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POLICY ISSUE

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(Information)

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 (DOE'S) CIVILIAN HIGH-LEVEL
RADIOACTIVE WASTE MANAGEMENT PROGRAM

Purpose: To provide the Commission with a Quarterly Progress Report
(October 1990 through December 1990) on the pre-licensing
phase of DOE's civilian high-level radioactive waste
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 key aspects of the
pre-licensing consultation program, between NRC and DOE,
that deserve Commission attention. The previous Quarterly
Progress Report, SECY-90-032C, discussed activities that
occurred between July and September 1990.

There are two significant changes in the contents of this
Quarterly Progress Report. First, the former sections
entitled "Early Establishment of Repository Design
Parameters" and "Adoption of the Policy of Conservatism"
have been replaced by a new section entitled "Iterative
Performance Assessment." This new section encompasses the
information previously covered in the old sections and
eliminates the need for a separate section to discuss the
need for conservatism.

The second change is the addition of three new sections, one
on the Monitored Retrievable Storage (MRS) Facility, a
second on transportation of high-level waste, and a third
on research activities conducted by the Office of Nuclear
Regulatory Research (RES) in support of NRC's regulation
of high-level waste. These sections will focus only on
those issues that merit Commission attention.

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Executive
Summary:

The most significant activities during this period pertained to three areas of the repository pre-licensing consultation program: DOE Implementation of Scheduled and Systematic Consultations; Early Implementation of a Quality Assurance (QA) Program; and Iterative Performance Assessment.

DOE Implementation of Scheduled and Systematic Consultations

The previous Quarterly Progress Report noted a significant improvement in the timeliness and effectiveness of scheduled interactions. During this period, this improvement continued. Specifically, two of three scheduled technical interactions were held. One technical interaction that was to be held in November 1990, had to be postponed because DOE was not ready.

On December 14, 1990, DOE submitted its response to the staff's Site Characterization Analysis (SCA). The staff is reviewing this submittal to see how DOE is addressing its concerns.

Early Implementation of a QA Program

In October 1990, the staff observed DOE's QA audits of its Office of Civilian Radioactive Waste Management (OCRWM) and its Yucca Mountain Site Characterization Project Office (YMSCP). The DOE audit team noted that the implementation of the QA programs for these two organizations was not extensive in a number of areas, and that these areas were generally found to be indeterminate. However, there were no findings identified that would preclude DOE from starting limited site characterization in specific areas.

Iterative Performance Assessment

The first technical exchange focusing on performance assessment was held in November 1990. It enabled the staff to gain insight regarding DOE's program in this area and opened a dialogue with the U.S. Environmental Protection Agency (EPA) on this subject.

Discussion:

1. DOE Implementation of Scheduled and Systematic Consultations

The last Quarterly Progress Report noted significant improvement in the timeliness and effectiveness of scheduled NRC-DOE formal interactions. During this reporting period, this improving trend continued. Specifically, two of three technical interactions were held as scheduled. The two interactions which were held covered the data needs in the Calico Hills Formation (the major stratigraphic layer under the repository) and performance assessment and were considered meaningful by the staff. A technical exchange on the benefits and risks of excavating and drifting in the Calico Hills, which was scheduled for November, was cancelled because DOE was not ready to present its results.

On December 13, 1990, the staff met with DOE to schedule interactions between January and May 1991, and to identify potential interactions beyond May 1991. At the meeting, six interactions were scheduled, covering: (1) exploratory shaft facility design alternatives, including excavating and drifting in the Calico Hills Formation, and site characterization activities; (2) the Staff Technical Position (STP) on seismic hazards investigations; (3) radionuclide retardation testing and modeling; (4) revisions to the procedural agreements between the staff and DOE; (5) the STP on repository design thermal loads; and (6) a discussion of lessons learned from the Waste Isolation Pilot Project experience led by DOE's Office of Civilian Radioactive Waste Management (OCRWM) and DOE's Office of Environmental Restoration and Waste Management.

Also, during this meeting, the staff and DOE discussed a DOE request to visit the CNWRA. The staff proposed an agenda for the visit. The purpose of the meeting will be to introduce DOE to the CNWRA and its programs, and to focus on the systems engineering approach to regulatory analysis. The meeting is scheduled for February 1991.

By letter dated December 14, 1990, DOE submitted its response to the staff SCA. Overall, the staff identified 198 concerns, which were classified as either objections, comments, or questions. Based upon the staff's preliminary

review, DOE's response generally focused on ways of improving the site characterization program, rather than closing any of the SCA concerns. The staff is presently scoping and developing a schedule for its review of DOE's response.

As part of its ongoing effort to demonstrate its readiness to begin surface-based testing in January 1991, on December 18-19, 1990, DOE's YMSCPO conducted a Readiness Review of those prerequisites necessary to initiate trench construction and to conduct subsequent geologic studies in Midway Valley. These studies will evaluate the occurrence of faulting near the proposed location for the high-level waste repository surface facilities and how recently the faulting occurred. The NRC staff participated in this review, which was to determine whether work activity prerequisites have been satisfied, relevant QA and technical procedures are in place, and personnel have been suitably trained and qualified. A number of administrative open items were identified, and will be resolved before completing the Readiness Review.

During this reporting period, DOE and the EPA did not have any interactions on issues concerning high-level radioactive mixed waste and the Resource Conservation and Recovery Act.

2. Early Implementation of a QA Program

In the previous Quarterly Progress Report, the staff committed to report on DOE's QA workshops. At earlier DOE workshops, a general need was identified for better education of DOE and DOE contractor personnel performing scientific investigations on the need for QA program development and successful methods of implementation. In response, DOE held a QA workshop on October 10-12, 1990, and a follow-up session on October 25, 1990, which was attended by scientists, QA personnel, and managers of participant organizations. The purpose of these sessions was to identify specific problems and develop recommendations for their resolution. Another meeting was held on December 5-6, 1990, to summarize the results of the workshop sessions and to present the recommendations to DOE management. DOE management accepted the recommendations,

which were keyed to such areas as: simplifying the complex hierarchy of requirement documents imposed on the DOE participants; involving scientists in the preparation and concurrence of implementing procedures; and initiating a seminar to explain the licensing process and the need for QA requirements to the DOE participants.

Action items were identified for carrying out these recommendations. DOE has tentatively scheduled a QA workshop for January 1991, where the status of action item completion will be reviewed. Because DOE has taken steps to address these concerns, the staff believes that the DOE actions are a positive approach to correct the concerns with regard to the implementability of the QA programs.

On October 15-19, 1990, NRC staff observed a DOE QA audit of the OCRWM headquarters and on October 22-26, 1990, the staff observed a DOE audit of the YMSCPO. The audit team, composed of DOE and DOE contractor personnel, noted that the implementation of the QA programs was not extensive in a number of areas, and these areas were generally found to be indeterminate. However, no findings were identified by the DOE audit team that would preclude DOE from starting site characterization in specific, limited areas.

DOE has been making considerable progress in resolving the staff's SCA concern regarding its QA program. The previous Quarterly Progress Report noted that in September 1990 DOE sent a letter to NRC staff requesting acceptance of six of its contractors' QA programs. By letter dated October 24, 1990, the staff agreed that two of the six contractors' QA programs were acceptable and that the remaining four contractors' programs were conditionally acceptable subject to satisfactory resolution of the exceptions noted by DOE in its September 1990 letter. The staff is continuing to work with DOE in reviewing the remaining contractor QA programs as well as the QA programs for OCRWM headquarters and YMSCPO. In view of the progress being made in this area, the staff anticipates no QA-related obstructions to DOE's being able to start limited site characterization in specific areas in January 1991. However, DOE plans to demonstrate through its Readiness Reviews that all precursors to beginning site characterization activities have been identified and will be accomplished before starting work.

On November 1-2, 1990, the Nuclear Waste Technical Review Board (NWTRB) QA Panel held a meeting where it was briefed by NRC staff on NRC regulations and requirements for QA. Representatives from the State of Nevada and DOE program participant organizations also provided briefings. The NWTRB QA Panel was concerned about complaints various organizations made about DOE QA program implementation. However, both NRC and DOE noted that none of the problems were due to NRC regulations. This point was also noted in the previous Quarterly Progress Report.

3. Iterative Performance Assessment

As noted earlier in this report, on November 27-29, 1990, one of the key technical exchanges held between the staff and DOE was on iterative performance assessment. This exchange focused on DOE's performance assessment program and the need for integration of performance assessment into site characterization. Representatives from EPA were present, as well as representatives from the Nuclear Waste Technical Review Board, the Advisory Committee on Nuclear Waste, and the CNWRA. This meeting was of particular significance because it provided an opportunity for the staff to gain insight regarding DOE's program in the area of performance assessment. Furthermore, this exchange also drew EPA into the discussions with DOE regarding this area.

At the first day of the meeting, EPA gave a presentation on its work in the area of iterative performance assessment. This information had been previously provided to the staff, and no new information was given in the presentation. The EPA presentation did acknowledge that carbon-14 was a problem; however, EPA was not prepared to discuss any future work it had planned. EPA did say that it was placing a small contract with the Conservation Foundation to investigate the possibility of conducting a negotiated rulemaking process for the revision to its standard.

During the next two days of the meeting, the NRC staff and DOE discussed the ongoing work being done by DOE to develop its own iterative performance assessment capability. The discussions centered on DOE's performance assessment calculation exercises (PACE), and focused

mainly on the transport modeling capability. PACE is DOE's effort to develop its modeling capability and to begin integrating the contractors involved in its performance assessment effort. Overall, the staff found that DOE had accomplished a lot over the past year, and had developed one-, two-, and three-dimensional models. However, the DOE effort appeared to focus on performance assessment of various subsystems rather than a total system iterative performance assessment. DOE indicated it may have a total system performance assessment complete by the Summer of 1991. Based on the information presented, the staff found that DOE was working to address NRC's concern in SCA comment number 2, which identified the need for early iterative performance assessments. All parties agreed that the effort was beneficial and that there was a need for more meetings in this area.

Previous Quarterly Progress Reports noted that the SCA had identified the need for DOE to be sufficiently conservative in its approaches to treating uncertainty in its investigations and analyses. During this reporting period, there were no new issues related to the need for conservatism deserving Commission attention.

4. Early Resolution of State and Tribal Concerns

The last Quarterly Progress Report noted that in September 1990, the Ninth Circuit Court had rejected the State of Nevada's challenge to disapprove Yucca Mountain as a potential repository site. On December 19, 1990, the State appealed this decision to the U.S. Supreme Court. As of January 17, 1991, the Court has taken no action.

5. Early Resolution of Issues

During this reporting period, the draft regulatory guide, DG-3003, "Format and Content for the License Application for the High-Level Waste Repository," was made available for public comment. A notice of availability of the draft was published in the Federal Register on November 13, 1990. The public comment period will end on March 15, 1991.

6. MRS

As noted earlier in this report, this is the first time that MRS and transportation are being discussed in the Quarterly Progress Reports. In introducing these new sections, the staff is providing some background and status information.

Specific NRC regulations (10 CFR Part 72) and regulatory guidance are in place for review of an MRS license application. The staff reviewed a conceptual design for a full-scale MRS facility and issued an evaluation report (NUREG-1168) in 1986. Since that time, the staff has reviewed and approved various types of dry spent fuel storage casks, modules, and vault designs, that might also be considered for inclusion in a simple storage or full-scale processing MRS facility.

The recent appointment of a Nuclear Waste Negotiator marks the start of a determined effort to find a volunteer for an MRS site. Should DOE succeed in its plans to obtain a potential MRS site by 1992 in a volunteer State (presumably with Congressional approval to nullify scheduler linkages to the repository), DOE could begin the process of applying for a license. DOE would first have to characterize the proposed site and settle on an MRS facility design. The staff is prepared to meet with DOE and offer guidance on the content of a license application, as needed.

7. Transportation

During this reporting period, the staff met with DOE and its contractors on the development of spent fuel shipping casks, which require NRC certification under the Nuclear Waste Policy Act. This included meetings with Nuclear Assurance Corporation on the design of a barge/rail cask Model No. NAC-CTC, with a capacity of 52 boiling water reactor (BWR) assemblies, or 26 pressurized water reactor (PWR) assemblies and with Babcock and Wilcox, on the design of a barge/rail cask Model No. BR-100, with a capacity of 52 BWR assemblies, or 21 PWR assemblies. Applications for the Model No. NAC-CTC are expected in January 1993, and for the Model No. BR-100, in January 1992. The staff also met with DOE and its contractors to discuss credit for spent

fuel burn-up in the criticality analyses for spent fuel casks. Additional meetings will be required to discuss end effects, measurement techniques, and low density moderator effects.

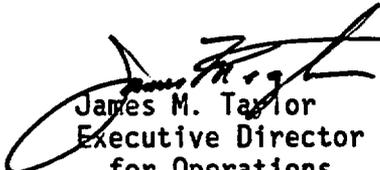
8. Research

As mentioned earlier in this report, this is the first time that NRC's HLW research program is being discussed in the Quarterly Progress Reports. The HLW research program provides the staff with the technical basis for supporting its regulatory program. Significant RES HLW actions that occurred during this reporting period were RES's participation in the October 1990 meetings of INTRAVAL (an international cooperative effort coordinated by the Swedish Nuclear Power Inspectorate on validation of transport models applied to radioactive waste disposal), a December 1990 review of NRC's participation in the Alligator Rivers Analogue Program (ARAP) in Australia coordinated by the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD/NEA), final transfer of performance assessment technology developed for NRC at Sandia National Laboratories to the staffs of NRC and the CNWRA, and coordination of the issuance of the aforementioned (Section 5) draft regulatory guide, DG-3003.

The INTRAVAL meetings, held in Cologne, Germany, had both NRC and DOE participation, as well as participation by representatives of several other countries, and provided NRC with a forum for learning about validation strategies being adopted by DOE and by HLW developers and regulators in several other countries. Recent ARAP research suggests that some formations in the Koongaara ore body in Australia may be directly analogous to formations at DOE's proposed Yucca Mountain HLW site. The technology transfer form Sandia delivered NEFTRAN-II (a simulator of radionuclide transport in unsaturated media), software, and insights on sensitivity and uncertainty analysis techniques, to NRC and CNWRA staff. A computer program for simulating groundwater flow and other aspects of the performance assessment methodology that Sandia developed for NRC were delivered to NRC and CNWRA throughout the last three quarters of FY90. Sandia technology transfer activities will be completed in the next quarter. RES staff also participated in the iterative performance assessment activities discussed in Section 3 of this report.

Conclusion:

Overall, the staff and DOE continue to make progress in addressing and resolving issues. Most of the activities undertaken during this quarter have been positive indicators that DOE is considering NRC concerns in its program. There were no issues that required Commission attention or action.



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