



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

ACNWS-0142

January 13, 2004

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

SUBJECT: SUMMARY REPORT—147TH MEETING OF THE ADVISORY COMMITTEE
ON NUCLEAR WASTE, NOVEMBER 19–20, 2003, AND OTHER RELATED
COMMITTEE ACTIVITIES

Dear Chairman Diaz:

The Advisory Committee on Nuclear Waste (ACNW or the Committee) held its 147th meeting on November 19–20, 2003, at the Texas Station Hotel and Casino, 2101 Texas Star Lane, North Las Vegas, Nevada. During that meeting, the Committee discussed the following matters.

HIGHLIGHTS OF KEY ISSUES CONSIDERED BY THE COMMITTEE

1. Yucca Mountain Site Visit and Amargosa Valley (Nevada) Bus Tour

On November 18, 2003, the Committee toured the exploratory studies facility (ESF) at Yucca Mountain, Nevada. The focus of the tour was to review the geologic features identified within the ESF that can be used to predict the stability of the rock mass surrounding underground openings (or drifts) that would be part of any future geologic repository at Yucca Mountain. The tour was conducted primarily by Dr. Mark Board, a rock-mechanics expert employed by the U.S. Department of Energy's (DOE's) management and operating contractor, Bechtel-SAIC, Inc.

Dr. Board expressed the view that there was no geologic evidence to suggest that the rock mass proposed as the emplacement horizon for the geologic repository (the Topopah Spring welded tuff [TSw]) presented any significant engineering challenges to designers. Although there are some portions of the ESF (in other geologic units) where localized geologic conditions dictated use of elaborate ground support measures, most of the underground openings excavated to date at the site were in geologically stable rock and required no special ground-support measures. Dr. Board observed that in the more than 10 years of underground operations, which has included *in-situ* stress measurements, there have been no reported incidents of drift instability, including falling rock. Dr. Board also cited triaxial rock core tests performed in laboratories, numerical modeling exercises conducted on computers, and natural analogue evidence observed at the site as further examples of rock mass stability. For these reasons, Dr. Board expressed the view that

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repository drifts excavated within Yucca Mountain are expected to remain stable through the pre-closure phase of repository operations (100 years).

Following the site visit, the Committee participated in a bus tour of the nearby community of Amargosa Valley. The bus tour was conducted by a local knowledgeable resident, Robert McCracken, who has operated a private ranch in the valley since 1992. The local population there numbers about 1500, in about 500 residences, and most individuals obtain their drinking water from a geologic aquifer that is down gradient from the proposed Yucca Mountain repository. It was noted that most residents work full-time, in occupations outside of the valley, or maintain part-time retirement residences there. DOE estimates that about 70 percent of the residences maintain kitchen gardens. Aside from the 6000-head Ponderosa Dairy, a clay mine (and processing mill), and a few large alfalfa farms, there are few other commercial enterprises in the valley. As part of the tour, ACNW Members were briefed on operations at the Ponderosa Dairy, local alfalfa farming operations, and other lesser agricultural activities taking place in the valley.

Both the underground tour and bus excursion were organized by DOE. Representatives of affected units of government and selected stakeholder organizations, i.e., the State of Nevada, Clark County, and the Nevada Nuclear Waste Task Force, accompanied the Committee.

Committee Action

Information obtained from the underground site visit and the subsequent DOE briefing on its rock mechanics programs later in the week (November 18, 2003), is expected to help the Committee prepare a letter report on rock mechanics issues at Yucca Mountain.

The Committee learned more, first hand, from a local citizen's perspective on the characteristics and lifestyles of this rural farming area during the bus tour. The bus tour also contributed to the Members' knowledge base for the forthcoming ACNW Working Group meeting on biosphere dose calculations, currently scheduled for February 2004.

2. Department of Energy Opening Remarks

Mr. Russell Dyer, Assistant to the Deputy Director on Technical and Regulatory Programs, DOE, welcomed the Committee to Nevada. He discussed the following items: the current status of key technical issues (KTIs), the status of the Yucca Mountain license application (LA) under preparation, data acquisition and codes and model development, a comparison of KTI submittals vs. their scheduled submission date, and the DOE Corrective Action Program. He also presented the results of the recently conducted Office of Civilian Radioactive Waste Management 2003 Safety Conscious Work Environment Survey and closed his presentation by discussing the Yucca Mountain Project performance indicators.

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Mr. Dyer stated that prior to submitting the LA in December 2004 all codes and models would be verified.

Committee Action

None, as these were introductory comments.

3. Yucca Mountain Program Status

Mr. Joe Zeigler, Director, Office of License Application and Strategy, Office of Repository Development, DOE, discussed the following topics:

- License Application (LA) Status
- DOE Feedback on NRC Risk-Ranking of Key Technical Issue (KTI) Agreements
- KTI Agreement Status
- Design Evolution

He reiterated that DOE plans to submit a complete, high-quality LA and is working towards the Licensing Support Network certification requirement.

Mr. Zeigler discussed the KTI agreement subjects to which NRC gave a “high” risk ranking and the DOE relative risk ranking of the same agreements. He noted that DOE’s perspective differed, observing that the risk associated with geologic disposal at Yucca Mountain is not “high” in an absolute sense.

He then discussed DOE’s plans regarding KTI resolution, noting that DOE plans to address each KTI agreement prior to LA submittal. DOE will use an integrated approach to address groups of KTI agreements within the context of their relationship to the repository system, i.e., “bundling.” Although DOE is still behind the agreed-upon schedule, this “bundling” approach has closed the gap. The current submission schedule for the these KTI packages was discussed. DOE intends to accelerate, where possible, the submission of the remaining packages.

The presentation was closed with a discussion of the evolution of the design for the surface facilities, the subsurface repository, and the waste packages (from the Viability Assessment renditions through the Site Recommendation package through the forthcoming LA).

Committee Action

None. This was an information briefing. Committee members indicated they were looking forward to receiving further updates.

4. Repository Design Status

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The Committee heard an update from DOE on the Yucca Mountain repository design. Dr. Paul Harrington, General Engineer, DOE, conducted this presentation. A phased approach to surface facility construction was described. Changes to the waste package and drip shield were described. New design concepts for ground support for emplacement and access drifts were presented. These new designs included the use of a stainless steel liner for all emplacement drifts. The pre-closure safety analysis indicates regulatory performance objectives will be met.

Committee Action

The ACNW will continue to follow the evaluation of the Yucca Mountain repository design.

5. Department of Energy Approach to Drift Degradation Analyses

Dr. Mark Board, a DOE representative, presented rock mechanics models of tunneling at Yucca Mountain. The models are used to predict drift degradation. The conclusions from this work include the fact that complete collapse of the tunnels is not inevitable, even in the absence of engineered ground support devices. Dr. Board noted, for example, that many excavations and natural openings stand for millions of years without collapse.

Committee Action

A report on drift degradation is being considered.

6. Stakeholder Interactions

Upon completion of presentations on both meeting days, members of the public and stakeholders were invited to address the Committee. Nine attendees offered comments to the Committee, providing their perspectives on current and planned activities at Yucca Mountain as well as on other areas where they believed additional effort should be applied.

Committee Action

None at this time. This session was an opportunity for the Committee to hear the views of stakeholders.

7. Igneous Activity Status Report

In 2002, DOE elected to sponsor a peer review of its igneous consequence modeling programs owing to long-standing disparate professional opinions on how to realistically model this potential phenomena at the Yucca Mountain site. As a result, the staff developed several NRC and DOE KTI agreements whose respective outcomes are tied to the peer review recommendations and any subsequent DOE actions. In February 2003,

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the Igneous Consequences Peer Review (or ICPR) Panel issued its final recommendations on the modeling of potential igneous consequences at Yucca Mountain.

During this meeting, the ACNW was briefed by Dr. Frank J. Spera, University of California at Santa Barbara, member of the ICPR Panel, who summarized the panel's 2003 comments and recommendations. Generally, the ICPR Panel found that DOE's performance assessment conceptual model was adequate and reasonable. Also, the ICPR Panel expressed the view that major advances in the understanding of localized magma-drift interactions would not be available within the next 3 years. Therefore the Panel did not recommend alteration of current DOE models and computer codes. However, the ICPR Panel did make 29 specific recommendations for DOE to consider to address uncertainties in its existing models and codes.

DOE has not issued detailed responses to the ICPR Panel recommendations at this time. DOE stated that it was in the process of preparing written responses to each of the 29 ICPR Panel comments and recommendations. Furthermore, DOE noted that the main emphasis of its igneous activity modeling programs would be to address the NRC/DOE agreements necessary for the December 2004 LA.

Also, DOE plans updates to the technical bases for the 1996 Probabilistic Volcanic Hazards Analysis, consistent with the ICPR Panel recommendations and earlier agreements with the NRC staff, but these updates are not likely to be completed until after submittal of the DOE LA in 2004.

Committee Action

None at this time. This presentation was intended as an information briefing. However, the Committee is contemplating a working group session during calendar year 2004 intended to evaluate the disruptive consequences of potential igneous activity at Yucca Mountain, including doses to receptor groups.

8. Inyo County Carbonate Drilling Program Status

Inyo County is an Affected Unit of Local Government under the Nuclear Waste Policy Act. Inyo County is conducting regional studies of hydrology to determine the future potential for radionuclides that may escape the proposed Yucca Mountain repository to impact water supplies in the Death Valley region of California. Inyo County has completed one of five wells planned to investigate the regional groundwater system.

Committee Action

None at this time. This presentation was an information briefing about Inyo County's multiwell drilling project. The Committee plans to request a future briefing after all of the wells are completed and the results are interpreted by Inyo County.

9. Nye County Early Warning Drilling Program Status

Since 1998 Nye County has been developing an Early Warning Drilling Program (EWDP) for wells located south and southwest of the proposed Yucca Mountain site. A representative of Nye County discussed funding and goals, program justification, wells drilled to date, significant findings, and future plans. He described the primary goals of the EWDP: to characterize potential flow paths between Yucca Mountain and Amargosa Valley, to reduce uncertainty in DOE's performance assessment models, and to support the design of a groundwater monitoring network.

The EWDP has greatly expanded the database of hydrogeologic data for the area south of Yucca Mountain within and outside of the Nevada Test Site. A series of new wells has been drilled under EWDP Phase IV. These include 16P, 24P, 27P, 28P, and 29P, all of which have been drilled in the area west of Fortymile Wash and north of Highway 95 and well Nye 2D. Other major activities under the EWDP include geophysical logging, lab testing of geologic samples, aquifer testing, groundwater level monitoring, and sampling and analysis of groundwater chemistry. Samples are shared with DOE and data are available to the public via the Nye County Web site and technical reports. Future work will include tracer tests in alluvium at well site 22, expected to begin in February 2004. Nye County would also like to conduct large-scale aquifer tests in wells that span fault systems.

Committee Action

None at this time. The Committee expects to have a future briefing to review the results of planned tracer tests in alluvium. These tests have the potential to provide significant data about radionuclide transport in the valley fill aquifers along potential flow paths from Yucca Mountain. If so, this information will need to be considered in NRC and DOE performance assessment models of the site.

10. Electric Power Research Institute (EPRI) Workshop on Natural Analogues

Dr. John Kessler, a manager for EPRI's HLW and Spent Fuel Management Program, discussed the recent EPRI Workshop on Natural Analogues. He stated, in the context of the current 10 CFR Part 63 geologic disposal regulations for Yucca Mountain, the Commission recognizes that natural analogue information can be used by DOE to develop its technical basis for portions of its LA. Consistent with those regulations, the U.S. Nuclear Regulatory Commission's (NRC's) Yucca Mountain Review Plan (NUREG-1804)

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describes how natural analogue information can be used as “acceptance criteria” and “review methods” to review information in that LA.

In its October 2003 workshop, EPRI organized a panel of experts to examine the use of natural analogues in Yucca Mountain programs. Invited experts included:

<i>Affiliation</i>	
Patrick Sellin	Swedish Nuclear Fuel and Waste Management Co (SKB)
Maria Jose	Research Centre for Energy, Environment and Technology (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas – CIEMAT), Spain
D. Warner North	NorthWorks, Inc.
Robert Bernero	NRC (retired)
Rod Krich	Exelon Corporation

Approximately 30 participants, representing NRC, DOE, their respective contractors, and others, attended the workshop and participated in the Panel discussions. Dr. John Kessler noted that EPRI expects to use the discussions and expert Panel deliberations from the workshop to serve as input to a future EPRI report on the possible use of natural analogue information in Yucca Mountain programs.

Committee Action

None at this time. This briefing was intended for information purposes only.

11. Presentation by Affected Units of Local Government

Irene Navis, a representative of Clark County, Nevada, spoke to the Committee on socioeconomic issues. She noted that Clark County is in the fastest growing region of the United States and helps drive the economy of the entire state of Nevada. Clark County is concerned about the effects on the local economy of potential accidents at Yucca Mountain or along transportation routes. The representative described Clark County as a unique mix of urban-service-provided areas and governance, and the county has first responder status for the entire region. The representative noted that this week’s Air Force crash at the Nevada Test Site and Nellis Air Force Training Range does impact Clark County. The crash occurred less than 20 miles from Indian Springs. She indicated that the county has a vested interest in monitoring the decisions of Nellis Air Force Base as the Yucca Mountain project moves forward. In response to questions from an ACNW Member, the Clark County representative offered to provide information about the number of shipments of hazardous materials and gasoline that go through Clark County every year.

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Committee Action

The Committee will obtain data from Clark County regarding the number of shipments of hazardous materials that annually go through Clark County.

12. Proposed Agenda for the 148th ACNW MEETING

The Committee agreed to consider the following topics at its 148th meeting on February 24–27, 2003:

- Working Group on Biosphere Dose Assessments for the Proposed Yucca Mountain High-level Waste Repository (February 24–25, 2004)
- Waste Management-Related Safety Research Report
- Radiological Dispersal Devices (Closed)
- Risk Insights Report
- Report on KTI Status and DWM Evaluation of DOE Bundling Approach
- Preparation of ACNW Reports on:
 - Pre-Closure Safety Assessment Tool
 - Drift Degradation at Yucca Mountain
 - Public Interactions during November 2003 Nevada Field Trip
 - Risk Insights Report
 - Report on DWM Evaluation of DOE Bundling Approach
 - Radiological Dispersal Devices (Closed)
 - Biosphere Working Group

Sincerely,

/RA/

B. John Garrick
Chairman