



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

ACNWS-0156

September 28, 2005

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

SUBJECT: SUMMARY REPORT—161<sup>ST</sup> AND 162<sup>ND</sup> ACNW MEETINGS OF THE ADVISORY COMMITTEE ON NUCLEAR WASTE, JULY 19–21, AND AUGUST 2–4, 2005, RESPECTIVELY, AND OTHER RELATED COMMITTEE ACTIVITIES

Dear Chairman Diaz:

During its 161<sup>st</sup> and 162<sup>nd</sup> meetings on July 19–21, and August 2–4, 2005, respectively, at the NRC's headquarters in Rockville, MD, the Advisory Committee on Nuclear Waste (ACNW) discussed matters, highlights of which are documented in this summary report. Subsequently, the Committee issued the following reports:

REPORTS

**161<sup>st</sup> Meeting**

- C Report to Nils J. Diaz, Chairman, NRC, from Michael T. Ryan, Chairman, ACNW, Subject: Response to the Occupational Safety and Health Agency Request for Information on Ionizing Radiation, dated July 27, 2005
- C Report to Nils J. Diaz, Chairman, NRC, from Michael T. Ryan, Chairman, ACNW, Subject: Report on Selected NRC-Sponsored Technical Assistance Programs at the Center for Nuclear Waste Regulatory Analyses, dated August 3, 2005

**162<sup>nd</sup> Meeting**

- C Report to Nils J. Diaz, Chairman, NRC, from Michael T. Ryan, Chairman, ACNW, Subject: Draft Revised Decommissioning Guidance to Implement the License Termination Rule, dated August 12, 2005

## HIGHLIGHTS OF KEY ISSUES CONSIDERED BY THE COMMITTEE

### 161<sup>st</sup> Meeting

#### 1. Development of Risk-Informed Regulations In the NRC and Their Application to the Nonreactor Arena

##### A. The Evolution of Risk-Informed Regulations

Ashok Thadani, Deputy Executive Director, Advisory Committee on Reactor Safeguards (ACRS)/ACNW, briefed the Committee on the evolution of risk-informed regulation and how the science of probabilistic risk assessment (PRA) has developed over the last 35 years. Mr. Thadani said that NRC is now able to quantify with some confidence the low probability of occurrence of severe accidents and to use this information in making important regulatory decisions. Reactor vendors and plant operators in the U.S. now routinely use PRA insights to modify plant designs and operating procedures and make the likelihood of severe accidents even less probable. Mr. Thadani described NRC use of these insights to focus regulatory activities on the areas that have the most impact on safety. He identified areas needing further development and concluded that NRC's commitment to increased use of PRA, coupled with a strong technical basis, will support nuclear safety as the bottom line.

##### B. Risk-Informing Nonreactor Regulatory Activities

John Flack, Senior Technical Advisor to the ACRS/ACNW, gave an overview of the similarities and differences between reactor and nonreactor PRA applications. He discussed the guiding principles of risk-informed integrated decisionmaking and compared the reactor applications with nonreactor technologies. He said the challenges of applying risk information to nonreactor activities included startup costs, community acceptance, and perception of risk-based (versus risk-informed) decision-making. Mr. Flack also discussed NRC's risk-informed initiatives in the nonreactor areas and previous ACNW recommendations, including potential enhancements to the regulatory process.

### Conclusions/Action Items

The Committee will consider the information presented by Mr. Thadani and Mr. Flack during their formal review of the Office of Nuclear Material Safety and Safeguards (NMSS) draft document entitled "Risk-Informed Decision-Making for Nuclear Material and Waste Application." The Committee plans to write a letter on the risk-informed guidance document and associated regulatory initiatives. The Committee requested that the draft document be made publically available so that the Committee can begin its formal review.

2. ACNW's Followup to the May 2005 Visit to Japan Followup

During May 14–21, Chairman Ryan, Vice-Chairman Croff, and Member Clarke conducted a technical exchange with nuclear regulators and officials in Japan. They also toured a high-level waste (HLW) demonstration site in Horonobe and visited the Rokkasho-mura and Tokai-Mura nuclear complexes. ACNW staff member Neil Coleman accompanied the members.

Highlights of this trip were discussed at the July ACNW meeting, including Japanese efforts to define categories of nuclear waste, their attempts to locate a HLW repository site, Japan's development of two HLW demonstration projects, waste package design, HLW storage, preparations for reprocessing HLW, and low-level radioactive waste (LLW) handling and disposal.

Conclusions/Action Items

Details of this trip to Japan have been documented in a trip report (NRC ADAMS Accession No. ML0520003450). This trip provided a valuable exchange of technical and regulatory information on fuel cycle and waste disposal issues. Given the pace of program advancement in Japan, ACNW recommends and encourages similar NRC exchanges in the future, both in the U. S. and in Japan.

3. Occupational Safety and Health Administrations's (OSHA) Request for Additional Information (RFI) on Ionizing Radiation

Chairman Ryan read the contents of a Committee letter responding to OSHA's request, which the Committee members voted to send to the Commission. The letter included various sources of data on occupational exposure to ionizing radiation. It concluded that existing radiation safety programs and the current regulatory infrastructure provide adequate radiation protection to workers.

Ralph Anderson of the Nuclear Energy Institute (NEI) provided his organization's view on worker radiation safety in the nuclear industry. He provided data on measurable worker dose in the nuclear power industry. The data indicated a clear trend in worker dose reduction since 1984, which NEI credited to robust "as low as reasonably achievable" (ALARA) programs and a protective regulatory framework.

Conclusions/Action Items

The ACNW letter was forwarded to the Commission, recommending that the Commission provide a response to OSHA consistent with ACNW's view that existing programs provide adequate radiation protection to workers.

4. ACNW Low-Level Radioactive Waste Management Paper: Draft No. 2

The ACNW staff proposed to the Committee a slightly revised scope for the proposed paper. The Committee did not provide comments since it had not yet had enough time to complete the review of the new information.

Alan Pasternak, Cal Rad Forum, participated by telephone. He urged the Committee to expand the scope of the LLW paper to include what he described as the failure of states to address the Low-Level Waste Policy Act, as amended, and the failure of to provide adequate LLW storage capacity.

Conclusions/Action Items

The Committee and staff will continue to review and refine the white paper.

5. Staff Briefing on International Atomic Energy Agency (IAEA) Requirements Document DS-154, "Design and Operation of Facilities for Geological Disposal of Radioactive Waste"

The International Atomic Energy Agency (IAEA) is concerned about the safe management of long-lived radioactive wastes. The IAEA's Waste Safety Standards Advisory Committee (WASSAC) is developing a set of safety requirements for planning, designing, operating, and closing a geologic repository. Recently, the WASSAC completed an initial draft of a safety guide entitled "Design and Operation of Facilities for Geological Disposal of Radioactive Waste," DS-334. DS-334 provides general guidance to policy makers, regulators, and operators concerned with the development and regulatory control of such facilities. Supporting DS-334 is another IAEA/WASSAC safety requirements document—DS-154, entitled "Geological Disposal of Radioactive Waste." This companion document describes specific safety objectives for both the pre- and post-closure phases of repository operations.

At its 161<sup>st</sup> meeting, the NRC staff provided the Committee an information briefing on the latest version of DS-154. Speaking for the NRC staff, Timothy McCartin summarized the guidance document. The current revision is undergoing internal IAEA review before release to IAEA member countries for approval and is not publicly available for inspection. He said that because of the relative maturity of the domestic HLW disposal program, the NRC has played a leadership role in the development of DS-154. He noted that the NRC staff participated in WASSAC activities to (a) ensure the compatibility of its regulatory programs with international standard-setting efforts and (b) improve public confidence in IAEA programs. Mr. McCartin also said the staff has taken the position the draft safety requirements in DS-154 are generally consistent with NRC's site-specific repository regulations in 10 CFR Part 63.

When the IAEA has approved DS-154, the Department of State will coordinate the final review by the NRC, the U.S. Environmental Protection Agency, and the U.S. Department of Energy.

Conclusions/Action Items

This briefing was for information only.

6. Review of Generic Waste-Related Research in the Office of Nuclear Regulatory Research (RES)

William Ott, RES, described RES-sponsored waste safety research programs. The research addresses various performance assessment issues and was primarily defined by user need requests. Funding for this work is limited, and RES makes extensive use of cooperative research arrangements. The research topics are source characterization, barrier performance, flow models, reactor transport models, transport calculations, dose assessment, and performance monitoring. Dr. Ott described the past and planned accomplishments of these programs and proposed to develop a plan for interactions with the ACNW over the next year.

Conclusions/Action Items

The ACNW will work with RES to develop a plan for ACNW-RES interactions and incorporate the plan into its FY 2005–FY2006 schedule. The ACNW plans to work on a report to the Commission during its August 2–4, 2005, ACNW meeting.

7. Office of Nuclear Regulatory Research White Paper on Collective Dose

The Committee was briefed by and held discussions with representatives of RES regarding development of a white paper on the staff's proposed uses of collective dose in making regulatory decisions. Calculating very small doses to large numbers of people is not a true measure of risk and may not even be a useful surrogate measure of risk. The staff described several options for using collective dose in NRC's regulatory work:

- C Truncate individual doses at a nominal value.
- C Do not use collective dose for populations where almost everyone is estimated to receive a lifetime dose of less than 10 rem beyond natural sources (the formal position of the Health Physics Society).
- C Calculate individual doses for members of a critical group and instead of calculating a collective dose.
- C Use a hypothetical Commission-approved criterion to judge the significance of a collective dose calculation.

The NRC staff discussed the advantages and disadvantages of each of the options. Chairman Ryan commented that the very small doses being discussed are not meaningful because they are usually dwarfed by medical exposures, background

radiation exposure, and uncertainties in estimation of doses calculated from sources of interest. He suggested that quantitative tests should be used to show whether sufficient statistical power exists to interpret collective dose in light of these uncertainties.

#### Conclusions/Action Items

The Committee will draft a letter to the Commission for review and finalization at an upcoming ACNW meeting.

#### 8. Election of ACNW Officers

The Committee reelected Michael T. Ryan and Allen G. Croff to the positions of Chairman and Vice Chairman, respectively, of the ACNW for a 1-year term ending June 30, 2006.

### **162<sup>nd</sup> Meeting**

#### 1. Working Group on Waste Determinations

The purpose of the working group (WG) meeting on waste determinations was to (a) inform the Committee members of the history and practice of non-high-level waste determination activities by DOE and NRC, waste determination provisions in the National Defense Authorization Act of 2005, and status of the approaches, technologies, and practices for waste retrieval and processing and onsite disposal and monitoring; and (b) identify pertinent waste determination considerations to be addressed in any followup waste determination activities by the Committee, with an emphasis on advice and recommendations to the Commission on a waste determination standard review plan (SRP) that the staff is currently developing and on a long-term strategy for ACNW waste determination review activities.

The WG meeting included sessions on four topics:

**Session 1-Introduction and Background:** Two invited speakers from DOE and NRC discussed their agencies' respective roles in waste determinations. The DOE speaker discussed current and planned management of incidental waste at tank sites managed by DOE. The NRC speaker addressed the agency's involvement in waste determination evaluations.

**Session 2—Retrieval and Processing Technology :** This session included five presentations. Four invited experts addressed state-of-the-art and research and development technologies, including fluidic and robotic technologies for (a) removal of waste from tanks and technologies for removing common radionuclides and (b) determining the volume and composition of residual tank waste. A fifth expert gave a historical perspective on the definition of "highly radioactive waste" in the regulations and in practice. There was also a roundtable discussion of Session 2 topics.

**Session 3—Waste Disposal and Performance Assessment:** This session included four presentations. Two invited experts discussed the status of technology for using cementitious materials to stabilize waste and for predicting the durability of cementitious materials. The other two experts addressed performance assessment issues for near-surface disposal of LLW and decisionmaking considerations in waste determinations. There was also a roundtable discussion of Session 3 topics.

**Session 4—Monitoring Onsite Disposal:** Three invited speakers made presentations on the status of technology for environmental monitoring, monitoring issues for caps and subsurface barrier walls, and nondestructive testing and monitoring technology for existing concrete structures. There was also a roundtable discussion of Session 4 topics. The roundtable also included two participants from RES.

**A. Main Findings**

1. The WG meeting identified pertinent waste determination issues to be considered in followup waste determination activities by the Committee, including advice on a waste determination SRP that the NRC staff is currently developing, and a long-term strategy for ACNW waste determination activities. Issues that have been identified include the availability of tank space for removal and treatment of waste, performance and durability of cementitious materials and concrete structures, performance assessment issues (including modeling and monitoring), a practical definition of highly radioactive waste, and considerations in ALARA determinations.
2. There is a need and an opportunity for RES undertake integrated research in the areas of modeling and performance monitoring to support the waste determination reviews by the NRC staff.

**B. Proposed Followup Action**

The Committee will use the findings to develop recommendations and advice to the Commission on the waste determination SRP development and staff waste determination reviews. The Committee will undertake several follow-up activities to supplement the Members' understanding of the waste determination issues and DOE operations: (i) Committee Members will visit some of the affected DOE sites (Savannah River, South Carolina; Hanford, Washington; INEEL, Idaho; and the West Valley Demonstration Project, New York); (ii) an ACNW staff member will observe in a waste tank retrieval demonstration by a DOE contractor; (iii)

ACNW Members and/or staff will attend a public meeting that the NMSS staff plans to hold in October 2005 to discuss the scope of the SRP (as part of the SRP development); and (iv) the Committee will review the draft SRP when it is issued in the spring of 2006.

#### Conclusions/Action Items

The Committee will prepare a letter with its early input into NMSS efforts to develop a waste determination SRP.

Committee Members and/or staff will participate in the NMSS public meeting on waste determinations.

The Committee will incorporate waste determination activities in the ACNW Action Plan for FY 2006.

## 2. Status of Repository Design Issues

Representatives of the NMSS' Division of High-Level Waste Repository Safety (DHLWRS) briefed the ACNW on the status of precicensing consultations in the area of geologic repository operations area (GROA) design. NMSS staff stated that the NRC staff (and its technical assistance contractor, the Center for Nuclear Waste Regulatory Analyses) conducted focused precicensing reviews of available DOE technical basis documents expected to support the pre-closure GROA design aspects of the license application in 2003/2004. The intent of this internal review was to determine the level of design detail in DOE's 2003 GROA design concept.

The NRC staff noted that the principal outcome of their internal review was the identification of GROA design areas for which DOE may need to develop additional engineering detail and/or analyses. The staff's determination essentially represents informal expert judgment based on operational and licensing experience and risk insights, taking into account available design and analytical information from DOE. During a June 1, 2005, technical exchange, the NRC and DOE staffs agreed to conduct a series of technical exchanges through the rest of 2005 to discuss the DOE's approach to documenting the engineering detail and/or analyses the NRC staff was expecting in the DOE license application. These areas (listed below) are generally considered "items important to safety" and therefore should be on DOE's Q-list for the purposes of quality assurance.

C Aging Pad for Spent Nuclear Fuel (SNF)	C Pre-Closure Safety Assessment (PCSA) Process
C Aircraft Hazards	C Pre-Closure Criticality
C Commercial SNF Handling in a Dry Environment	C Pre-Closure Seismic Design
C Design and Classification of Electrical Systems	C Pre-Closure Consequences and Worker Doses
C Fuel Behavior and Release Fractions	C Structural Analyses for Aircraft Impact
C Information Available at License Application	C Technical Specifications
C Material Handling	C Waste Package Transporter and Gantry
C Nonstandard Equipment	

#### Conclusions/Action Items

The ACNW will track the staff's progress in the staff's meetings with DOE on the design-related subjects identified above. The staff has also committed to give the Committee an information briefing on the overall outcome of these technical exchanges when they are completed in late 2005.

#### 3. ACNW Low-Level Waste White Paper, Draft 3

Dr. Ryan recommended that the LLW paper be divided in two parts: a primer on history and a path forward. ACNW staff will continue to revise Part I - History. The Committee will await the completion of Part I in order to work on the forward looking part of the paper.

#### Conclusions/Action Items

Dr. Ryan and the ACNW staff will continue review and research of the existing draft.

4. Proposed Agenda for the 163<sup>rd</sup> ACNW Meeting

The ACNW agreed to consider the following topics at its 163<sup>rd</sup> meeting on September 20–22, 2005:

- C DOE Overview on Status of Yucca Mountain Project
- C 2005 Update to the DOE Performance Confirmation Program Plan
- C NRC Project Plan for the Yucca Mountain License Application Review
- C ACNW Low-Level Radioactive Waste White Paper Status Report
- C ACNW Subcommittee Report on DOE Probabilistic Volcanic Hazards Analysis (PVHA) Workshop No. 2
- C 1995 National Academy of Sciences Recommendations for Yucca Mountain Standards and the 2004 Court Remand
- C Evolution of Climate in the Yucca Mountain Region Over the Next Million Years
- C An Approach to the Modeling of Magma/Repository Interactions
- C ACNW Summer Intern Project: Modeling a Volcanic Ash Plume
- C ACNW Subcommittee Report on August 2005 Savannah River and Barnwell LLW Disposal Site Visits
- C ACNW Public Outreach Meeting
- C ACNW Retreat (partially closed)

Sincerely,

**/RA/**

Michael T. Ryan  
Chairman

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