



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

ACNWS-0157

November 30, 2005

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

SUBJECT: SUMMARY REPORT—163RD MEETING OF THE ADVISORY COMMITTEE
ON NUCLEAR WASTE, SEPTEMBER 20–22, 2005, AND OTHER RELATED
COMMITTEE ACTIVITIES

Dear Chairman Diaz:

During its 163rd meeting on September 20–22, 2005, at Pacific Enterprise Plaza Building One, 3250 Pepper Lane, Henderson, Nevada, the Advisory Committee on Nuclear Waste (ACNW) discussed several matters and completed the following reports:

REPORTS

- C Report to Nils J. Diaz, Chairman, NRC, from Michael T. Ryan, Chairman, ACNW, Subject: Review of Staff's Preclosure Review Preparations for the Proposed Yucca Mountain Repository, dated September 29, 2005
- C Report to Nils J. Diaz, Chairman, NRC, from Michael T. Ryan, Chairman, ACNW, Subject: Comments on USNRC Staff Recommendation of the Use of Collective Dose, dated September 30, 2005

HIGHLIGHTS OF KEY ISSUES

1. Status of the Yucca Mountain Project

It has been customary to have a senior representative from the U.S. Department of Energy (DOE) brief the ACNW on the status of DOE's Yucca Mountain program when the Committee meets in Las Vegas. The principal focus of past DOE presentations was the Department's progress on site characterization work. With this work now substantially complete, the focus of the discussions has turned to DOE's readiness to submit a construction authorization license application.

At present there is no official information on when DOE expects to submit its license application to the NRC. Several programmatic developments over the last year may have adversely impacted DOE's repository program and schedules. At its 163rd meeting, Dr. J. Russell Dyer, representing DOE, briefed the Committee on the schedule for the following matters:

- the status of the overall project, including the status of the license application submittal
- the status of the Licensing Support Network certification status

- the 2005 U. S. Geological Survey e-mail controversy
- the update of the 1996 Probabilistic Volcanic Hazards Analysis expert elicitation
- the safety-conscious work environment review
- the update of the Nevada Rail transportation environmental impact statement

Committee Action

None at this time. This presentation was for information.

2. 2005 Update to the DOE Performance Confirmation Program Plan

Deborah Barr of DOE briefed the Committee on DOE's Performance Confirmation (PC) Plan for Yucca Mountain. A PC plan will be included in any DOE license application requesting authorization to construct a geologic repository. Ms. Barr talked about how the PC plan has evolved, summarized currently planned activities, described how the PC program would respond to change, and said how the results would be used in future performance assessments. Ms. Barr noted that the process for selecting PC activities was risk informed. The process focused on the highest risk areas to determine the activities needed to test the total system and barriers important to waste isolation.

Committee Action

The ACNW has asked the NRC staff to brief the Committee on the staff's views of DOE's PC Plan either at the January or February 2006 ACNW meetings .

3. NRC Project Plan for the Yucca Mountain License Application Review

Jeffrey Ciocco gave an overview of a project plan that the Division of High-Level Waste Repository Safety (DHLWRS) and Center for Nuclear Waste Regulatory Analyses (CNWRA) will follow in reviewing a potential DOE license application (LA) for a high-level waste geologic repository at Yucca Mountain. Mr. Ciocco described the project management approach and the LA review process, and discussed the path forward. He said the outcome of the LA review is a safety evaluation report (SER). Elmo Collins, Deputy Director with the DHLWRS, added that the development of the project plan was a major effort and that the DHLWRS is well positioned to receive an LA. Discussions by the ACNW members and staff covered the public involvement in the LA review process; contingency planning; adoption of the environmental impact statement (EIS); the review schedule, including the RAIs; skill and resource availability and utilization; and conflict-of-interest issues.

Committee Action

The Committee agreed to write a letter to the Commission with comments on the project plan. The ACNW will continue to follow the project plan update and the plan implementation practices.

4. ACNW Subcommittee Report on DOE Probabilistic Volcanic Hazards Analysis (PVHA) Workshop

ACNW member William Hinze, consultant Bruce Marsh, and ACNW staff member Neil Coleman provided their observations from the August 2005 DOE PVHA expert elicitation workshop. Their observations included the early results from the exploratory drilling program to locate buried basalts. They provided comments about a recent volcanism article by G. Smith in EOS, the PVHA panel use of volcanism analog studies, the panel decision to use reconnaissance dating methods to more quickly obtain basalt ages, and availability to the panel of a new geophysical data set (free air gravity anomaly). DOE has drilled the first of the magnetic anomalies targeted in the exploratory program. DOE did not expect to find basalt in this borehole but did locate what is probably very old basalt (approximately 1 million years old) based on its depth and relation to local stratigraphy. The age of this basalt will be confirmed in the near future by radiometric dating.

Committee Action

The Committee is preparing a trip report. The Committee plans to continue observing future meetings of the PVHA panel. The next meeting is scheduled for April 2006.

5. Evolution of Climate in the Yucca Mountain Area Over the Next Million Years

Dr. Mark Huber of Purdue University talked about projected climate trends in the Yucca Mountain region and discussed the possible implications for the regional groundwater flow system. He said that considerable advances have been made in global climate modeling over the last decade. Dr. Huber discussed present-day controls on precipitation at Yucca Mountain and reviewed the possible role of greenhouse gases on future climate change. He said fully coupled climate models can only reproduce the climate variability of the last 150 years by taking into account anthropogenic greenhouse gases and natural (solar, volcanic) variability. Calculations of orbital forcing suggest that no ice age will occur in the next 50,000 years, even in the absence of enhanced greenhouse gases. Approximately 400,000 years may pass before the next ice age. Dr. Huber said the carbon cycle of the biosphere will take a long time to neutralize and sequester anthropogenic carbon dioxide. It is estimated that 10-15 percent of the fossil fuel carbon will still be in the atmosphere 10,000 years from now. This is very different from the estimates published in the Yucca Mountain literature, according to which anthropogenic carbon dioxide will go away quickly and pluvial climates will return in a few thousand years.

Committee Action

This was an informational briefing. The material will be considered in the future when the staff presents its approach to future climate change and infiltration at Yucca Mountain.

6. An Approach to the Modeling of Magma-Repository Interactions

Dr. Bruce Marsh of Johns Hopkins University, an ACNW consultant and expert in magma physics, gave a presentation on how this very unlikely but potentially disruptive event might be modeled for the purposes of a Yucca Mountain performance assessment. The title of his talk was "Magma Interactions with the Repository: The Effects of Solidification." He described the formation of basaltic dikes and showed pictures of dikes and lava flow phenomena from various field locations. Dr. Marsh said any magma that entered a repository would quench on contact with engineered barriers or nuclear waste. A glassy layer would quickly form on the walls and contents of disposal tunnels. Large-scale convection of magma into the drifts would not occur. Dr. Marsh showed spectacular photos of tree casts in Hawaii, where flowing lava rapidly quenched on trees. The viscosity of magma is very sensitive to changes in pressure, volatile content, and the percentage of crystals in the magma. Consideration of these factors will make it possible to more realistically evaluate the potential interaction of magma with repository drifts.

Committee Action

The Committee is drafting a letter to the Commission on the topic of volcanism for review at the November ACNW meeting.

7. 1995 National Academy of Sciences (NAS) Recommendations for Yucca Mountain Standards and the 2004 Court Remand

In a decision dated July 9, 2004, the U.S. Courts of Appeals for the District of Columbia Circuit found that the 10,000-year compliance period (hereafter the time period of compliance or TOC) selected by the U.S. Environmental Protection Agency (EPA) for its Yucca Mountain site-specific radiation standards at 40 CFR Part 197 violated Section 801 of the Energy Policy Act of 1992 (EnPA). This decision was in response to a 2001 complaint filed by the State of Nevada that the EPA-specified 10,000 year timeframe for evaluating repository performance was not consistent with EnPA. In the decision the Court vacated the parts of the EPA standard (Part 197) and the NRC regulations (10 CFR Part 63) that refer to a 10,000-year TOC. EPA must now revise Part 197 to be consistent with the earlier NAS findings and recommendations. In a *Federal Register* notice dated August 22, 2005, EPA published its proposed revisions for public comment.

On August 1, 1995, the Committee on Technical Bases for Yucca Mountain Standards (TYMS) of the National Research Council issued its report, "Technical Bases for Yucca Mountain Standards." In the report¹ the TYMS Committee found that with respect to the length of TOC

¹National Research Council, "Technical Bases for Yucca Mountain Standards," Washington, National Academy Press, Commission on Geosciences, Environment, and Resources, July 1995.

that there was “no scientific basis for limiting the time period of the individual risk standard to 10,000 years or any other value” (p. 55). According to the TYMS Committee, “compliance assessment is feasible for most physical and geologic aspects of repository performance on the time scale of the long-term stability of the fundamental geologic regime—a time scale that is on the order of one million years at Yucca Mountain” (p. 6). The TYMS Committee also said that humans may not face peak radiation risks until tens to hundreds of thousands of years after the disposal of wastes, “or even farther into the future” (p. 2). The TYMS Committee thus recommended “that compliance assessment be conducted for the time when the greatest risk occurs, within the limits imposed by the long-term stability of the geologic environment” (*Op cit.*). In promulgating its now-vacated rule adopting a 10,000-year TOC, EPA expressed the view that TYMS Committee’s TOC recommendations were “not practical for regulatory decision-making” (66 FR 32,097).

During this meeting, the ACNW held discussions with two former members of the TYMS Committee: Robert Fri (Resources for the Future Visiting Researcher), who was the TYMS Committee Chairman,² and Dr. Fred Philips (New Mexico Institute of Mining and Technology/Socorro, Department of Earth and Environmental Sciences). The purpose of these discussions was to better understand the basis for and the intent of the original TYMS recommendations on site-specific radiation standards for Yucca Mountain. The Committee was also interested in the two TYMS members’ personal views on issues to be considered in addressing the court remand.

Committee Action

None at this time. This presentation was intended as background for future Committee discussions concerning the revisions that are now being proposed to the Yucca Mountain regulatory framework.

8. ACNW Summer Intern Project: Modeling a Volcanic Ash Plume

The density of deposited volcanic ash at various locations following a hypothetical intrusive igneous event is used to predict expected dose and is important to the risk studies of Yucca Mountain. NRC’s independent performance assessment computer code (TPA Version 4.1) uses the ASHPLUME model (Jarzemba et al., 1997³) to calculate the distribution and density of volcanic ash. The accuracy of the predicted results was limited by the ASHPLUME model itself and by the sampled input data. For example, the model does not incorporate vertical heterogeneity in either wind speed or direction, preventing the modeling of dispersion due to vertically varying wind velocities. Also, the wind direction parameter in ASHPLUME is currently deterministic and assumed to transport all released ash directly south to the location of the reasonably maximally exposed individual (RMEI). This approach is conservative and not realistic. There is

²This presentation was made via videoconference from the NAS’ office in Washington, D.C.

³Jarzemba, M. S., P. A. LaPlante, and K. J. Poor, “ASHPLUME Version 1.0— A Code for Contaminated Ash Dispersal and Deposition: Technical Description and User’s Guide,” San Antonio, Center for Nuclear Waste Regulatory Analyses, CNWRA 97-0004, Rev. 1, June 1997.

interest in examining alternative (more realistic) wind-direction-modeling scenarios at the Jackass Flats topographic drainage basin that includes the RMEI location.

Over the summer of 2005, an ACNW intern, Leah Spradley⁴, used another computer code, the HYSPLIT (Hybrid-Particle Lagrangian Integrated Trajectory) computer code (Draxler and Hess, 1997⁵) to calculate an alternative distribution and density of volcanic ash near Yucca Mountain. HYSPLIT is a publicly available computer code developed for the National Oceanographic and Atmospheric Administration or NOAA (Air Resources Laboratory/Silver Spring, Maryland). Ms. Spradley said that the HYSPLIT computer code calculates particle trajectories for complex particle dispersion and deposition simulations. She said the two codes are different in that HYSPLIT incorporates vertical heterogeneity by treating each particle trajectory as a random walk (allowing the particle to randomly move in other directions in addition to wind direction). To improve the realism of the modeling results, the HYSPLIT computer code can also integrate mesoscale site-specific meteorological data⁶ into the simulations. Ms. Spradley said this computational feature does not exist in the ASHPLUME computer code.

Ms. Spradley compared calculated results from the two different types of dispersion computer code models. She also discussed the significance of the calculated results and offered some preliminary recommendations on appropriate investigations and analyses on which to use the HYSPLIT computer code.

Committee Action

None at this time. This presentation was for information. The results of Ms. Spradley's analysis have already been communicated to the cognizant program staff member (Dr. Richard Codell) of the DHLWRS. The Committee expressed the wish that Ms. Spradley would consider returning to the ACNW next summer and do additional studies of volcanism using the HYSPLIT computer code.

9. ACNW Public Outreach Meeting

The NRC has a longstanding practice of providing the public with substantial information on its regulatory activities and safety responsibilities. This practice helps the agency to fulfill its strategic goal of increasing openness. Consistent with this goal, the ACNW has conducted regular public outreach sessions in Nevada over the last several years. The purpose of these public outreach sessions is listen to stakeholder's concerns about and perspectives on the

⁴Ms. Spradley is enrolled in Vanderbilt University's School of Engineering civil and environmental science doctorate program.

⁵Draxler, R.R., and G.D. Hess, "Description of the HYSPLIT-4 Modeling System," Washington, D.C., National Oceanographic and Atmospheric Administration, NOAA Technical Memorandum ERL ARL-224, December 1997.

⁶Currently, 9 months of this mesoscale data for the Yucca Mountain region is available to the NRC staff from five local weather stations. The meteorological data is available in 15 minute time intervals and 2-kilometer spaced locations for up to 4 day's predictions

proposed geologic repository at Yucca Mountain and to use this information to advise the Commission on stakeholders' views.

During this meeting, the ACNW conducted a public outreach session and heard from Dr. Jacob Paz, a private citizen and Las Vegas resident; Ms. Judy Treichel, representing the Nevada Nuclear Waste Task Force; Mr. Steve Frishman, representing the State of Nevada's Nuclear Waste Project Office; Dr. Atef Elzeftawy, representing the Las Vegas Paiute Tribe of Native Americans; and Mr. Mike Henderson, representing Congressman Jim Gibbons of Nevada's 2nd Congressional District, U.S. House of Representatives.

Committee Action

None at this time.

10. ACNW Retreat

On Thursday, September 22nd, the Committee and its staff held a retreat. The parts of this retreat that pertained to personnel and internal administrative issues were closed. During the retreat, the Committee and staff reviewed the Committee's performance so far against the ACNW 2005–2006 Action Plan. As appropriate, lessons learned were carried forward from this discussion to a later discussion of the Committee's planned activities for FY 2006. The Committee agreed on a tentative list of proposed workshops and reviews for the year. The Committee also began discussing the list of Tier I (top priority) and Tier II (secondary priority) subject areas for FY 2006. These discussions are expected to ultimately result in a revision of the ACNW Action Plan.

Committee Action

Action items were assigned to Committee members and staff.

11. Reconciliation of ACNW Comments and Recommendations/EDO Commitments

The Committee considered the following reports from the NRC's Executive Director for Operations (EDO) during its Planning & Procedures meeting September 20, 2005:

- C EDO response dated August 16, 2005, to ACNW letter dated July 21, 2005, on Comments on International Commission on Radiological Protection Foundation Documents—A Followup to the ACNW's November 3, 2004 Comments

The Committee was satisfied with the EDO's response.

- C EDO response dated August 19, 2005, to ACNW letter dated June 28, 2005, on Definition of a Timespan of Regulatory Compliance for a Geological Repository at Yucca Mountain

The Committee was satisfied with the EDO's response.

- C EDO response dated September 2, 2005, to ACNW letter dated August 3, 2005, on Report on Selected NRC-Sponsored Technical Assistance Programs at the Center for Nuclear Waste Regulatory Analyses

The Committee was satisfied with the EDO's response.

- C EDO response dated September 8, 2005, to ACNW letter dated July 27, 2005, on Response to the Occupational Safety and Health Agency Request for Information on Ionizing Radiation

The Committee was satisfied with the EDO's response.

12. Proposed Agenda for the 164th ACNW Meeting

ACNW agreed to consider the following topics at its 164th meeting on October 19–20, 2005:

- C Working Group Meeting To Discuss the Application of the Commission's Final Policy Statement on Decommissioning Criteria for the West Valley Demonstration Project (WVDP)
- C Consideration of Proposed ACNW Reports

Sincerely,

/RA/

Michael T. Ryan
Chairman

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