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For: The Commissioners

From: James M. Taylor
Executive Director
for Operations

Subject: QUARTERLY PROGRESS REPORT ON THE PRE-LICENSING PHASE OF THE U.S. DEPARTMENT OF ENERGY'S CIVILIAN HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT PROGRAM

Purpose: To provide the Commission with a Quarterly Progress Report (July 1991 through September 1991) on the pre-licensing phase of the U.S. Department of Energy's (DOE's) civilian high-level radioactive waste (HLW) management program.

Background: In the Quarterly Progress Reports on the pre-licensing phase of DOE's program, the U.S. Nuclear Regulatory Commission (NRC) staff discusses the key aspects of the NRC/DOE pre-licensing consultation program that deserve Commission attention. In this report, the title of Section 5 has been changed from "Early Resolution of Issues" to "Rulemaking and Regulatory Guidance Development" to more precisely describe the contents of the section. The previous Quarterly Progress Report, SECY-91-222, discussed activities that occurred from April 1991 through June 1991.

Executive Summary: The most significant activities during this period were in three areas of the repository pre-licensing consultation program: (1) DOE Implementation of Scheduled and Systematic

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Consultations; (2) Early Implementation of a Quality Assurance Program (QA); and (3) interactions with the Nuclear Waste Negotiator.

DOE Implementation of Scheduled and Systematic Consultations

- In August 1991, DOE issued Revision 1 to the Project Decision Schedule (PDS) for its Office of Civilian Radioactive Waste Management (OCRWM). This document, which replaces the original PDS issued in 1986, is currently under review by NRC staff.

- In September 1991, the DOE announced the availability of its draft Mission Plan Amendment for public comment. The staff is reviewing the draft and will provide comments to DOE.

- During this reporting period, DOE began site characterization activities at the Yucca Mountain site. The work focused on evidence of faulting and studies to determine the age of volcanic cones near the site and the origin of calcite/silica deposits in trenches at the site.

Early Implementation of a QA Program

In September 1991, the staff performed an independent audit of the OCRWM work being performed by U.S. Geological Survey (USGS). In contrast to its work in observing DOE audits, this was the first independent staff audit of a program participant since early 1987.

Nuclear Waste Negotiator

In July 1991, Chairman Selin and the Nuclear Waste Negotiator signed a Memorandum of Understanding (MOU). The MOU outlines the initial procedures for interactions between NRC and the Negotiator and assures a timely flow of information.

Discussion:

1. DOE Implementation of Scheduled and Systematic Consultations

During this reporting period, three of four technical interactions were held as scheduled. Technical exchanges were held on the status of DOE's program for management and control of the technical data on the Yucca Mountain site, and on DOE's exploratory studies facility (ESF) design

control process, discussed in more detail later in this section. Also, the staff visited the Savannah River Defense Waste Processing Facility to observe the status of DOE's vitrification process. The last Quarterly Progress Report noted that a technical exchange on the Waste Isolation Pilot Plant (WIPP) experiences in the area of performance assessment was to have been held in August 1991. However, during this reporting period, the WIPP technical exchange was postponed indefinitely by DOE because of an unavoidable conflict in scheduling with other WIPP activities. The staff will work with DOE to reschedule this exchange when WIPP activities allow.

On July 31, 1991, NRC transmitted to DOE the results of its evaluations of DOE's responses to the open items presented in NRC's Site Characterization Analysis (SCA) of DOE's Site Characterization Plan (SCP) for the Yucca Mountain site. NRC noted the progress DOE has made toward closing the two objections on QA and on the ESF design and design control process, and was able to close 59 of the 198 open items on the basis of the DOE responses. The staff will continue to work with DOE towards resolving the remaining open items.

In August 1991, DOE issued Revision 1 to the PDS for OCRWM. This revision replaces the original PDS issued in March 1986, and contains milestones current as of April 1991. The staff has begun its review of the PDS, to determine if DOE has addressed the staff's comments on the Preliminary Draft PDS revision issued in March 1990 and the Draft PDS revision issued in October 1990.

In September 1991, DOE noticed, in the Federal Register, the availability of its draft Mission Plan Amendment. The notice stated that DOE was soliciting comments on the draft by November 8, 1991. The staff is presently reviewing the draft and will provide comments to DOE by the requested date.

On September 12, 1991, NRC and DOE staffs met to discuss proposed revisions to the procedural agreements that implement their pre-licensing consultations for the HLW repository as provided for in the Nuclear Waste Policy Act (NWPA). Many of the proposed revisions were necessitated by changes to organizations, deletions of obsolete provisions, and updates to reflect advances in technology such as computer facilities. A majority of these revisions were agreed on. However, some proposals will need further review by both agencies. A second meeting to discuss these proposals has tentatively been scheduled for October 28, 1991.

On September 16, 1991, the staff and DOE held a technical exchange on DOE's design control process for the ESF. The staff had previously raised an objection to DOE's Yucca Mountain SCP because DOE had not demonstrated the adequacy of its ESF Title I design or its ESF design control process. DOE revised its ESF Title I design under a newly developed design control process. The purpose of this technical exchange was for DOE to explain its new design control process and to provide examples of how it has been implemented in the revised ESF design. The staff indicated that, based on the information presented at this exchange, as well as on other NRC-DOE interactions, such as observations of design reviews and QA audits, it appears that DOE is addressing the ESF design control process portion of the objection. DOE needs to document the ESF design control process presented at this meeting and demonstrate its effective implementation before the staff can make an independent determination of whether part of the objection is resolved.

During this reporting period, DOE began site characterization work. Trench 14, which is in the vicinity of the proposed surface facility for the repository, was deepened an additional 10 feet, so that DOE could further evaluate the calcite/silica deposits. DOE conducted new work to look for evidence of faulting in Trench A, located in Midway Valley at the site of the north portal of the ESF. No evidence of faulting was identified by DOE and the trench was closed on September 12, 1991. Soils studies were performed at Lathrop Wells to determine the age of the volcanic cones at that site. The soil data are currently being analyzed by the Los Alamos National Laboratory.

During this reporting period, there were no interactions between DOE and the U.S. Environmental Protection Agency (EPA) on issues concerning high-level radioactive mixed waste and the Resource Conservation and Recovery Act (RCRA). However, on August 26-29, 1991, the American Society of Mechanical Engineers (ASME) held the first International Symposium on Mixed Waste, in Baltimore, Maryland. The ASME stated, "the site selection and design of the repository is based on its stability and containment over several millennia, thus, far exceeding the stability and containment of any RCRA disposal site. Furthermore, the storage of spent nuclear fuel at the reactor site or in a Monitored Retrievable Storage (MRS) facility is managed under conditions far more restrictive than any materials covered under RCRA. There is no logical reason to extend the coverage of RCRA to a high-level waste repository or an MRS facility."

2. Early Implementation of a QA Program

During this reporting period, the staff observed DOE QA audits of Raytheon Services Nevada (RSN), Sandia National Laboratories, and the Vitrification Projects Branch of the Office of Environmental Restoration and Waste Management. No findings were identified, during these audits, that would preclude DOE from continuing with surface-based site characterization activities. DOE has delayed, until Fiscal Year 1992, the annual QA audits of the OCRWM Headquarters and the Yucca Mountain Site Characterization Project Office. The NRC staff will observe these audits in October 1991.

On September 16-20, 1991, the NRC staff performed an independent audit of USGS activities associated with the collection of hydrologic data from wells at the Nevada Test Site and transfer of the data through the USGS Field Office to the principal investigator in Denver, Colorado. This was the first independent staff audit of a program participant since early 1987. Before this, the staff had participated as observers in DOE audits. The results of this audit indicated that USGS is effectively implementing its QA program in the area audited. The findings from this audit will be compared to findings from DOE audits of similar activities to assist the staff in evaluating the effectiveness of DOE audits and the USGS QA program.

By letter dated August 21, 1991, DOE has requested that the staff remove SCA Objection No. 2, concerning the DOE lack of an acceptable QA program. The staff is evaluating the request, which is partially dependent on acceptance of HLW-repository-participant QA programs. Those actions remaining to be completed before the objection can be removed include acceptance of the OCRWM and Technical and Management Support Services QA programs.

3. Performance Assessment

In previous Quarterly Progress Reports, the staff committed to inform the Commission of any areas where there was a need for DOE to be sufficiently conservative in its approach to treating uncertainties. During this reporting period, the staff identified several concerns with DOE's Waste Acceptance Process (WAP). DOE developed the WAP in 1985, to ensure that the vitrified waste forms would be acceptable for disposal in any potential geologic repository. A key feature of the WAP was the Waste Acceptance Preliminary Specifications (WAPS) which relates the radionuclide-release

specification for HLW glass (of a given composition) to the performance allocation for the glass waste form described in DOE's Yucca Mountain SCP.

In developing the WAP, DOE recognized that the schedule for the production of HLW glass at the Defense Waste Processing Facility (DWPF) and at the West Valley Demonstration Project (WVDP) was in advance of repository licensing decisions, and that committing to the WAP and to making HLW glass in advance of these decisions would involve a degree of risk. The current schedule calls for glass production to begin at the DWPF in 1993 and at the WVDP in 1995.

However, during this reporting period, DOE announced that it was restructuring the WAP to remove the intended relationship in the WAPS between the radionuclide-release properties of the glass waste form and the performance allocation for glass in the SCP. Although it is DOE's prerogative to structure the WAP and the specifications for waste acceptance in the manner it chooses, the DOE decision to modify the rationale for the "release" specification in the WAPS does represent a change in DOE's approach to the structure of the WAPS and a departure from the staff's understanding about the purpose of this specification. In describing this change, DOE did not offer an alternative means of implementing the compliance strategy for glass waste package designs and performance described in the SCP.

The staff has noted that allocating performance to the various components of the waste package system, including the waste form, as DOE did in the SCP, reflects both sound licensing strategy and implementation of the Commission's defense-in-depth design philosophy. This philosophy relies upon multiple barriers to ensure that uncertainties in the performance of any one barrier will be compensated for by the ability of the remaining barriers to perform their intended functions. Accordingly, the various components of the engineered barrier system (EBS), including the waste package and its constituent parts, could be relied upon by DOE to make a meaningful contribution to the overall performance of the EBS. The staff's view is that, by removing the linkage of the release specification in the WAPS to performance allocation and regulatory performance requirements, DOE may not be taking advantage of the contributions made by all of the multiple barriers.

Although the staff has recognized the overall benefit to public health and safety that can be achieved once the liquid HLW is vitrified, the staff has three primary

concerns with regard to DOE's glass-making programs, in light of this development. They are: (1) the need for an integrated schedule that identifies all WAP-related milestones and activities, to ensure that there is sufficient time for consultation before the initiation of HLW glass production; (2) the need to establish a linkage between the glass composition prescribed by the WAP and the performance allocation assigned to the glass waste form and the waste package in the SCP; and (3) the need to conduct a preliminary performance assessment of the glass waste form in the context of the overall waste package container and anticipated waste-package conditions.

These concerns have been discussed with DOE, and the staff will be documenting its position in a letter to DOE. The staff will continue to work with DOE toward resolving these concerns and will report on the status of these interactions in future Quarterly Progress Reports.

4. Early Resolution of State and Tribal Concerns

As noted in the last Quarterly Progress Report, the Nevada Environmental Protection Division issued the first two of three permits needed by DOE to begin site-characterization work at Yucca Mountain. These permits pertained to air quality and underground-water injection control. The third permit that DOE needs from the State is for appropriation of underground waters for industrial and domestic purposes. While awaiting a decision on its application for this permit, DOE trucked water onto the site from the State of California. This water was used to control dust during site characterization activities. Thus, for limited site-characterization activities conducted to date, DOE could proceed without the permit for water appropriation. Nevada scheduled an administrative hearing from September 24 to October 4, 1991, on the issue of the water-appropriation permit.

Pursuant to an invitation from DOE's OCRWM Director, Mineral and Churchill Counties, Nevada, have applied for and received affected party status, under the NWPA. This brings the total of affected counties up to nine. Lander County, Nevada, which was also invited by the OCRWM Director, has also applied for affected party status. A decision on its acceptance is expected soon.

5. Rulemaking and Regulatory Guidance Development

During this reporting period, the staff continued to work on a staff technical position (STP) entitled "Investigations to Identify Fault Displacement and Seismic Hazards at a

Geologic Repository." This STP will provide guidance to DOE on appropriate geologic repository investigations that can be used to identify fault displacement and seismic hazards. In August 1991, when the public comment period for this STP ended, more than 80 comments had been received from five different parties. The staff is currently reviewing these comments and will take them into consideration in developing the final STP.

6. MRS

During this reporting period, the staff had no meetings with DOE on MRS. The staff did meet with representatives of NUMATEC, Inc. to discuss dry spent fuel storage licensing, under 10 CFR Part 72. NUMATEC is considering submitting a bid to DOE on its request for proposal for conceptual designs for an MRS.

Current DOE plans include prelicensing interactions with NRC, relating to the development of a safety analysis report (SAR) for the MRS, concurrent with the preparation of a draft environmental statement. The DOE schedule calls for SAR development in 1993 and submittal to NRC for review in March 1994, nearly one year before the MRS license application. Future topics for discussion with DOE include NRC participation in the National Environmental Policy Act process for the MRS and a possible NRC-DOE MOU for prelicense application interactions and SAR review.

7. Transportation

During this reporting period, the staff met with DOE and Westinghouse Electric Corporation on the design of the Titan truck cask. This cask has a titanium alloy body, and the capacity to transport three pressurized-water reactor or seven boiling-water reactor assemblies. This meeting was held to discuss the physical properties (particularly brittle fracture characteristics) of Grade 9 titanium alloy. Additional meetings will be held to discuss the acceptability of using titanium as a structural component of shipping casks.

On September 18, 1991, the staff briefed Lincoln County, Nevada, local officials, at NRC Headquarters, on NRC's role in certifying shipping casks for HLW transportation. Lincoln County is an affected unit of local government, under the NWPA. Representatives from Lincoln County included the Mayor of Caliente, County Commissioners and Council members, the Nuclear Waste Program Office, and Emergency Management Services.

8. Research

On July 23-25, 1991, the Office of Nuclear Regulatory Research (RES) and the Center for Nuclear Waste Regulatory Analyses (CNWRA) sponsored a workshop in San Antonio, Texas, on the "Role of Natural Analogs in Geologic Disposal of High-Level Nuclear Waste." Approximately 50 technical experts from the United States met to discuss the potential uses and applicability of natural analogs to the problems facing the HLW disposal program. NRC staff and CNWRA staff were actively involved in all workshop sessions, and DOE staff and contractors also participated. This core was supplemented by technical experts invited to bring in special perspectives in areas such as volcanism, regional tectonics, and experiences from oil and mineral exploration work.

The workshop consisted of one day of background presentations to develop a common base for the working group sessions. The second and third days involved discussions in four working groups: Waste Package/Waste Form; Near-Field Processes/Environment; Far-Field Processes/Environment; and Tectonics/Volcanism. The final session involved a summary presentation from each of the working groups and an open discussion of the working group summaries. Aside from specific technical recommendations, it was clear that almost all participants agreed that: (1) attention must be focused on the temporal and spatial scales important to assessing repository performance; (2) natural analogs are the only way to address model applicability over long time scales; (3) natural analog studies must be carefully evaluated, to make certain that the data will be useful (i.e., comparison to criteria such as those suggested by the Commission of the European Communities Natural Analog Working Group); and (4) internationalization is often appropriate, since the scale of a natural analog field investigation is often beyond the resources of any one national program to support effectively.

9. Nuclear Waste Negotiator

On July 26, 1991, Chairman Selin and David H. Leroy, the Nuclear Waste Negotiator, signed an MOU between NRC and the Office of the U.S. Nuclear Waste Negotiator, similar to the MOU between DOE and the Negotiator. The MOU outlines the initial procedures for interactions between NRC and the Negotiator, in carrying out the Nuclear Waste Policy Amendments Act of 1987. It establishes a working

relationship between both parties and assures a timely flow of information between them. It also provides the Negotiator with the use of such NRC services, facilities, and personnel as the Chairman determines appropriate, and maintains each party's independence.

Coordination: The Office of the General Counsel has reviewed this paper and has no legal objection.

Conclusion: During this reporting period, the staff and DOE continued to make progress in addressing and resolving issues. There were no issues between the staff and DOE that required Commission action.

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