



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

ACNWS-0160

January 24, 2006

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

Dear Chairman Diaz:

SUBJECT: SUMMARY REPORT—166TH MEETING OF THE ADVISORY COMMITTEE ON NUCLEAR WASTE, DECEMBER 13–14, 2005, AND RELATED ACTIVITIES OF THE COMMITTEE

During its 166th meeting, December 13–14, 2005, the Advisory Committee on Nuclear Waste (ACNW) discussed several matters and completed the following reports, letters, and memoranda.

REPORTS

Reports to Nils J. Diaz, Chairman, NRC, from Michael T. Ryan, Chairman, ACNW:

- C West Valley Demonstration Project (WVDP) - ACNW Working Group Meeting, dated December 23, 2005
- C Opportunities in the Area of Low-Level Radioactive Waste Management, dated December 27, 2005
- C Observations of Stakeholder Participation in Recent Meetings of the Advisory Committee on Nuclear Waste (ACNW), dated December 27, 2005

HIGHLIGHTS OF KEY ISSUES

1. U.S. Nuclear Regulatory Commission's (NRC's) Plans for the Implementation of a Dose Standard After 10,000 Years

The Committee was briefed by Timothy McCartin of NRC's Office of Nuclear Material Safety and Safeguards (NMSS) staff and via videoconference by Gordon Wittmeyer of the Center for Nuclear Waste Regulatory Analyses. The presentation covered the following topics:

- C the purpose of the proposed 10 CFR Part 63 revisions
- C variations in radionuclide inventory in a repository from 1,000 to 1 million years
- C dose conversion factors for performance assessments
- C NRC specification of values to represent climate change beyond 10,000 years [the Department of Energy will use a log-uniform range of deep percolation rates from 13 to 64 mm/year (0.5 to 2.5 inches/year)]

- C status of proposed revisions to 10 CFR Part 63 (the NRC comment period ended December 7, 2005)

NRC will consider the public comments on Part 63 and expects to finalize its regulation shortly after the U.S. Environmental Protection Agency (EPA) finalizes its standard. The comment period for EPA's 40 CFR Part 197 ended on November 21, 2005.

Committee Action

The ACNW will prepare a letter commenting on the staff's proposed revisions to Part 63 and the approach to climate change in the post-10,000 year time frame. The Committee plans to request a future briefing on how the staff considered and addressed public comments on Part 63.

2. Reasonableness of NRC Infiltration Assumptions in the Proposed 10 CFR Part 63

The Committee was briefed by two experts on the chloride mass-balance method, a technique that has been used to evaluate groundwater recharge at Yucca Mountain. Ward Sanford (USGS) gave an overview of the methodology and summarized the results for field localities in northern Texas and Albuquerque, New Mexico. Dr. Sanford said recharge in the Basin and Range Province tends to be spatially distributed at high elevations, is focused by runoff into channels at intermediate elevations, and is minimal at lower elevations. Also, high temporal variability in precipitation leads to greater recharge in focused events. Dr. Sanford reported recharge rates for Yucca Mountain based on data from boreholes SD-7 and UZ-14. The estimated Holocene rate was 7-8 mm/yr, and the Pleistocene recharge rate was 11-40 mm/yr.

Chen Zhu (Indiana University) was lead author of a paper (cited in NRC's September 8, 2005, *Federal Register* notice) on "Implementation of a Dose Standard After 10,000 Years." He described the challenges of estimating infiltration rates in arid regions. Dr. Zhu outlined the chloride mass-balance method and the assumptions commonly made in applying this technique. At Yucca Mountain the saturated zone groundwater at the water table was probably recharged from a distance and is not representative of local recharge. Dr. Zhu studied perched water bodies above the water table and concluded that they probably represent a mixing of Holocene and Late Pleistocene recharge. For Yucca Mountain, he and his coauthors have estimated a Holocene recharge rate of 5 ± 1 mm/yr, and a Late Pleistocene recharge of 15 ± 5 mm/yr.

Committee Action

The ACNW will prepare a letter on the staff's proposed revisions to Part 63 and the approach to climate change in the post-10,000-year time frame. This letter will also consider material on climate change presented at the ACNW meeting in September 2005.

3. White Paper on Low-Level Radioactive Waste (LLW)

During a briefing of the Commission in 2005, the ACNW agreed to examine some of the issues surrounding the lack of progress in the national program to manage the disposal of commercial low-level radioactive waste (LLW). As a first step, the Committee (with support from its staff) undertook to develop a White Paper that briefly examines the history and current status of commercial LLW disposal in the United States. The White Paper was also to examine the staff's reasoning and approach to developing the LLW disposal regulations in 10 CFR Part 61.

During this meeting, the ACNW's Chairman, Dr. Michael T. Ryan, reviewed the format and content of the ACNW LLW White Paper. Dr. Ryan said the White Paper was substantially complete and was on track for submission to the Commission by the December 30, 2005, due date. He said the White Paper provides an abridged examination of NRC's LLW regulatory program and is based on a review of key literature sources. He also noted the White Paper includes a summary of past ACNW advice in the area of LLW. Dr. Ryan reviewed the outline of the White Paper and noted that it has three parts:

- a history of the national LLW program
- a description of NRC's LLW regulatory framework in Part 61
- a summary of past ACNW advice on LLW disposal

The White Paper also includes four appendices:

- the structure of Part 61
- the final Commission policy statement on the use of probabilistic risk assessment methods in NRC regulatory activities
- the evolution of the regulatory definition of LLW
- a summary of NUREG-1573, "A Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities"

Because of time constraints or other ongoing reviews, the paper did not consider international approaches to the management of commercial LLW, domestic approaches to the management of chemically hazardous mixed radioactive wastes, and DOE's approaches to managing noncommercial LLW. The White Paper benefitted from the informal reviews of staff and management from NMSS and the Office of Nuclear Regulatory Research (RES).

Committee Action

The Committee approved a transmittal letter for the White Paper at this meeting. The letter included a tentative list of aspects of the existing LLW regulation that could be better risk-informed. The Committee intends to hold a working group meeting on LLW later this year to hear stakeholders' views on the issues affecting the national LLW program.

4. NMSS Office and Division Directors Briefings

Jack Strosnider, NMSS Office Director, and two division directors, William Reamer and Larry Camper, briefed the ACNW on current and emerging waste management issues within NMSS.

Jack Strosnider spoke about the value of the ACNW-NMSS interactions. He said NMSS is committed to continuously improving its programs to ensure that they are focused on the right topics. He cited the collaboration with ACNW on the NMSS decommissioning workshop, the ACNW meeting on waste determination, the visit to DOE's Savannah River Site, and the ACNW meeting on the West Valley performance assessments as examples of obtaining input from the Committee and other stakeholders. He anticipates continued coordination in the future, especially on the LLW White Paper and high-level waste issues. NMSS plans to ask the Committee to review over 35 topics in CY 2006.

William Reamer, Director of the Division of High-Level Waste Repository Safety, discussed the implications of the Yucca Mountain license application delay. Mr. Reamer said DOE has not provided a schedule for the application. Because of the uncertainty of DOE's resources and budget, it is not clear how much interaction it plans to have with NMSS during the pre-application phase. Mr. Reamer summarized some of DOE's plans:

- A simpler, cleaner approach to fuel handling. This will involve the use of transport aging and disposal (TAD) containers. Changes to the container design will result in changes to the design of the surface facility at the repository. Less handling of spent fuel is anticipated.
- Replacement of the moisture infiltration model. DOE plans to complete the modeling and technical analyses needed to support compliance with the proposed revised EPA standard. NMSS plans to revise its total-system performance assessment (TPA) code and the Yucca Mountain Review Plan within the next year to make them consistent with the EPA standard.
- A potential move to a "cold" repository.

As a result of DOE's new plans, NMSS will update the risk insights baseline. So far, NMSS has completed 258 of the 293 technical issue agreements. It has requested additional information from DOE on 29 issues.

Larry Camper, Director of the Division of Waste Management Environmental Protection, said his interactions with the Committee have been extremely useful. He discussed several emerging issues in the management of LLW:

- In early 2006, the division will make recommendations to the Commission on long-term storage of LLW and development of guidance for LLW. The staff assumes that the Barnwell LLW facility will close.
- NMSS is closely observing the interactions of the DOE, the State of Texas, and the waste control specialist regarding the LLW site in Andrews, Texas.

- NMSS is observing the National Academy of Sciences study on low-activity waste and the Government Accountability Office activities, including studies on international approaches to the management of LLW.
- Staff will work as a commenting agency with DOE on the greater-than-Class C (GTCC) environmental impact statement.
- As organizations continue to look for better way to manage low activity waste, NMSS expects a great deal of interest in alternate disposal under the 20.2002 process in Resources and Conservation Recovery Act hazardous waste facilities and solid waste landfills.
- NMSS is interested in the Committee's work on risk-informing Part 61. Mr. Camper said that, like many regulations, Part 61 has flaws, but NMSS must consider its limited resources in revising the regulation and the guidance.
- The Commission recently directed the staff to consider whether the quantities of depleted uranium in the waste stream from uranium enrichment facilities warrants amending the waste classification tables of Part 61. The staff is developing a position paper in response to this direction.
- NMSS recently held a public meeting to solicit comments on the scope of the standard review plan for waste determinations. The staff plans to publish the standard review plan in 2006.
- In December 2005, the NRC staff sent a letter to DOE providing draft interim guidance on the application of concentration-averaging principles. The interim guidance was based on 1995 guidance, and it attempted to clarify for DOE how to determine if it had greater-than-Class C or Class C waste.

Mr. Camper also discussed specific waste determination and decommissioning activities.

Mr. Croff asked if there was a dialogue between NMSS and DOE concerning fuel cycle and waste issues that might emerge in the future due to a new generation of advanced reactors. Bill von Til (Office of Fuel Cycle and Safeguards staff) said he would provide an answer to the ACNW later. John Flack (ACNW staff) asked about NMSS plans to enact new responsibilities under the Energy Policy Act of 2005. NMSS indicated that the responsible division, the Division of Industrial and Medical Nuclear Safety (IMNS), is currently working with the Advisory Committee on the Medical Use of Isotopes on the naturally occurring or accelerator-produced radioactive material/naturally occurring radioactive material rulemaking. Because of the tight schedule, IMNS will find it difficult to interact with the ACNW as well.

Committee Action

The ACNW agreed to coordinate with NMSS and DOE on similar proposed briefing topics to increase the productivity of discussions. (The ACNW staff provided the information to the NMSS coordinators on December 16, 2005.)

5. Generalized Composite Modeling

William Ott, RES, and James Davis, U.S. Geological Survey (USGS), briefed the Committee on the generalized composite modeling approach and its applications to the Naturita site. This work is documented in NUREG/CR-6871 (2005).

The USGS work on the demonstration of a generalized composite approach to site modeling was based on work done at Alligator Rivers and was later extended to modeling uranium migration at the Naturita site. Sandia National Laboratories and Johns Hopkins University provided the information used for the characterization of minerals and coatings.

The objective of this study is to determine a “surface complexation” modeling approach at field scale for estimating distribution coefficient (k_d) values and the retardation of a sorbing radionuclide with complex aqueous chemistry. The Uranium Mill Tailings Remediation Act site near Naturita, Colorado, was chosen for this demonstration because it had a well-developed uranium plume and a shallow alluvial aquifer and had spatially variant chemical conditions that were believed to be important influences on uranium transport and retardation. In his presentation, Dr. Davis made the following points:

- C Current reactive transport models can accommodate the surface complexation concept to describe retardation of inorganic contaminants during transport. Use of the k_d concept is no longer required.
- C Semiempirical surface complexation modeling can reduce transport modeling uncertainty with respect to sorption under conditions of temporally variable chemical conditions in groundwater.
- C Spatial variability in groundwater chemistry may be a more important influence on the retardation of strongly absorbing species than is the variability in the surface properties of aquifer materials at the kilometer scale.
- C Predictions based on a range of site-specific k_d values do not always bracket simulation results obtained using the semiempirical surface complexation models. Random sampling of a k_d distribution may overlook the spatial character of the distribution.

Committee Action

This briefing was for information only. ACNW comments will be provided in the Committee’s report on RES-sponsored waste safety research.

6. Preparation for Commission Briefing on January 11, 2006

The Committee reviewed and finalized slides for the Commission briefing on January 11, 2006.

Committee Action

The Committee will do a dry run of its presentations during its January 2006 meeting.

RECONCILIATION OF ACNW COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

During its Planning and Procedures meeting on December 14, 2005, the Committee considered the Executive Director for Operations' (EDO's) December 5, 2005 response to the comments in the October 27, 2005, ACNW report on the NRC staff's project plan for the Yucca Mountain license application review.

The Committee also considered the EDO's November 2, 2005, response to the comments in the September 29, 2005, ACNW report on the staff's preclosure review preparations for the potential Yucca Mountain repository.

The Committee decided that it was satisfied with the EDO's responses to these reports.

LIST OF MATTERS FOR THE ATTENTION OF THE EDO

- NMSS plans to brief the Committee on depleted uranium issues in 2006.
- NMSS will update the Committee on the impact of and NMSS's response to the Energy Policy Act of 2005.
- NMSS will provide to the Committee any plans it has for discussions with DOE on fuel cycle or waste issues related to advanced reactors.

PROPOSED SCHEDULE FOR THE 167TH, JANUARY 10–12, 2006, ACNW MEETING

The Committee agreed to consider the following topics during the 167th ACNW meeting on January 10–12, 2006:

- C Status of Risk-Informed Decisionmaking for Nuclear Materials and Waste Application
- C Fabrication of Pressurized Water Reactor Uncanistered Fuel Waste Package Prototype
- C Spent Fuel Transportation Package Response to the Baltimore Tunnel Fire Scenario (NUREG/CR-6886)
- C White Paper on Transportation
- C Source Characterization (Spatial Analysis and Decision Assistance Code)
- C Use of Dedicated Trains for Transportation of High-Level Radioactive Waste and Spent Nuclear Fuel

The Honorable Nils J. Diaz

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C Preparation for Commission Briefing

C Discussion of Draft and Possible Letters and Reports

Sincerely,

/RA/

Michael T. Ryan
Chairman