Chairman Meserve:

In April 2000, the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) held a meeting to decide how to accelerate the issue resolution process. Since that meeting, there have been several technical exchanges between NRC and DOE. During the 121st, 122nd, and 123rd meetings of the Advisory Committee on Nuclear Waste, September 19-21, October 17–19, and November 27-29, 2000, we were briefed by representatives of NRC and DOE staffs regarding the progress toward resolution of the key technical issues (KTIs).

The issue resolution process appears to be working as planned. We commend the staff for its work on issue resolution. At the technical exchange meetings, both the NRC and Center for Nuclear Waste Regulatory Analyses (CNWRA) staffs demonstrated a sound grasp of the technical issues and were prepared to negotiate an acceptable way of closing these prelicense-application issues. Furthermore, we are pleased to see that the staff has made significant progress in adopting a risk-informed and performance-based (RIPB) approach. The staff has modified acceptance criteria for issue closure to avoid unnecessary prescriptiveness, opting to allow DOE to propose the process by which DOE will fulfill the requirements. This approach is consistent with the Commission's intent and will lead to a rational basis for evaluating the DOE's proposal for meeting the requirements.

We have two continuing concerns about the overall process, namely: (1) whether all important subissues have been identified and (2) whether issues and subissues are being appropriately integrated. For example, we think that examination of coupled processes in the waste package and near-field environments may lead to some "surprises" that are not subsumed in the current structure. With respect to integration, we agree with the continued use of the total system performance assessment code to determine "how the pieces fit together." We were also glad to learn that the staff plans to publish an *integrated* issues report in the near future. We plan to monitor further progress in issue integration.

The first KTI meeting in August 2000 was on total system performance assessment. NRC and DOE agreed at that meeting that all of the issues and subissues specific to the repository functioning must be discussed before any decision is made about the adequacy of the overall integration within a performance-assessment framework. The final KTI meeting on total system performance assessment is scheduled for the spring of 2001. We look forward to learning more about how the staff has used the "performance-assessment window" to look at issue resolution in an integrated way.

We are disappointed that the issue-resolution meetings were not used to explore innovative ways to engage the public in the evaluation process. We recognize that the technical issues that must be addressed by the NRC and DOE staffs are many and complex and that the time at the meetings must be devoted to discussions needed to reach agreements on closure. We remain convinced, however, that these meetings might have proved important to help build public confidence in NRC's independent oversight.

Sincerely,

B. John Garrick
Chairman

References:

1. Letter dated November 17, 2000, from C. William Reamer, Office of Nuclear Material Safety and Safeguards, NRC, to Stephan Brocoum, U. S. Department of Energy, transmitting Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Unsaturated and Saturated Flow Under Isothermal Conditions, October 31-November 2, 2000, Albuquerque, New Mexico.
2. Letter dated October 27, 2000, from Janet Schlueter, Office of Nuclear Material Safety and Safeguards, NRC, to Stephan Brocoum, U. S. Department of Energy, transmitting Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Subissues Related to Criticality, October 23-24, 2000, Las Vegas, Nevada.
3. Letter dated October 27, 2000, from Janet Schlueter, Office of Nuclear Material Safety and Safeguards, NRC, to Stephan Brocoum, U. S. Department of Energy, transmitting Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Structural Deformation and Seismicity, October 11-12, 2000, Las Vegas, Nevada.
4. Letter dated October 4, 2000, from Janet Schlueter, Office of Nuclear Material Safety and Safeguards, NRC, to Stephan Brocoum, U. S. Department of Energy, transmitting Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Container Life and Source Term, September 12-13, 2000, Las Vegas, Nevada.
5. Letter dated October 23, 2000, from Janet Schlueter, Office of Nuclear Material Safety and Safeguards, NRC, to Stephan Brocoum, U. S. Department of Energy, transmitting Summary Highlights of NRC/DOE Technical Exchange and Manage-

ment Meeting on Igneous Activity, August 29-31, 2000, Las Vegas, Nevada.

6. Letter dated September 8, 2000, from Janet R. Schlueter, Office of Nuclear Material Safety and Safeguards, NRC, to Stephan Brocoum, U. S. Department of Energy, transmitting Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Unsaturated and Saturated Flow Under Isothermal Conditions, August 16-17, 2000, Berkeley, California.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

March 8, 2001

MEMORANDUM TO: E. William Brach, Director
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards

FROM: John T Larkins, Executive Director
Advisory Committee on Nuclear Waste

SUBJECT: PROPOSED FINAL REGULATORY GUIDE (GUIDANCE FOR IMPLEMENTATION OF 10 CFR 72.48, CHANGES, TESTS, AND EXPERIMENTS)

The members of the Advisory Committee on Nuclear Waste have individually reviewed the proposed final Regulatory Guide, "Guidance For Implementation of 10 CFR 72.48, Changes, Tests, and Experiments." The members also reviewed the resolution of public comments. There appear to be no technical issues on which the ACNW might have comments. No member objects to the issuance of this final guide.

CC: A. Vietti-Cook, SECY
W. Travers, EDO
C. Paperiello, DEDM
J. Craig, OEDO
I. Schoenfeld, OEDO
M. Virgilio, NMSS
E. W. Brach, NMSS/SFPO
C. Jackson, NMSS/SFPO

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

March 27, 2001

MEMORANDUM TO: William D. Travers
Executive Director for Operations

FROM: John T. Larkins, Executive Director
Advisory Committee on Nuclear Waste

SUBJECT: PROPOSED RULE TO STANDARDIZE THE PROCESS FOR ALLOWING A LICENSEE TO RELEASE PART OF ITS REACTOR FACILITY OR SITE FOR UNRESTRICTED USE BEFORE NRC HAS APPROVED ITS LICENSE TERMINATION PLAN

During the 125th meeting of the Advisory Committee on Nuclear Waste, March 21-22, 2001, the Committee considered the subject rulemaking plan and decided not to review it at this time. The Committee has no objection to issuing this rulemaking plan for public comment. The Committee would like to have the opportunity to review the proposed rule after the reconciliation of public comments.

Reference:

SECY-01-XX, Subject: Proposed Rule to Standardize the Process for Allowing a Licensee to Release Part of Its Reactor Facility or Site for Unrestricted Use Before NRC Has Approved its License Termination Plan.

Cc: A. Vietti-Cook, SECY
J. Craig, OEDO
I. Schoenfeld, OEDO
A. Thadani, RES
W. Ripley, NRR
S. Collins, NRR

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

April 18, 2001

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001

SUBJECT: ADVISORY COMMITTEE ON NUCLEAR WASTE 2001 ACTION PLAN AND PRIORITY ISSUES

Dear Chairman Meserve:

The Advisory Committee on Nuclear Waste (ACNW) has modified its 2000 Action Plan to update the priority issues it will consider in the year 2001 and beyond. A copy of the Action Plan is enclosed for your consideration.

The Action Plan supports the U.S. Nuclear Regulatory Commission's (NRC's) Strategic Plan for FY 2000 - FY 2005 (NUREG-1614, Vol. 2) and supports NRC's mission, the principles of good regulation, and relevant strategies and performance goals identified by the Commission. The plan is consistent with the ACNW charter and is reflected in the ACNW Operating Plan, which will be updated to reflect the priority issues identified herein.

One purpose of the ACNW Action Plan is to guide the Committee in carrying out its mission in the near term and beyond. The Committee identifies first-tier priority issues it will address this year and the second-tier issues it will address if time and resources permit, unless directed otherwise by the Commission. In addition to the priority issues addressed in this Action Plan, the ACNW will continue to identify process improvements that it will implement to improve its efficiency and effectiveness. Process improvements will be reported in the ACNW Operating Plan submittal rather than in the Action Plan.

The Committee has identified four first-tier priority issues in this Action Plan:

1. **Site Suitability and License Application** reflect activities associated with the proposed Yucca Mountain repository, as the time for the site recommendation decision and a possible license application draws near.

2. **Risk-Informed and Performance-Based (RIPB) Regulatory Framework** acknowledges that the Committee remains committed to and engaged in the agency's move toward an RIPB regulatory structure. The Joint ACNW and Advisory Committee on Reactor Safeguards (ACRS) Subcommittee will continue to support the NRC staff and the Commission in developing and implementing an overall RIPB framework for nuclear waste and materials.

3. **Decommissioning** will remain an area of continued focus. The decommissioning topics include the development of decommissioning guidance, the decommissioning activities associated with the West Valley Demonstration Project, and continued attention to developments in the control of solid materials.

4. The **Yucca Mountain Review Plan** will contain the license application acceptance criteria and review methods. The Committee will support the staff in risk-informing the development of this plan.

The Committee has also identified the following four second-tier priority issues in this Action Plan:

1. **Research** remains a second-tier priority issue. The Committee will continue to review waste-related research performed by the Office of Research, as well as the technical assistance performed by the Center for Nuclear Waste Regulatory Analyses, and report to the Commission.

2. **Low-Level Radioactive Waste** (LLW) remains a second-tier priority issue. The Committee continues to believe that LLW disposal issues need to be resolved to allow society to continue to benefit from the use of nuclear materials.

3. **Transportation of Radioactive Waste** is now a second-tier priority item. The Committee will continue to stay informed on technical issues and support the NRC staff in its work on changes to Part 71 and on the Package Performance Study, as well as provide other assistance as the Commission requests.

4. **Proposed Private Fuel Storage Facility** is a new second-tier priority issue. The Committee will continue to stay informed of the technical issues associated with this facility design and proposed operation and provide such assistance as the Commission requests.

Risk Harmonization has been removed from the Committee's priority list this year because of time and resource limitations. We would appreciate your comments or suggestions on the enclosed Action Plan.

Sincerely,

B. John Garrick
Chairman

Enclosure: ACNW 2001 Action Plan

THE ADVISORY COMMITTEE ON NUCLEAR WASTE 2001 ACTION PLAN AND PRIORITY ISSUES AND ACTIVITIES

This plan provides strategic direction and guidance to the Advisory Committee on Nuclear Waste (ACNW) in 2001 and beyond for addressing the issues most important to the U.S. Nuclear Regulatory Commission (NRC) in carrying out its mission to protect public health and safety, promote the common defense and security, and protect the environment. It also defines ACNW's mission, vision, goals, and priority activities and indicates how these goals support the NRC's Strategic Plan. The plan provides ACNW clients and stakeholders with information about the topics that the ACNW will be addressing in its reviews.

SCOPE OF ACNW ACTIVITIES

The Committee reports to and advises the Commission on technical matters related to nuclear waste management. The bases of ACNW reviews include 10 CFR Parts 61, 71, and 72, the proposed Part 63, and other applicable regulations and legislative mandates. The ACNW will undertake studies and activities related to the transportation, storage, and disposal of high-level and low-level radioactive waste (HLW and LLW, respectively), including the interim storage of spent nuclear fuel; materials safety; decommissioning; application of risk-informed and performance-based (RIPB) regulations; and evaluation of licensing documents, rules, regulatory guidance, and other issues, as requested by the Commission. The Committee will interact with representatives of the public, NRC, the Advisory Committee on Reactor Safeguards (ACRS), other Federal agencies, State and local agencies, Indian Nations, and private, international, and other affected organizations as appropriate to fulfill its responsibilities.

OVERARCHING PHILOSOPHY

In conducting its self-assessments, the Committee realized that it has been most effective when it addresses important complex issues on timetables that permit thorough examination of the issues and communication with stakeholders while regulatory solutions are being formulated.

The Committee will take a top-down, systems-based approach in its review of issues, focusing on the interconnections between issues.

The Committee continues to believe that it will best serve the Commission by taking an RIPB approach to its activities. By this statement, the Committee means that it will strive to identify the inherent risk associated with various issues, to encourage transparency and focus on risk in decision-making, including the identification of uncertainty, and to encourage an informed approach to risk assessments. The Committee will accomplish these goals by encouraging development of an overall RIPB regulatory framework for materials and waste-related regulations that is flexible enough for diverse applications. The ACNW believes that an RIPB approach will provide a more rational method and reduce unnecessary rigid interpretation and prescriptive approaches in the application of regulations. The ACNW further believes that an RIPB framework could advance efforts toward risk harmonization and alleviate conflicts associated with dual regulatory authority by providing a systematic and quantitative framework for assessing and comparing risk assessment approaches across and within agencies. An RIPB framework

Enclosure

will facilitate the use of more rational and transparent regulation and will thus lead to an improved confidence in regulatory decisions. In this way, the NRC can develop more efficient regulations that have an obvious relation to safety and encourage a more effective allocation of NRC and licensee resources.

The Committee will continue to examine international experience and apply the lessons learned. The ACNW strives to involve the public in its deliberations, to increase public confidence in the regulatory process, and to ensure that communication paths with the public remain open and effective.

ACNW MISSION

The ACNW's mission is to provide the Commission with independent and timely technical advice on nuclear waste management issues to support the NRC in conducting an efficient and effective regulatory program that enables the Nation to use nuclear materials in a safe manner for civilian purposes.

ACNW VISION, DESIRED OUTCOMES, AND COMMITMENTS

In addition to a mission statement describing the ACNW's purpose, the Committee has identified a vision statement and desired outcomes to guide the Committee's implementation of its mission, as well as commitments that will guide the Committee toward these outcomes.

Vision

The ACNW strives to provide advice and to recommend solutions that are forward-looking, are based upon best available science and technology, can be implemented, and reflect the need to balance risk, benefit, and cost to society to enable the safe use of nuclear materials.

Desired Outcomes

The Committee aspires to achieve the following outcomes:

1. Provide clear, useful advice, along with the rationale for this advice, in adequate time for consideration by the Commission in making regulatory decisions.

2. Alert the Commission to potential challenges that may be averted by taking action and provide recommendations as to the appropriate action.

3. Forewarn the Commission of emerging issues that may later require action.

4. Ensure that the Committee's advice reflects state-of-the-art technology; is practical; and allows for incorporation into the NRC's technical approaches, regulations, and guidance.

5. Ensure that the Committee's advice reflects an understanding of inherent risks and considers, first, the need for adequate protection and, second, the need to balance risk, cost, and benefit in all of the NRC's decisions.

6. Focus on risk and make the regulatory process more transparent.

7. Provide advice that is valued by the Commission, the NRC staff, the U.S. Department of Energy (DOE), and the public.

8. Earn the public's trust by providing frank, open advice and by offering a forum for public participation in the regulatory process.

9. Resolve conflicts between the NRC and other stakeholders by encouraging communication and providing a neutral forum for interaction.

Commitments

To accomplish its mission, the Committee will carry out the following commitments:

1. Focus on nuclear safety.

2. Be responsive to the Commission's needs.

3. Maintain technical excellence.

4. Foster an atmosphere of mutual problem solving with the NRC staff.

5. Remain unbiased, be responsive to change, and consider various options and contingencies.

6. Identify, in advance, those issues that could impact the NRC's ability to achieve its mission.

7. Focus on risk by asking: What is the risk? What are the important contributors to risk? What are the uncertainties associated with the risk?

8. Keep abreast of international trends and developments that could affect the NRC's regulatory practices or approaches, and factor international experience into the Committee's advice, where appropriate.

9. Consider issues from the perspective of relationship and harmonization with other NRC and stakeholder activities.

10. Regard the public as its ultimate stakeholder and seek better ways to obtain more public involvement.

11. Abide by the Committee's Action Plan to foster efficiency and effectiveness of Committee activities and products.

GOALS AND OBJECTIVES

The ACNW has developed general goals and objectives consistent with its mission and vision. The following five goals serve to provide strategic direction for the ACNW this year and support selected goals identified in NRC's Strategic Plan. Each goal is followed by objectives to help the Committee better focus on priority issues.

Goal 1: **Assist the NRC in positioning itself to respond to external change in its regulation of the management of nuclear waste and materials. [This goal supports the NRC's Nuclear Waste Safety and Nuclear Materials Safety strategic arenas and NRC's strategic goal and primary Performance Goal to maintain safety, protection of the environment, and the common defense and security.]**

Objective 1: *Advise the Commission in a timely fashion on technical developments that may require changes in NRC's regulations, policies, and practices.*

Objective 2: *Inform the Commission of issues that the NRC needs to address and recommend solutions.*

Goal 2: **Support the NRC in employing the best science in resolving key safety issues. [This goal supports the NRC's Nuclear Waste Safety and Nuclear Materials Safety strategic arenas and the specific Performance Goal to make NRC activities and decisions more effective, efficient, and realistic.]**

Objective 1: *Keep informed of methods and technologies being developed and used worldwide that are applicable for assessing and managing risks associated with the cleanup, disposal, and storage of nuclear waste.*

Objective 2: *Advise the Commission on enhancements to the NRC staff's technical capabilities that are needed to address current and expected Commission needs.*

Objective 3: *Advise the Commission and the NRC staff on ways to use risk-informed and performance-based approaches to develop efficient and effective regulations and regulatory framework.*

Goal 3: **Advise the NRC on how to increase its reliance on risk as a basis for decisionmaking, including methods that (1) implement a risk-informed approach, (2) quantify and reveal uncertainties, and (3) are consistent across programs. [This goal supports the NRC's Nuclear Waste Safety and Nuclear Materials Safety strategic arenas and the specific Performance Goal to reduce unnecessary regulatory burden on stakeholders.]**

Objective 1: *Encourage the NRC staff in seeking and proposing approaches to gain a better understanding of the inherent risks of activities within its regulatory responsibilities, as well as the relationship between regulations, cost, and safety.*

Objective 2: *Support the NRC staff in developing an overall flexible RIPB framework for managing nuclear materials, waste disposal, and cleanup, that will enhance the transparency of the underlying assumptions and associated uncertainties, increase the overall consistency of NRC's programs, and facilitate the development of more efficient and less burdensome regulations that are clearly defensible and linked to safety.*

Goal 4: **Support the NRC in improving public involvement and understanding in its waste and materials program and gaining increased public confidence and respect. [This goal supports the NRC's Nuclear Waste Safety and Nuclear Materials Safety strategic arenas and the specific Performance Goal to increase public confidence.]**

Objective 1: *Provide opportunities through the Federal Advisory Committee Act process for more meaningful public involvement in the regulatory process.*

Objective 2: *Recommend ways for the NRC to achieve more meaningful public involvement in the regulatory process, taking into consideration lessons learned from international experience.*

Objective 3: *Assist the NRC in making the agency's decisionmaking process more transparent and ensuring that agency documentation is readily understandable and addresses the relevant issues.*

Goal 5: **Support the effectiveness and efficiency of NRC operations. [This goal supports the NRC's Corporate Management Strategies to employ innovative and sound business practices.]**

Objective 1: *Advise the NRC on how to increase its reliance on risk insights as a basis for decisionmaking, including using risk assessment methods for the safe use of nuclear power, that (1) implement a risk-informed approach, (2) quantify and reveal uncertainties, and (3) are consistent across programs, where possible.*

Objective 2: *Propose approaches that provide a better understanding of the inherent risks associated with nuclear power and the relationship between safety, regulations, and cost, and advise the Commission on the proposals.*

Objective 3: *Provide technically sound and realistic approaches for resolving new and emerging issues and identify ways to utilize risk-informed and performance-based approaches related to the safe use of nuclear materials for civilian purposes.*

Objective 4: *Select and evaluate feedback from stakeholders on ACNW operations.*

Objective 5: *Evaluate and modify existing ACNW operational procedures as appropriate, to accomplish "more with less."*

PRIORITY ISSUES AND PROCESS IMPROVEMENTS

In support of its first four goals, the ACNW has identified its highest priority issues for this year, along with other important issues it plans to address this year or next, time and resources permitting. The Committee has also defined the criteria it uses to select its priority issues. In support of its fifth goal, the ACNW has identified the process improvements it will continue to implement this year to improve its effectiveness. These process improvements will be incorporated into the ACNW Operating Plan and the status of the improvements reported.

The highest priority issues of 2001 are first-tier priorities, and the other important issues are second-tier priorities. The Committee plans to conduct in-depth information gathering on most of the first-tier topics, whereas it does not plan to carry out a concentrated effort this year on most of the second-tier issues unless directed by the Commission or in response to changes in nuclear waste legislation. The Committee will keep informed of the issues associated with second-tier priorities so as to be able to advise the Commission if requested. The Committee may move several of these topics to the first-tier in its next Action Plan. Each priority issue supports one or more of ACNW's goals, as indicated.

For each priority issue addressed, the Committee plans to prepare a task action plan that will identify the nature and scope of the issue and a strategy for addressing it. The plan will include a schedule, planned products, and performance measures and targets to assess the Committee's performance against planned goals.

CRITERIA FOR SELECTING PRIORITY ISSUES

The following criteria are used to select priority issues:

- issues that are requested by the Commission or the Executive Director for Operations for ACNW review,
- the potential for or likelihood of an issue to pose undue risk or costs to society,
- the significance of the issue to the protection of public health, workers, and the environment from adverse effects of the management of nuclear waste,
- issues for which the ACNW's review is "proactive" rather than "reactive,"
- issues that are long-term and require continuous attention by the agency,
- timeliness based on when an issue is scheduled to come before the Commission and when the advice would provide effective and efficient input into NRC regulatory decisions,
- the relationship of an issue to the NRC's Strategic Plan, including trends and directions in regulatory practice, such as the adoption of an RIPB method of regulation and decision-making, and
- issues that arise from strategies and activities of licensees and applicants.

FIRST-TIER PRIORITY ISSUES

1. **Site Suitability and License Application** — The DOE is expected to make a site suitability determination in 2001, and the NRC staff will comment on whether DOE's at-depth site characterization analysis and waste form proposal seem to be sufficient for inclusion in a license application. The ACNW has begun interactions with the NRC staff on the staff's strategy for site characterization sufficiency comments. A review plan has been developed and revised with milestones for the Committee, the NRC staff, and DOE interactions, so that the ACNW will be positioned to provide advice to the Commission before the NRC's sufficiency comments are sent to the DOE.

   If the Secretary of Energy recommends the Yucca Mountain Site to the President, and the President considers the site justified for application to the NRC for construction authorization, the President will submit a recommendation of the site to Congress. If there are no objections to the site from the Governor or legislature of Nevada, or if there is an objection and Congress passes a joint resolution of repository siting approval and the President signs it into law, a license application for construction authorization would be submitted by the Secretary of Energy within 90 days. The license application would be based on a particular facility design. The ACNW will review the construction authorization request in parallel to the NRC staff's review over the 3-year statutory time period for a licensing decision. The ACNW will include repository design and quality assurance issues under this item. This issue supports ACNW Goals 1 through 4.

2. **Risk-Informed and Performance-Based Regulatory Framework** — The ACNW will continue to support the agency's effort to implement a risk-informed and incrementally performance-based regulatory framework. Specifically, the ACNW and the Joint ACRS/ACNW Subcommittee will continue to encourage and assist the NRC staff in developing and implementing an overall RIPB framework for nuclear waste and materials. The Committee will continue to encourage the NRC to adopt transparent regulatory approaches, to enhance public understanding of the key safety issues, and to encourage the NRC to use risk as a basis for setting priorities. In particular, the Committee will continue to stress the need for RIPB risk assessments to quantify the contributions of individual barriers for waste isolation and for the staff to develop guidance that clarifies its intentions regarding quantification of barriers. Issues to be addressed under this Action Plan item will include the implementation of NRC's proposed HLW regulation, 10 CFR Part 63, and case studies brought to the joint ACRS/ACNW Subcommittee by the Office of Nuclear Material Safety and Safeguards Risk Task Group, such as the use of integrated safety analysis. This issue supports ACNW Goals 1 through 4.

3. **Decommissioning** — Decommissioning topics will continue to be a first-tier priority issue of the Committee through the coming year. The Committee will continue to focus on the development of decommissioning guidance. Decommissioning options, such as entombment, and important support needs, such as LLW disposal, will continue to receive attention. The Committee will continue to follow developments in the control of solid materials. The Committee also expects to further review the use of institutional controls, the disposal of Greater than Class C wastes, the decommissioning of the West Valley

Demonstration Project, and a review of the Formerly Utilized Sites Remedial Action Program (FUSRAP). This issue supports ACNW Goals 1 through 4.

4. Yucca Mountain Review Plan — The ACNW will review the license application acceptance criteria as they are developed and documented in the Yucca Mountain Review Plan (YMRP). The Committee intends to review both pre-closure and post-closure safety issues and to ensure that the review framework is risk-informed and performance-based. The ACNW will review the YMRP to ensure reviews are prioritized on the basis of risk significance. The Committee will make formal comments on the completed draft review plan when it is made publicly available. The Committee also expects to review the final review plan following the public comment period. This issue supports ACNW Goals 1 through 4.

SECOND-TIER PRIORITIES

1. Research — The ACNW will continue to report yearly to the Commission on NRC's waste-related research and technical assistance programs. The Committee will examine research performed by the Office of Nuclear Regulatory Research and technical assistance performed at the Center for Nuclear Waste Regulatory Analyses. The Committee expects to conduct its review of the Center's activities in San Antonio, Texas. The ACNW will continue to monitor the NRC's research program to ensure that it is changing in response to the agency's shifting emphasis to RIPB regulation. This issue supports ACNW Goals 1 through 3.

2. Low-Level Radioactive Waste — The ACNW believes that, from a risk perspective, the national LLW program is of growing concern because of the failure of the Low-Level Waste Policy and Amendments Act of 1985 process to bring about new LLW disposal sites. The ACNW will consider the role of the NRC in LLW disposal from the perspective that lack of progress of the national LLW program could interfere with society's benefitting from the use of nuclear material, and therefore with NRC's ability to carry out its mission. Other possible topics for review under this issue may be mixed-waste (waste with a hazardous and radioactive component), including the effort by the NRC and the U.S. Environmental Protection Agency to end the dual regulation of mixed wastes; assured isolation; and an RIPB approach to regulation. The Committee will keep informed of developments in LLW management practices in other countries. This issue supports ACNW Goals 1 through 4.

3. Transportation — The transportation of HLW and spent fuel is an issue that creates public concern. The ACNW plans to continue to stay engaged in the coming year, expanding its involvement in transportation issues undertaken during the review of the Yucca Mountain Draft Environmental Impact Statement. The Committee's goal is to increase public confidence in this aspect of waste management by using a risk-informed approach. The Committee will be prepared to assist the Commission as needed. The Committee also expects to review the Package Performance Study and proposed changes to the NRC's transportation rule (10 CFR Part 71) from an RIPB perspective. This issue supports ACNW Goals 1 through 4.

4. **Proposed Private Fuel Storage Facility** — In June 1997 Private Fuel Storage submitted an application to the NRC for a license to operate an away-from-reactor independent spent fuel storage installation on the reservation of the Skull Valley Band of Goshute Indians. The NRC staff subsequently issued its safety evaluation report on this application in September 2000. The ACNW will continue to keep informed of the technical issues associated with this facility design and the proposed operation of the facility and will provide such assistance as the Commission requests.

PRIORITY OPERATIONAL ACTIVITIES

Operational processes or activities that the ACNW plans to implement this year in support of ACNW Goal 5, "Support the effectiveness and efficiency of NRC operations," will be included in the ACRS/ACNW Operating Plan. In addition, the ACNW will continue to conduct top-down planning to identify primary goals and priority issues and activities for the coming year, and perform self-assessments of the Committee's performance against these goals. The ACNW has established performance goals and indicators to measure effectiveness and will use stakeholder surveys to solicit feedback on the Committee's effectiveness.

MEASURES OF SUCCESS

An Assessment of the extent to which the goals and objectives of this plan have been achieved (including the ACNW's effectiveness, efficiency, quality, timeliness, and rate of success in contributing to the regulatory process) will be addressed in the annual ACRS/ACNW Operating Plan.

UPDATING THIS PLAN

The ACNW will conduct periodic planning meetings to update this Action Plan as necessary. Revisions to the plan may be based on input from the Commission, changes to the NRC Strategic Plan, results of stakeholder surveys and self-assessments, external influences, and available resources.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

May 23, 2001

MEMORANDUM TO: William D. Travers
Executive Director for Operations

FROM; John T. Larkins, Executive Director
Advisory Committee on Nuclear Waste

SUBJECT: DRAFT PROPOSED MAJOR REVISION TO 10 CFR PART 71, "PACKING AND TRANSPORTATION OF RADIOACTIVE MATERIAL"

During the 126th meeting of the Advisory Committee on Nuclear Waste, May 15-17, 2001, the Committee considered the subject revision to the rule, and decided not to review it at this time. The Committee has no objection to issuing this rulemaking plan for public comment. The Committee would like to have the opportunity to review the proposed rule after the reconciliation of public comments.

Reference:
Memorandum dated April 28, 2000, from Donald A. Cool, Office of Nuclear Material Safety and Safeguards, to Addressees, Subject: Commission Paper for Major Revision of 10 CFR Part 71: Compatibility with ST-1, The IAEA Transportation Safety Standards.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

May 24, 2001

The Honorable Richard A. Meserve
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Meserve:

SUBJECT: ADVISORY COMMITTEE ON NUCLEAR WASTE COMMENTS ON ENTOMBMENT

On October 18, 2000, at the 122nd meeting of the Advisory Committee on Nuclear Waste (ACNW), the NRC staff gave a presentation on entombment. The Committee was asked to comment on the staff's regulatory framework for reactor entombment and on the dose reduction contributions that engineered barriers can provide. At the 124th ACNW meeting there were additional discussions between the NRC cognizant engineer and the Committee to clarify issues relating to volume averaging of radioactivity. NRC papers, SECY-99-187 and SECY-00-0129 deal with entombment issues. The staff requirements memorandum relating to SECY-00-0129 requires the staff to proceed with rulemaking on entombment.

RECOMMENDATION

Entombment should not be the subject of a separate regulation but should be included in the larger context of other reactor decommissioning and license termination issues.

DISCUSSION

Reactor decommissioning is regulated by 10 CFR 50.82. In addition, decommissioned reactor sites must meet the criteria for license termination in 10 CFR Part 20, Subpart E. The governing requirements for license termination are that the dose to the public not exceed 25 mrem/year except in special cases and that doses be as low as reasonably achievable (ALARA). Subpart E does not specify what concentration or total amount of radioactivity may remain on site, but rather relates to the potential dose to individuals.

The Committee believes that entombment can be a viable option as a part of reactor site decommissioning. We further believe that entombment is a subissue of the larger issues of reactor decommissioning and license termination and should be addressed by the NRC staff in that context rather than being dealt with separately. We believe that the reactor license termination regulation in Part 50.82 should be expanded to deal with entombment and with other reactor site decommissioning and license termination issues such as the 60-year

decommissioning time limit and rubblization. For those reactor sites where entombment would result in possible short-term exposures exceeding 25 mrem/year, increasing the decommissioning time limit to greater than 60 years, perhaps as much as 300 years, could provide time for adequate radioactive decay to meet the standard.

Engineered barriers at reactor sites offer the possibility of making important contributions to reducing the potential for radiation exposure to the public, not only in the case of entombment but also for rubblization. This would be especially true if the decommissioning time limit were extended. However, the potential dose to the public with any engineered barrier proposal is site-specific and depends on the source term, rainfall, type of soil, and location of groundwater.

The issues associated with reactor decommissioning and license termination provide excellent examples of how risk-informed, performance-based regulations may be used to ensure public safety.

Sincerely,

B. John Garrick
Chairman

References:

1. Memorandum dated July 19, 1999, for The Commissioners, from William D. Travers, Executive Director for Operations, NRC, SECY-99-187, Subject: Information Paper on the Viability of Entombment as a Decommissioning Option for Power Reactors.
2. Memorandum dated June 12, 2000, for The Commissioners, from William D. Travers, Executive Director for Operations, NRC, SECY-00-0129, Subject: Workshop Findings on the Entombment Option for Decommissioning Power Reactors and Staff Recommendations on Further Activities.
3. Memorandum (Revised) dated September 5, 2000, from Annette Vietti-Cook, Secretary of the Commission, to William D. Travers, Executive Director for Operations, NRC, Subject: Staff Requirements - SECY-00-0129 - Workshop Findings on the Entombment Option for Decommissioning Power Reactors and Staff Recommendations on Further Activities.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

May 24, 2001

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: STAFF REQUIREMENTS MEMORANDUM DATED APRIL 11. 2001, ON THE MARCH 22, 2001, ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW) BRIEFING OF THE COMMISSION

Dear Chairman Meserve:

We are responding to the April 11, 2001, staff requirements memorandum (SRM) pertaining to the ACNW's March 22, 2001, briefing of the Commission on our integrated strategy to evaluate the staff's licensing capability and sufficiency review. We are pleased that the Commission supports the ACNW's vertical slice approach. As requested, the Committee will conduct its review with minimal impact on the U.S. Nuclear Regulatory Commission (NRC) staff resources.

The Commission made several other requests, including that the Committee provide an index when using acronyms and explain technical terms in ACNW letter reports. We acknowledge the Commission's concern about the use of undefined acronyms and will correct this concern in the future.

The Commission requested that the ACNW provide specific recommendations on how to improve the NRC staff's communications with the public. The ACNW has addressed the issue of risk communication and stakeholder involvement in several past letters, in particular, our letters of December 23, 1999, August 18, 2000, and November 1, 2000. In these letters, we made specific recommendations aimed at improving public outreach based on input we received from stakeholders during our meetings in Nevada and Europe. We have scheduled a meeting in June on the staff's progress on public outreach and communication, and we plan to meet with stakeholders in Nevada in October 2001. At that time, we will update our recommendations regarding public outreach.

The Commission requested the ACNW to provide specific recommendations on key technical issues that warrant scrutiny by the NRC and the U.S. Department of Energy (DOE). In our February 2001 letter, we commended the staff for its progress in key technical issue resolution, but also identified several concerns, including whether key technical issues and subissues are being integrated and whether all important subissues have been identified, especially coupled processes. The staff's reply to our letter provided us more information regarding the staff's current activities to ensure integration of key technical issues. We have scheduled staff briefings in July and August 2001 on the status of the NRC staff's sufficiency review and the draft integrated issue resolution status report. We expect to gain greater knowledge of the staff's process for integrating the key technical issues from these briefings. Should we identify

specific issues which warrant greater emphasis or scrutiny during our reviews, we will bring them to your attention.

Finally, during the March 22nd briefing, Commissioner Dicus asked the Committee about the importance of microbially induced corrosion (MIC) of the waste package. At the time, the Committee was unsure whether the DOE had a program in this area. Since then, DOE has informed us about its program on MIC at Yucca Mountain and has offered to brief the ACNW on this topic in the near future. We will keep you informed.

Sincerely,

B. John Garrick
Chairman

Reference:
Memorandum dated April 11, 2001, from Annette L. Vietti-Cook, Secretary, to John T. Larkins, Executive Director, ACRS/ACNW, Subject: Staff Requirements - Meeting with ACNW Thursday, March 22, 2001.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

June 27, 2001

Dr. William D. Travers
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Dr. Travers:

SUBJECT: NRC STAFF PUBLIC OUTREACH ACTIVITIES

During its 127th meeting, June 19–21, 2001, the Advisory Committee on Nuclear Waste met with representatives of the NRC staff to learn about its public outreach activities in the high-level waste (HLW) program. We were very impressed with the progress and the results the staff has achieved over the past 2 years. We commend the staff for its success in transforming the HLW outreach program.

Sincerely,

B. John Garrick
Chairman

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555-0001

June 29, 2001

The Honorable Richard A. Meserve
Chairman
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Chairman Meserve:

SUBJECT: RISK-INFORMED, PERFORMANCE-BASED REGULATION OF WASTE MANAGEMENT AND DECOMMISSIONING

Sufficient tools and experience now exist in the application of a risk-informed, performance-based (RIPB) regulatory process to consider its future direction. The development of the proposed RIPB rule for Yucca Mountain offers an opportunity to extend the concept of risk-informed regulation to a broader scope of radioactive waste management activities. A goal of the RIPB regulatory process is to better ensure nuclear safety while simplifying the licensing and license termination processes. This goal is consistent with the Commission's probabilistic risk assessment (PRA) policy statement that the agency should increase its use of PRA.[1]

RECOMMENDATION

The Committee recommends that decommissioning and waste management regulations that are not based on radiation dose be reviewed and that a phased approach be taken to remove impediments to the implementation of RIPB regulation.

DISCUSSION

An important advantage of the proposed Yucca Mountain RIPB regulatory model is that it uses a single radiation standard as the primary basis for assuring public safety. The broader implementation of this concept carries the promise of eliminating conflicts among multiple regulations. For example, the entombment option for nuclear facilities may be compromised because of the need to comply with two inconsistent regulations: one establishing a concentration limit, the other a dose rate standard. The precedent set in the proposed Yucca Mountain RIPB model is that a concentration limit is not necessary to protect the health and safety of the public. The Committee believes this position is correct from a risk perspective. In particular, if the potential radiation dose rate to an individual from a radiation source cannot exceed a safe dose rate standard (e.g., 15 mrem/year), then no further protection is necessary. Concentration per se is not a valid measure of risk. Although the present NRC regulations

[1]Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities; Final Policy Statement Federal Register Vol 60, No.158, 42622-42628 (August 16, 1995).

based on radionuclide concentrations provide for public safety, they are not concordant with RIPB regulation.

We believe a move toward harmonizing all NRC waste disposal regulations using a common risk-informed perspective would be a major step forward for the agency in implementing an RIPB regulatory philosophy. In the opinion of the Committee, the benefits would be many. The agency would demonstrate its sincerity in adopting RIPB practices by its willingness to change regulations where necessary.

The adoption of a risk-informed standard would potentially apply to many areas of waste management such as the decommissioning of power and research reactors (including entombment and rubblization); decommissioning of nuclear fuel fabrication facilities, commercial nuclear material treatment and handling facilities, and uranium conversion plants; disposal of sealed sources; and other types of waste management and disposal activities.

Movement toward risk-informed regulation for waste management and decommissioning would necessitate a critical review of existing regulations, especially those based on radionuclide concentrations. It would also require the promulgation of new regulations. The Committee believes that a phased approach would be the best strategy for implementing conversion to an RIPB regulatory process.

Sincerely,

B. John Garrick
Chairman

NRC FORM 335
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U.S. NUCLEAR REGULATORY COMMISSION

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This compilation contains 18 reports issued by the Advisory Committee on Nuclear Waste (ACNW) during the Thirteenth year of its operation. The reports were submitted to the Chairman and Commissioners of the U. S. Nuclear Regulatory Commission (NRC). All reports prepared by the Committee have been made available to the public through the NRC Public Document Room, or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS) which is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room); the U. S. Library of Congress, and the Committee's Web site at http://www.nrc.gov/ACRSACNW.

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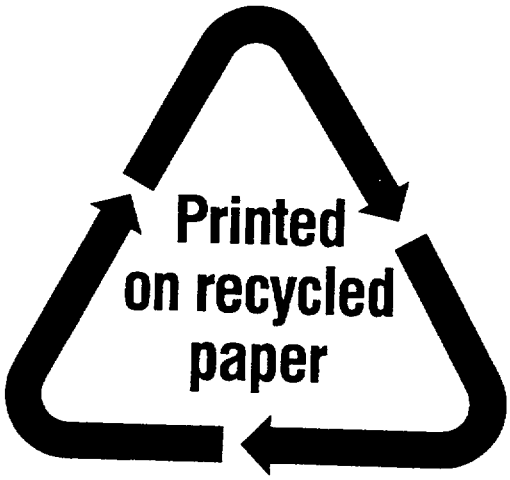

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