



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

ACNWS-0144

May 19, 2004

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

SUBJECT: SUMMARY REPORT—149TH MEETING OF THE ADVISORY COMMITTEE
ON NUCLEAR WASTE, APRIL 20–22, 2004, AND OTHER RELATED
COMMITTEE ACTIVITIES

Dear Chairman Diaz:

During its 149th meeting on April 20–22, 2004, the Advisory Committee on Nuclear Waste (ACNW) discussed several matters and completed the following reports to Nils J. Diaz, Chairman, U.S. Nuclear Regulatory Commission (NRC):

REPORTS

1. Review and Evaluation of the U.S. Nuclear Regulatory Commission's Radionuclide Transport Waste Safety Research Program, dated May 5, 2004
2. Risk Insights Baseline Report, dated May 3, 2004
3. Working Group Session on Biosphere Dose Calculations, dated May 3, 2004
4. Observations From the 147th Meeting of the Advisory Committee on Nuclear Waste in Las Vegas, Nevada, dated May 3, 2004

HIGHLIGHTS OF KEY ISSUES CONSIDERED BY THE COMMITTEE

1. Update on West Valley and Performance Assessment Plans

The NRC staff briefed the Committee on plans to decontaminate and decommission the West Valley Demonstration Project. The emphasis was on plans to conduct a performance assessment for the environmental impact statement and decommissioning plan that will demonstrate compliance with the Commission's license termination rule. Representatives from the Department of Energy and the New York State Energy Research and Development Authority participated through a video conference link.

Conclusions/Action Items

The ACNW plans to write a report to the Commission on this complex decommissioning site. The Committee plans to periodically review progress towards license termination.

2. Risk-Informed Regulation for the Office of Nuclear Materials Safety and Safeguards Activities

Christiana Lui, James Smith, and Alan Rubin gave the Committee an overview of the proposed risk-informed decisionmaking process in the Office of Nuclear Materials Safety and Safeguards (NMSS). Two pilot studies have been conducted to illustrate the risk-informed process and draft guidance—on dry cask storage and chemical agent detectors or monitors. The presentations covered the decisionmaking process and decision metrics for routine or normal exposures, accident risks, and cost-benefit analyses. Accomplishments to date include (a) development of draft guidance, (b) development of draft accident risk guidelines for the public and workers regarding nuclear materials and waste activities, (c) completion of two pilot studies, and (d) identification of key issues related to the use of the risk guidelines.

Conclusions/Action Items

The Committee plans to write a report to the Commission with its views on this activity.

3. Environmental Protection Agency Advanced Notice of Proposed Rulemaking, 40 Code of Federal Regulation Chapter 1, "Approaches to an Integrated Framework for Management and Disposal of Low-Activity Radioactive Waste: Request for Comment"

Dan Schultheisz, Project Manager, Office of Radiation and Indoor Air, Radiation Protection Division, Environmental Protection Agency (EPA), discussed the advanced notice of proposed rulemaking (ANPR) which was published in November 2003 with an extended comment period ending on May 17, 2004.

The ANPR was drafted in the belief that efficient disposal of low-activity waste is currently discouraged not only by the limited disposal options but also by dual and inconsistent regulation. These, as well as other factors, result in increased exposure and risk to human health and the environment. In addition to considering low-level waste, the ANPR also asks a number of questions on topics such as the large volumes of uranium and thorium mill tailings, as well as technologically enhanced naturally occurring radioactive material.

As a result of a 1999 proposal regarding the problem of mixed waste for NRC and State licensees, the EPA has undertaken a broader consideration of potential wastes and taken a "bigger picture" look at the current origin-based system. The overall approach outlined in the ANPR is to identify additional options for protection against the potential risks of disposal and to apply consistent methods to the evaluation of the risks, regardless of

origin. It is EPA's belief that these additional disposal options will result in greater protection of public health and permit a more efficient use of resources for site cleanups. A primary consideration is that the ANPR articulates, for the first time, the potential universe of low activity.

The ANPR proposes the use of hazardous waste landfills, suggesting that they have been developed with explicit design and engineering requirements and a robust regulatory framework, and have been used for radioactive materials in the past.

After discussing potential regulatory and nonregulatory approaches and the remaining major uncertainties, Mr. Schultheisz broadly described the 115 comments received to date.

After further meetings with stakeholders and a detailed evaluation of the comments, EPA will develop a recommendation for future action.

Conclusions/Action Items

After the question period, Members requested that the Committee be kept informed as EPA finalizes its disposition of comments and develops its position on whether to proceed with a rulemaking.

4. Nuclear Regulatory Commission Division of Waste Management Evaluation of the Department of Energy Bundling Approach

Greg Hatchett, Chris McKenney, and John Trapp, from the NRC's Division of HLW Repository Safety presented an evaluation of DOE's bundling approach for agreement items. They discussed the process for reviewing technical basis documents (TBDs) using TBD #12, Biosphere Transport, as an example. The staff has finished reviewing five biosphere agreements. The staff continues to review two igneous activity agreements (IA 2.11 and 2.14) related to mass loading parameters used to calculate dose from contaminated volcanic ash. The staff expects to send requests for additional information on these agreements to DOE in June 2004.

Conclusions/Action Items

The Committee plans to review further progress in this area and will request an update of this work on NRC/DOE agreements at an upcoming meeting.

5. Department of Energy Schedule for Responses to Key Technical Issue (KTI) Agreements

Tim Gunter (DOE) discussed the status of DOE's responses to the remaining KTI agreement items. DOE considers it has fully responded to 168 of the original 293 agreement items. Seven of the 14 supporting TBDs have also been submitted to NRC. DOE has submitted all of the agreement items for saturated zone flow and transport and for biosphere transport. Most of the agreements that remain to be submitted, 21, relate to

the waste package and drip shield. DOE expects to respond to the remaining 125 KTI agreements and requests for additional information by August 2004. The current status and plans for completing any remaining work on criticality and total system performance assessment will be provided at that time.

Conclusions/Action Items

None at this time. This was an information briefing that provided DOE's perspective of the status of NRC/DOE agreements and the schedule for DOE's agreement submittals.

6. Update on Risk Insights

During its 148th meeting, the ACNW was briefed on initial results of the staff's June 2003 risk insights initiative. Embracing past ACNW advice,¹ the NRC staff developed an integrated synopsis report on the key contributors to performance for a geologic repository at Yucca Mountain. This report is entitled the "Risk Insights Baseline Report." It reflects the informal expert opinions of the NRC staff regarding the risk significance² of 14 integrated subissues (ISIs) to overall repository performance. These opinions were based on the staff's own independent performance assessment work, reviews of DOE performance assessments, and other documented sources.

Regarding the 14 model abstractions in the Yucca Mountain Review Plan (NUREG-1804),³ the staff previously noted it was developing the following types of information for the report:

- a. ranking of risk significance to waste isolation

¹The Committee has recommended that the staff (a) use performance assessment results to judge quantitatively the effectiveness of individual repository barriers; (b) develop and use performance assessment techniques such as a post-processor to rank-order the contribution of individual barriers to performance; (c) use probabilistic methods (i.e., the risk triplet) in performance assessment modeling; and (d) use performance assessment analyses to prioritize key technical issues (KTIs) and to reexamine KTIs and attendant subissues.

²The staff evaluated risk significance by considering the waste isolation capabilities of the repository system. In general, *high risk significance* is associated with features, events, and processes that could (a) affect the integrity and longevity of a large number of waste packages; (b) affect the release of radionuclides from the waste form and waste package; or (c) affect the transport of radionuclides through the geosphere and biosphere. *Medium risk significance* is associated with a lesser affect on waste packages, radionuclide releases, or radionuclide transport. *Low risk significance* is associated with little or no effect.

³Independent of the risk insights initiative, the NRC staff identified 14 model abstractions that, in its view, collectively contribute to the waste isolation capabilities of the repository system. Within each of these 14 model abstractions, now called "ISIs," the staff has also identified key features, events, and processes important to repository performance.

- b. the specific risk insights, including the technical basis for the staff's judgment and the uncertainties associated with that judgment
- c. areas that need additional analyses to reduce the uncertainty in the judgments
- d. principal technical references

Using this information, the NRC staff categorized the risk significance of the 293 DOE/NRC KTI agreements. In general, the risk significance of an agreement is associated with the level of uncertainty of the agreement and the relationship of the uncertainty to risk.

Dr. Brett Leslie of the NRC staff briefed the Committee on the contents of the April 2004 final report, currently in concurrence. He reviewed the risk insights and rankings for each of the 14 ISIs. He also noted that the risk ranking for about 20 percent of the KTI agreements had changed since the staff's initial assessment was provided in a memorandum to the Commission, dated June 5, 2003. The staff has added one new risk insight relating to the number of waste packages affected by a possible igneous eruptive event at the site. Despite the ranking adjustments, Dr. Leslie noted that the proportions of the agreements in the three risk categories (high, medium, low) have remained fixed at 41/92/160, respectively. No KTI agreements have been eliminated from further consideration as a result of the staff's evaluations.

Conclusions/Action Items

The Committee issued a letter on the Risk Insights Baseline Report on May 3, 2004.

7. Scientific and Technical Priorities at Yucca Mountain

For several years, a dedicated staff at the Electric Power Research Institute (EPRI) has been tracking developments in the Yucca Mountain repository program. This staff has focused on evaluating DOE's and NRC's performance assessment work. The EPRI staff has also conducted iterative performance assessments for Yucca Mountain independent of the assessment of the Federal Government and its contractors.

The EPRI staff has formed certain opinions as to what key factors influence repository performance. In its most recent performance assessment report, "Scientific and Technical Priorities at Yucca Mountain" (dated December 2003), EPRI has independently considered these key factors, and has reached the conclusion that it is not necessary or appropriate to address all of the 293 KTI agreements prior to licensing because these agreements do not have the same risk significance. In general, EPRI believes that a majority of the 293 KTI agreements are of low risk significance and the DOE and NRC staffs should focus their prelicensing efforts and resources on issues that have the greatest risk significance.

In making this recommendation, EPRI cites the results of sensitivity and uncertainty analyses done for its own performance assessments. For the purposes of the 2003

analysis, EPRI assumed that any engineered barrier and/or repository feature, event, or process exerts a significant influence on overall performance assessment when variation in that input parameter causes the dose risk estimates to shift by a “significant percentage”; in this case, a “significant percentage” is defined in EPRI’s 2003 report as a 1-millirem-per-year shift relative to the 15 millirem standard or about a 7-percent change.

In summary, EPRI has recommended that ongoing technical work to evaluate the effects of disruptive events on the release and transport of radionuclides is valuable and should be completed. EPRI also recommends that work related to the evaluation of common-mode failures of the engineered barrier system should be completed. Lower priority work identified by EPRI for completion included evaluation of colloid-aided transport. EPRI is also conducting an independent evaluation of the consequences of igneous activity. Although EPRI has not completed this evaluation, the report suggests that current NRC and DOE analyses overestimate the risk from igneous activity.

Conclusions/Action Items

The EPRI report is timely because the Committee prepared a report commenting on the NRC staff’s Risk Insights Baseline Report. EPRI had commented that risks from igneous activity may have been overestimated. The Committee plans to convene a working group session on igneous activity later this year where this and other volcanism issues will be reviewed.

8. Proposed Agenda for the 150th ACNW Meeting

The Committee agreed to consider the following topics at its 150th meeting on May 25–27, 2004:

- Safeguards and Security Matters (Closed)
- Louisiana Energy Services Gas Centrifuge Uranium Enrichment Project
- Review of DOE Documents Supporting the Yucca Mountain License Application
- Decommissioning Program Changes
- Preparation for Meeting With the NRC Commissioners
- Treatment of Uncertainties in Hydrologic Models: Conceptual Model and Parameter Uncertainty

- Preparation of ACNW Reports on:
 - West Valley Performance Assessment Plans
 - Risk-Informed Regulation for NMSS Activities
 - Louisiana Energy Services Gas Centrifuge Uranium Enrichment Program
 - Decommissioning Program Changes
 - Review of DOE Documents Supporting Yucca Mountain License Application

Sincerely,

/RA/

B. John Garrick
Chairman