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FOR: The Commissioners

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: SEMI-ANNUAL 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 Semi-Annual Progress Report (SAPR) on the pre-licensing phase of the U.S. Department of Energy's (DOE's) civilian high-level radioactive waste (HLW) management program. This particular report covers the three quarterly reporting periods of January through March, April through June, and July through September 1994.

BACKGROUND:

In the SAPR on the pre-licensing phase of DOE's program, the U.S. Nuclear Regulatory Commission staff discusses the key aspects of the NRC/DOE pre-licensing consultation program that deserve Commission attention. Until now, this information was provided to the Commission in the form of a Quarterly Progress Report (QPR). The previous QPR, SECY-94-040, discussed activities that occurred from October through December 1993. However, pursuant to a February 22, 1994, memorandum from the Office of the Secretary of the Commission, the frequency of the QPR was changed to a semi-annual reporting period. Because of a series of other events, including the

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reassignment of key staff for developing the SAPR to work on the Commission Decision Tracking System, and shifting priorities, this particular SAPR was delayed and will cover the three quarterly reporting periods of January through March, April through June, and July through September 1994. Subsequent reports will be issued on a semiannual basis, in synchronization with the fiscal year.

SUMMARY:

The most significant activities during this nine-month reporting period were related to the areas of "DOE Implementation of Scheduled and Systematic Consultations" and "Early Implementation of a Quality Assurance (QA) Program."

In the area of "DOE Implementation of Scheduled and Systematic Consultations," there were numerous changes in the DOE program, during this reporting period. DOE presented its Proposed Program Approach (PPA) in various meetings with NRC staff and other interested parties and requested comments on its proposed site suitability process. DOE is undertaking the PPA to streamline the HLW program and to demonstrate measurable progress. In order to implement its PPA, DOE reorganized both its Headquarters and Yucca Mountain Site Characterization Project Office (YMSCO) organizations. Finally, construction began on the Exploratory Studies Facility (ESF) using the Tunnel Boring Machine (TBM).

As part of its ongoing prelicensing review of DOE's program, the NRC staff has been giving particular attention to reviewing DOE submittals and interacting with DOE on the PPA. The results of these reviews have been provided to the Commission. Furthermore, consistent with what DOE has discussed in management meetings with NRC, DOE has submitted many reports, important to resolving technical issues, that the NRC staff has reviewed and discussed with DOE.

NRC staff interactions with DOE also made progress in resolving issues related to methods of satisfying the requirements of maintaining substantially complete containment (SCC). DOE proposed a new performance goal that the mean waste package lifetime would be well in excess of 1000 years. Under this approach, DOE expects that only a small fraction (approximately one percent) of waste package failures would occur in the first 1000 years after closure. The NRC staff informed DOE that it considers the new DOE performance goals to be a reasonable implementation of the SCC requirement.

In the area of "Early Implementation of a QA Program," one of the NRC staff's concerns is that DOE's Management and Operating Contractor (M&O) QA program is not being implemented in a manner that will assure acceptability of the ESF. The staff questions the ability of DOE and the M&O to correct problems that have been identified. The recurrence of problems and the inability to correct them has eroded the staff's confidence in DOE's oversight of the M&O's QA program.

DISCUSSION:

1. DOE Implementation of Scheduled and Systematic Consultations

The DOE and NRC staff have taken several initiatives, through a variety of mechanisms, toward resolving important technical issues. The DOE staff has made greater efforts in explaining its program and responding to NRC staff concerns and the NRC staff has made greater efforts in focusing its attention on areas that are a priority for DOE. During this reporting period, the NRC and DOE staff conducted four meetings, four technical exchanges, and three site visits. In addition, the NRC staff participated in four DOE-sponsored meetings which are discussed in the section of this SAPR on "Early Resolution of State and Tribal Concerns." This included one meeting of DOE's Site Suitability Task Force and three DOE-sponsored Stakeholders meetings. The NRC staff also observed two DOE program reviews, two ESF design reviews, and reviewed and provided comments on many DOE documents. The NRC On-site Representatives (ORs) continued to observe ongoing DOE site characterization activities.

Meetings:

During this reporting period NRC and DOE initiated bi-monthly HLW management meetings to address issues of mutual concern regarding the HLW repository program. Thus far, these management meetings have been a useful way for NRC, DOE, and other parties to improve communications, identify and resolve management issues, and agree on priorities for future work. The first of these management meetings was held on May 19, 1994. Representatives from the Nuclear Waste Technical Review Board (NWTRB); Center for Nuclear Waste Regulatory Analyses (CNWRA); the State of Nevada; and Nye County, Nevada, were also present. During this meeting, DOE provided a briefing on changes that would result from its implementing the PPA. DOE is undertaking the PPA to streamline the HLW program and to demonstrate measurable progress. The PPA includes DOE making formal suitability findings (under 10 CFR Part 960 [Part 960]) in a step-wise manner during site characterization and revising expectations for information at each phase of licensing. The PPA also proposes increased reliance on a robust waste canister. As noted below in the discussion on "Comments on DOE Documents," the staff has provided comments to DOE which identify its questions and need for additional details on the PPA.

NRC staff and DOE representatives held a second bi-monthly management meeting on July 26, 1994, that was also attended by representatives of NWTRB, CNWRA, and the State of Nevada. DOE provided an update to its current plans for implementing its PPA to streamline its HLW program; however, these plans were still at a general level. DOE stated that detailed plans for FY95 would be approved in September 1994, and for FY96 in March 1995. DOE also discussed how it was addressing the recent vandalism incidents which could have been directed at site contractor quality control personnel. NRC noted its concern regarding these incidents and cited NUREG-1499, "Reassessment of NRC's Program for Protecting Allegers against Retaliation" (dated January 1994), as an example of how DOE might deal with potential harassment issues in the future. DOE discussed the status of organizational changes both at Headquarters and

YMSCO. Similarly, NRC discussed the status of personnel changes for its OR's and the Yucca Mountain Team Leader. Lastly, the status of major DOE submittals and NRC reviews were discussed.

A third bi-monthly NRC/DOE management meeting was held on September 21, 1994. This meeting was attended by representatives of DOE contractors; the State of Nevada; Clark County, Nevada; CNWRA; NWTRB; the Nuclear Energy Agency (NEA); and the publication, Radioactive Exchange. Topics discussed included an update of DOE's PPA for streamlining the HLW repository program and ways to improve topical report development and review processes. DOE noted a delay in the release of planning and implementation information on the PPA. Its Five-Year Plan is now scheduled for release in mid-October 1994, and its FY95 Technical Implementation Plan will be released in November 1994. DOE also described an ambitious program for development and submittal of requests for certification of multi-purpose canisters (MPCs). DOE and NRC proposed that more flexible ways of scheduling NRC/DOE meetings be considered and developed. Finally, DOE announced that the TBM used for excavation and construction of the ESF at Yucca Mountain, Nevada, had been started and operated for approximately two feet to test its hydraulic systems.
On July 27, 1994, NRC staff and DOE representatives held a bi-monthly technical meeting on the ESF at Yucca Mountain. Representatives of the State of Nevada, the Nevada Nuclear Waste Task Force, and NWTRB also attended. DOE representatives explained the design phases in the repository program. The staff, the Nevada representative, and the NWTRB representative all raised concerns with the relationship of design activities to other activities in the repository licensing process.

Technical Exchanges:

During this reporting period, NRC and DOE staff held three technical exchanges to discuss issues associated with burnup credit in the criticality analysis for spent fuel casks. These technical exchanges are described in this SAPR in the section on "Spent Fuel Storage and Transportation System Compatibility."

On September 27-28, 1994, NRC and DOE staff held a technical exchange on Total System Performance Assessment (TSPA). The details of this technical exchange are discussed in the "Performance Assessment" section of this SAPR.

An NRC/DOE technical exchange on the status of the work relevant to characterization of saturated and unsaturated zone flow was scheduled for March 1994. However, it was postponed until November 1994, to give DOE the time it needed to fully support the technical exchange.

Site Visits:

As part of its technical review of the DOE topical report entitled "Evaluation of the Potentially Adverse Condition 'Evidence of Extreme Erosion during the Quaternary Period' at Yucca Mountain, Nevada," the NRC staff participated in a February 1994 site visit with representatives of the State of Nevada; Nye and Clark Counties, Nevada; the Advisory Committee on Nuclear Waste (ACNW); and

the NWTRB. The NRC staff's conclusions are discussed later in the section of this SAPR on "Comments on DOE Documents."

On April 19-20, 1994, NRC and DOE staff participated in a site visit concerning hydrologic aspects of the Yucca Mountain site. Representatives from the State of Nevada; Nye and Clark Counties, Nevada; and CNWRA also participated in the site visit. DOE provided an overview of investigations being conducted at the Hydrologic Research Facility located near Yucca Mountain and described the newly revised stratigraphic nomenclature for the volcanic rock units of Yucca Mountain. The site visit included stops at excavation locations and features being investigated for characterization of the site. Participants were provided an overview of the status of excavation of the ESF and the ESF testing program, including a discussion of the hydrochemical test plan and preparations for testing in Alcove 1 of the ESF. Participants also observed initial work on assembling the TBM. Discussion topics included; the Bow Ridge fault, calcite-silica deposits at trenches NRT-1 and NRT-14, the Ghost Dance fault zone at Antler Ridge, and such aspects of the systematic drilling program as hole UZ-14, where a possible perched water table was encountered.

On May 2-5, 1994, NRC staff visited Yucca Mountain, Nevada, to discuss site characterization activities related to faulting in and near the proposed repository site. The site visit was also attended by representatives from the State of Nevada; Nye and Clark Counties, Nevada; ACNW; NWTRB; and CNWRA. As part of the site visit, DOE staff and DOE contractors reviewed what is known about stratigraphic and structural features in the path of the ESF's north ramp, including the zone of poorly lithified ("crumbly") tuff. DOE noted that the preliminary results of engineering tests of the poorly lithified tuff indicated that the tuff had sufficient cohesion and strength to permit the TBM to be used in constructing this part of the ESF without the implementation of a pre-transit grouting program. DOE contractor geologists also provided NRC staff with the most recent site characterization data on faults in the area of the proposed repository site, including the Sundance Fault.

Observed Program Reviews:

During this reporting period, the staff observed two DOE program reviews. The primary focus of the program reviews was to foster communication and promote understanding among DOE, DOE contractors, and Yucca Mountain Principal Investigators (PIs) regarding the technical status, progress, and direction of the various investigations being conducted for site characterization. NRC, the State of Nevada, and other Affected Units of Local Government (AULG) were invited to send representatives to hear the status of the program and to ask questions. During the week of February 14-18, 1994, NRC staff attended a YMSCO Technical Program Review. Topics addressed included: evolution of characterization studies as a result of technological changes and insights provided by new data; what data are needed to assess site suitability; and when there will be enough data for regulatory compliance, given likely residual uncertainties. PIs presented the status of studies of every technical discipline, including; geology, engineering, waste package, hydrology, geochemistry, quality assurance, and performance assessment.

On June 14, 1994, NRC staff attended the DOE Office of Civilian Radioactive Waste Management (OCRWM) Director's Program Review. This was the final program review before OCRWM's recently announced reorganization went into effect. All managers representing major program areas reported that their programs were generally on or near schedule and none reported major resource expenditure variances. The Deputy OCRWM Director reported that it was OCRWM's intention to aggressively meet schedules for submittal of documents to NRC for review and that it was his understanding that the NRC staff would review and comment on all documents submitted in accordance with schedules agreed on by the two agencies.

Observed ESF Design Reviews:

During this reporting period, NRC staff observed two DOE 90 percent design reviews. The first one was on January 5-7, 1994, where NRC staff observed a DOE OCRWM 90 percent design review for ESF Package 2B in Las Vegas, Nevada. Package 2B design includes the following configuration items: mapping gantry, locomotives, rolling stock, pre-cast concrete inverts, and ventilation system. Representatives of the State of Nevada, AULG, and NWTRB also observed this design review. The purpose of the DOE design review was to provide a complete overview of the design package and process followed by a formal presentation of the package by the actual designers, covering the input used, the assumptions made, applicable codes and specifications, any analyses, and the resulting design output.

NRC staff, accompanied by CNWRA staff, observed another DOE 90 percent design review for the Yucca Mountain ESF design Package 2C, in Las Vegas, Nevada, during May 23-27, 1994. Package 2C design includes these configuration items: north ramp excavation, linings and ground support, subsurface electrical systems, subsurface mechanical systems, subsurface fire protection, subsurface monitoring and warning systems, and subsurface conveyor systems. The State of Nevada, AULG, NWTRB, and the U.S. Bureau of Mines also provided representatives to observe this design review.

During the review for Package 2C, the NRC staff identified a miscalculation that required reevaluation of seismic analyses on ventilation supports and other related structure supports. This miscalculation did not appear to have a significant effect on the overall adequacy of the design. However, the NRC staff recommended, regarding future ESF design packages, that more attention be focused on the details of the design process to reduce the potential for errors of this kind.

The NRC staff concluded that the 90 percent design review for Package 2C was significantly improved in comparison to the 90 percent design review for Package 2B. Based on the observations of the two design reviews, the NRC/CNWRA observers provided oral and written comments to DOE. In an August 10, 1994, letter to DOE, the NRC staff noted that there was an improvement of integration among the M&O disciplines. However, the staff also noted its concerns regarding improper use of the response spectrum in seismic design, lack of attention to detail, and lack of an appropriate degree of conservatism.

Comments on DOE Documents:

Consistent with what DOE has discussed in management meetings with NRC, during this reporting period, NRC staff received more submittals from DOE important to resolving technical issues. The previous QPR noted that the staff had received DOE's "Mined Geologic Disposal System Annotated Outline Skeleton Text for the Preparation of a License Application, Revision 3" (AO), on November 23, 1993. During this reporting period, the staff reviewed this document. DOE had committed to develop the AO in accordance with Draft Regulatory Guide DG-3003: "Format and Content for the License Application for the High-Level Waste Repository" (FCRG). Revision 3 of the AO focused on the descriptive information for the "Natural System." The other major section of the "Natural System" chapter ("Assessment of Compliance with 10 CFR Part 60 [Part 60]") remains in outline. The staff determined that it could not review the descriptive information in isolation from any indication of how that information would be used by DOE in demonstrating compliance with the siting criteria and performance objectives of Part 60. Furthermore, the staff's review determined that DOE's AO was no longer following the repository systems-based approach for documenting assessments of the "Natural System." A letter describing these concerns was sent to DOE on February 1, 1994.

As noted in the previous QPR, NRC staff had accepted, for technical review, the DOE topical report entitled, "Evaluation of the Potentially Adverse Condition 'Evidence of Extreme Erosion during the Quaternary Period' at Yucca Mountain, Nevada." The staff's acceptance, however, was contingent on receiving additional information, which DOE provided on March 31, 1994. In addition, before completing its technical review, the staff also conducted a site visit in February 1994, which is described earlier in this SAPR. In a letter dated August 22, 1994, the staff concluded that the topical report did not contain sufficient information to demonstrate absence of the potentially adverse condition. The technical bases for the staff's conclusion are: (1) the topical report does not address the subject of extreme erosion, but focuses on long-term average rates of erosion; (2) the suitability of the method used to estimate the ages of past incidents of erosion had not been adequately demonstrated; and (3) the qualification process for the dating process was not acceptable. In the management meeting of September 21, 1994, NRC and DOE agreed to meet on October 7, 1994, to discuss these concerns and DOE's resolution so that DOE could revise the topical report and resubmit it to NRC.

During this reporting period, the NRC and DOE staff made progress in their work on performance objectives for groundwater travel time (GWTT) and SCC within the waste package. By letter of June 10, 1994, DOE gave NRC its general approach for demonstrating compliance with 10 CFR 60.113(a)(2), the GWTT performance objective for the geologic setting. In the letter, DOE wrote that the essence of its proposed approach is that GWTT is a distribution of water particle transport times whose dimensions are in units of time. DOE is considering using the same approach in the "Technical Site Suitability Evaluation" under its Part 960 siting guidelines. DOE requested that NRC evaluate whether the approach is acceptable for demonstrating compliance with 10 CFR 60.113(a)(2) and consistent with the basis for Commission concurrence.

By letter of August 23, 1994, the NRC staff responded to DOE's request. The NRC staff indicated that it holds a view similar to that of DOE, and generally believes that there are several sound technical reasons for developing and evaluating a distribution of water particle travel times as part of a GWTT compliance demonstration. However, the NRC staff requested additional information, to fully understand and evaluate the specific technical approach being proposed. The NRC staff suggested that, at the NRC/DOE technical exchange scheduled for November 28, 1994, DOE provide information on such areas as: (1) the specific methodology DOE proposes to employ in conducting an uncertainty analysis of GWTT; (2) the physical and chemical properties to be considered in defining the disturbed zone; (3) clarification of the method and appropriateness of incorporating dispersion and matrix diffusion into the analysis; and (4) how GWTT estimates in the unsaturated and saturated zones can be decoupled, and later summed, in a conceptually consistent manner. Furthermore, the staff expressed concern with DOE's proposed approach to evaluate the significance of short travel times. DOE's approach could potentially be inconsistent with both NRC's regulations under 10 CFR 60.113 and NRC's basis for concurring in DOE's siting guidelines.

By letters dated March 30, May 17, and June 10, 1994, DOE proposed resolving the staff's concern with DOE's methods to satisfy the requirement of maintaining SCC within the waste package in accordance with 10 CFR 60.113(a)(1). These concerns had been documented as open items in four questions/comments contained in NRC's Site Characterization Analysis (SCA) of DOE's Site Characterization Plan (SCP). Basically, DOE proposed a new performance goal that the mean waste package lifetime would be well in excess of 1000 years. Under this approach, DOE expects that only a small fraction (approximately one percent) of waste package failures would occur in the first 1000 years after closure. The NRC response letter, dated July 11, 1994, stated that, in principle, the NRC staff considers the new DOE performance goals to be a reasonable implementation of the SCC requirement. The July 11, 1994, letter also noted the staff's conclusion that two of the four open items were resolved. However, the staff requested additional information before the SCC issue could be resolved for the remaining two open items. By letter dated September 20, 1994, DOE responded to the NRC request. The staff is reviewing this information and will discuss it with DOE in a technical exchange planned for December 1994.

On June 30, 1994, DOE submitted the Topical Report, "Methodology to Assess Fault Displacement and Vibratory Ground Motion Hazards at Yucca Mountain," and requested that the NRC staff review its acceptability, for reference, in a license application for a potential geological repository at Yucca Mountain, Nevada. The NRC staff has conducted an acceptance review of the report in accordance with its Topical Report Review Plan and found that the report is incomplete in several important respects. Missing information identified by the NRC staff included: (1) a description of a deterministic methodology for fault displacement and seismic hazard assessment; (2) a description of the approach to be taken in consideration of fault displacement on the location of structures, systems, and components important to safety and waste isolation; and (3) a description of the expert judgment elicitation process DOE intends to use with its probabilistic hazard assessment methodology. In the absence

of the above information, the staff did not consider the report acceptable for further detailed review. During a September 21, 1994, management meeting, NRC and DOE agreed to meet on October 7, 1994, to discuss the NRC staff concerns and DOE's resolution so that DOE could revise the topical report and resubmit it to NRC.

On August 4, 1994, DOE published a Federal Register Notice (FRN) describing how it plans to apply its PPA to the site suitability process. The FRN and a DOE report, which it referenced, provided the NRC staff with some of the first documented details on the PPA. The FRN focused only on site suitability and DOE's interim technical site suitability decision which provides the staff no formal role. However, the staff has indicated its interest in assuring that DOE's site suitability process, which will lead to a recommendation on the site, is carried out in a way that is not inconsistent with the DOE siting guidelines. The NRC staff has reviewed the available information and believes that the PPA affects the entire repository program and that decisions made with regard to data collection and analysis for site suitability inevitably impact the site recommendation and licensing processes for which NRC has responsibilities. During the next reporting period, the staff will be transmitting, to DOE, its comments on the FRN, noting the importance of careful consideration of the impact, on the entire repository program, of PPA decisions being made now.

In addition to the letters and reports that the staff reviewed during this reporting period, DOE transmitted five new and three revised site characterization study plans for NRC staff review. The NRC staff completed its review of 13 study plans. Reviews of an additional nine study plans, two of which are revisions to previous DOE submittals, are currently underway by the staff, and are scheduled to be completed during the next reporting period.

On-Site Representatives:

The ORs continued to observe DOE's site characterization activities including: (1) the electrification of the ESF North Portal Pad to receive the TBM; (2) erection of the TBM on the pad; and (3) intensive testing of soft ground expected along the alignment of the TBM. The ORs noted that excavation of the large-block for in situ heater testing, under the direction of Lawrence Livermore National Laboratory (LLNL), was about three fourths completed and that a cross-section of the Ghost Dance fault had been excavated for detailed study by USGS. As mentioned previously in this SAPR, DOE began ESF construction and, by the end of this reporting period, had advanced the TBM about four feet to test its various systems.

During this reporting period, there were changes in both of the OR positions. The OR responsible for QA and engineering retired and, in July 1994, the OR responsible for geosciences completed his two-year assignment and returned to NRC Headquarters. A replacement for the QA and engineering OR was selected from Headquarters staff and, since August 1994, he has been spending two weeks per month in the OR office until his permanent assignment becomes effective in January 1995. The selection process for the geoscience OR position began during this reporting period and is nearing completion. Meanwhile, until

early 1995 when both ORs are working full time, the ORs Office will be covered about three quarters of the time by a combination of the two ORs, on a part-time basis. In addition, NRC technical staff will be on-site during the first one or two months of operation of the TBM.

Resource Conservation and Recovery Act:

During this reporting period, there were two interactions between DOE and the U.S. Environmental Protection Agency (EPA) on mixed HLW and the Resource Conservation and Recovery Act (RCRA). In April 1994, DOE conducted two introductory meetings with EPA to discuss its spent nuclear fuel (SNF) storage plans and the RCRA hazardous waste determination; no significant developments resulted from these discussions. However, DOE advised the staff that a 1993 EPA review of a DOE/Office of Naval Reactor report was discussed, during these meetings, which evaluated SNF from the Naval Nuclear Propulsion program and the RCRA hazardous waste determination. This report supports a general determination that none of the Naval Program's SNF, which is comparable to civilian SNF, would be classified as RCRA hazardous wastes; EPA has previously agreed with that determination. DOE's OCRWM staff indicated that it is reviewing the Office of Naval Reactor reports to determine the applicability of the report findings, and the EPA determination, to the HLW program, and will advise the staff of its findings when they become available.

2. Early Implementation of a QA Program

Based on findings from DOE QA audits of the M&O performed during this reporting period, the NRC staff has raised concerns that the M&O QA program is not being effectively implemented in a manner that will assure acceptability of the ESF. In addition, the NRC staff questioned DOE and the M&O's ability to implement a program to correct the problems identified. Although the staff's concerns are based on findings from DOE audits, surveillances, and design reviews, the recurrence of problems and the inability to correct them has eroded the NRC staff's confidence in DOE's oversight of the M&O's QA program.

On August 31, 1994, NRC and DOE staff met so DOE could explain the corrective actions it has taken to address the continued deficiencies in the QA program of its M&O. The staff had expressed its concern to DOE about the recurrence of problems in the M&O QA program over the past two years. At the end of the meeting, the staff indicated its concern that implementation of the corrective actions may not be effective, based on experience to date. The NRC staff is preparing a letter, to DOE, that will provide the results of its evaluation of the information obtained during the meeting, explain its concerns, and recommend what DOE action should be taken to resolve its concerns with the M&O QA program.

During this reporting period, NRC staff, supported by CNWRA staff, observed DOE external audits of Reynolds Electrical and Engineering Company, Raytheon Services Nevada, the M&O, Science Applications International Corporation/Technical and Management Support Services, USGS, Los Alamos

National Laboratory, LLNL, and SNL. They also observed internal audits of OCRWM Headquarters, YMSCO, OCRWM's High-Level Waste Division (EM-343), as well as several surveillances. No deficiencies were identified, during the audits and surveillances, that would preclude the auditing/audited/surveilled organizations from continuing their quality-affecting activities.

On February 23, 1994, NPC and DOE held a periodic QA meeting, to discuss issues of mutual interest related to the QA program for the DOE HLW repository. Representatives of the State of Nevada; NWTRB; the M&O; QA Technical Support Services; Weston; and the Edison Electric Institute (EEI) attended the meeting. Although they were notified of the meeting, there were no representatives of the AULG. Topics discussed included updates of: (1) status of implementing DOE's new QA Requirements and Description document (QARD) for the Civilian Radioactive Waste Management Program; (2) status of the M&O design improvement plan; (3) corrective actions from previous audits of EM-343; (4) DOE's QA overview of site characterization field activities; (5) the status of NRC QA open items; and (6) the ESF design process and its relationship to the Determination of Importance Evaluation process. Representatives of the State of Nevada and EEI inquired about recent changes in NRC's waste management organization and their questions were answered by the NRC staff.

On June 15, 1994, NRC and DOE held another in the series of periodic QA meetings to discuss items of mutual interest. The meeting was attended by representatives of the State of Nevada and NWTRB. Edison Electric Institute participated by speaker-phone. Although they were invited, no representatives from AULG attended. Topics discussed included: (1) a description of NRC's new High-Level Waste and Uranium Recovery Projects Branch; (2) OCRWM's proposed reorganization; (3) updates on the status of implementing DOE's new QARD; (4) the status of the design improvement effort; (5) DOE's QA overview of site characterization field activities; (6) NRC's observations of recent DOE audits; (7) status of NRC QA open items; (8) role and responsibilities of DOE for on-site QA; (9) role and responsibilities regarding on-site reassembly of the TBM; (10) evolution and status of the Quality-List; and (11) NRC involvement in DOE verification activities.

3. Performance Assessment

During this reporting period, NUREG-1464, "NRC Iterative Performance Assessment Phase 2: Development of Capabilities for Review of a Performance of a High-Level Waste Repository" underwent internal staff and CNWRA review, and comment resolution. Copies of the revised draft were sent to DOE, the State of Nevada, and AULG, for their information. The staff is currently preparing the NUREG for final publication, which is expected by the end of the calendar year.

On September 27-28, 1994, NRC and DOE staff held a technical exchange on TSPA. The purpose of the technical exchange was to discuss the methodology incorporated into two recently completed DOE TSPAs, one prepared by Sandia National Laboratories (SNL) and one prepared by INTERA for DOE's M&O, as well as NRC comments on the two DOE TSPAs. Participants included representatives

from YMSCO; various national laboratories; INTERA; the USGS; the State of Nevada; Clark County, Nevada; NWTRB; and the Electric Power Research Institute (EPRI). During the technical exchange, DOE discussed the TSPA program, including objectives and goals of the PPA; major PPA milestones; plans for future TSPA's to be performed in 1995, 1996, and 1997; status of the site characterization plan; and uncertainties in TSPA. SNL also gave presentations on various technical aspects of the SNL TSPA-1993, including source term, corrosion, climate change, undisturbed model results, and the effects of disruptive events.

During the technical exchange, NRC staff presented NRC staff and CNWRA comments on the SNL TSPA-1993 and INTERA TSPA-1993 and discussed resolution of open items. Discussion of these comments helped to clarify the differences in modeling approaches in a number of technical areas such as infiltration and deep percolation modeling.

4. Early Resolution of State and Tribal Concerns

The Nevada Legislature's Committee on HLW met in Las Vegas on July 13-14, 1994, to conduct an oversight visit of the Yucca Mountain site characterization program and to review topics concerning the transportation of HLW and associated subjects. The committee heard presentations by representatives of AULG, the Nevada Department of Transportation, and DOE contractors, who addressed DOE's transportation plan and route-selection process, modes of transportation, status of the MPC development, and the planned transportation risk management strategy. The committee emphasized the need to integrate all phases of the transportation planning and route-selection process.

The NRC staff continued to maintain its openness with those parties affected under the Nuclear Waste Policy Act of 1982, as Amended (NWPA). As a follow-up to a September 1994 briefing to the Commissioners by the State of Nevada, the AULG, and Indian Tribes, NRC staff agreed to forward copies of all correspondence between NRC and DOE regarding Yucca Mountain to the tribal representatives present at the briefing. This is intended to keep the tribal members informed and involved in the ongoing HLW disposal process.

During this reporting period, the NRC staff also participated in four meetings sponsored by DOE. Staff from the NRC's Office of the General Counsel and the ORs participated in a meeting of DOE's Site Suitability Task Force on March 4, 1994. The Task Force was considering whether it was necessary to change its HLW repository siting guidelines, Part 960. The following options, for DOE, were briefly discussed: continue to use existing Part 960 without change; issue interpretations of Part 960 that reflect current circumstances; amend Part 960; develop guidelines specific to the Yucca Mountain candidate site; adopt Part 60 siting criteria; and others. DOE indicated that it currently intends to use Part 960, without change, as a basis for making interim site suitability evaluations of the Yucca Mountain site.

On May 21, 1994, NRC staff attended DOE's semi-annual Yucca Mountain Stakeholders' Meeting held in Las Vegas, Nevada. Approximately 200 people

attended this meeting. The purpose of the stakeholders' meeting was to provide information and an opportunity for discussions, by DOE, with all interested parties on DOE's PPA. In addition to representatives of the State of Nevada and the AULG attending the meeting of May 21, 1994, there were a number of representatives of the public--including individual citizens, local unions who represent workers at the Yucca Mountain Project, and a group representing the Las Vegas African-American community. A majority of the attendees expressed support for continued study of Yucca Mountain. However, the official State and AULG representatives, a representative of the public citizen group, and several other members of the public voiced their continued opposition to the entire Yucca Mountain project.

On August 27, 1994, the staff attended a second Stakeholders' meeting conducted by DOE in Las Vegas, Nevada, to elicit the views of the general public on the proposed process for evaluating the suitability of the Yucca Mountain site for HLW disposal. About 40 people attended the meeting and discussed the proposal with DOE staff. DOE was questioned about the timely availability of site characterization data to support the findings DOE intends to make under this program. Concern was raised about the lack of evaluation of the favorable and adverse conditions for siting such a repository. DOE was also questioned about the rationale for the decision to continue use of the Part 960 guidelines and whether this would be documented. It was recommended that any peer reviews performed by the National Academy of Science (NAS) include experts from Nevada, minority representation, and be completely open for public review. A third meeting on this same topic was held in Washington, DC, on August 30, 1994, which was also attended by NRC staff.

5. Rulemaking and Regulatory Guidance Development

The NAS Committee on Technical Bases for Yucca Mountain Standards continues to analyze issues related to its charge to advise EPA on the technical bases for a reasonable standard for the protection of the public health and safety. Pursuant to the Energy Policy Act of 1992, the NAS is to make recommendations regarding a standard that will apply to radioactive material that is stored or disposed of at a proposed repository at Yucca Mountain. On April 28-29, 1994, the committee held a meeting in Las Vegas, Nevada. The morning session of April 28, 1994, was open to the public. As with all other open meetings of this committee, NRC was represented by the NRC liaison to the committee and other staff. In preparation for a closed writing session (held June 20-24, 1994), the open session on April 28, 1994, was structured to afford committee members an opportunity to directly question those who had provided written recommendations to the committee. Memoranda summarizing the technical and policy content of all open meetings of the committee have been provided to the Commission. The committee is expected to issue formal, peer-reviewed recommendations by late 1994 or early 1995.

The previous QPR had noted the end of the public comment period on the proposed Part 60 Rulemaking, "Clarification of Assessment Requirements for the Siting Criteria and Performance Objectives." The staff is analyzing the public comments received and anticipates submitting a final rule to the

Commission. However, work on this rulemaking will be delayed until the NRC staff has reviewed DOE's PPA and identified its impact on this rulemaking.

The previous QPR had also noted the end of the public comment period on the Draft Regulatory Guide DG-3009, "Topical Guidelines for the Licensing Support System." Because of higher priority assignments, no work was carried out on the Topical Guidelines during this reporting period. However, the staff plans on publishing the Final Regulatory Guide by February 28, 1995.

During this reporting period, the staff sent NUREG-1323, "License Application Review Plan (LARP) Revision 0" to the printer. In addition, preliminary copies of the draft LARP were also sent to DOE and other parties for their information. The LARP is intended to provide guidance to the NRC staff, who will review DOE's license application to construct a mined geologic repository for the disposal of spent nuclear fuel and other HLW at Yucca Mountain, Nevada. The LARP is intended to ensure the quality and uniformity of the staff reviews, establish the appropriate review priorities, and present a well-defined base from which to evaluate proposed changes in the scope and requirements of staff reviews. Because it is a public document, it will help DOE and other interested parties to better understand the NRC staff's review process by describing the review strategies, procedures, and acceptance criteria that the staff will use. This draft version, designated Revision 0, represents the staff's initial efforts in developing the LARP. Beginning with this version, the staff currently plans on issuing a revision to the draft LARP each year through 2000, culminating with the issuance of the LARP in 2001. Each revision of the draft LARP will contain the work completed by the staff during that particular year. Revision 0 and subsequent revisions of the draft LARP are preliminary documents and, as such, are subject to change.

The final staff technical position (STP) on "Consideration of Fault Displacement Hazards in Geologic Repository Design" was also issued during this reporting period. This STP, designated NUREG-1294, addresses how faults of regulatory concern should be considered. Specifically, this STP recognizes the acceptability of designing the geologic repository to take into account the attendant effects (e.g., displacement) of faults of regulatory concern and expresses the staff's views on what is needed from DOE, if DOE chooses to locate structures, systems, and components important to safety or important to waste isolation in areas that contain "Type I" faults (e.g., faults with Quaternary-age displacement).

Prior to this reporting period, the staff submitted a notation vote paper, SECY-92-408, to the Commission, concerning proposed amendments to Part 60, that would clarify the requirements necessary to protect public health and safety for a broad range of normal and accident conditions during the operational period of a geologic repository. As noted in SECY-92-408, the proposed amendments were intended to address regulatory uncertainties identified by the staff and a petition for rulemaking from DOE. During this reporting period, the Commission issued a staff requirements memorandum (SRM) which disapproved publication of the proposed amendments. Consistent with Commission guidance in the SRM, the staff made substantive changes to the proposed amendments and, on September 13, 1994, submitted a

revised notation vote paper to the Commission (SECY-94-239, Proposed Amendments to Part 60 on Disposal of High-Level Radioactive Wastes in Geologic Repositories--Design Basis Events for the Geologic Repository Operations Area).

6. Monitored Retrievable Storage

As noted in previous QPRs, a number of groups have expressed interest in hosting a monitored retrievable storage (MRS) site and have applied for, and received grants, from DOE, to study the feasibility of hosting an MRS, but some of these applications were denied or withdrawn. The following is a list of the Phase II grant applicants. Under Phase II-A, $200,000 funding is provided to identify potential sites. Phase II-B provides $3,000,000 to further investigate the sites. However, as previously reported, the Bingaman Amendment to the 1994 Energy and Water Development Appropriations Act (P.L. 103-126) precluded the funding thereunder of any Phase II-B grants. Accordingly, the Phase II-B applications have not been funded. As a result, there has not been any significant progress toward an MRS.

1. Mescalero Apache Tribe, New Mexico
   Applied March 13, 1992.
   Phase II-A Awarded April 21, 1992.
   Letter to Acting Negotiator requesting to enter into negotiations, August 4, 1993.
   Phase II-B application received October 1, 1993.

2. Skull Valley Band of Goshute Indians, Utah
   Applied October 28, 1992.
   Phase II-A Awarded on January 27, 1993.
   Letter to Acting Negotiator requesting to enter into negotiations, August 9, 1993.
   Phase II-B application received September 24, 1993.

3. Ft. McDermitt Paiute Shoshone Tribe, Nevada
   Applied on February 19, 1993.
   Phase II-A Grant awarded June 1, 1993, and studies are underway.

4. Tonkawa Tribe of Oklahoma
   Applied on March 31, 1993.
   Phase II-A Grant awarded September 30, 1993, and studies are underway.

However, the Mescalero Apache Tribe has proceeded with a private initiative to site an away-from-reactor independent spent fuel storage installation (ISFSI). In a joint press announcement dated March 11, 1994, Northern States Power and the Mescalero Apache Tribe announced an agreement in principle to move forward to site a private ISFSI on the Mescalero Apache reservation in New Mexico. Thirty-three utilities and several other industry groups have expressed interest and joined in the development of a business arrangement. On September 22, 1994, NRC staff testified before the Radioactive and Hazardous Materials Committee of the New Mexico Legislative Council about spent fuel

storage technologies and licensing requirements. NRC has received no formal submittal from any potential licensee on this issue, but continues to monitor progress through the media.

7. Spent Fuel Storage and Transportation System Compatibility

As a result of lack of progress toward an MRS, as noted above, DOE is moving forward with its plans to develop an MPC, to be used with appropriate overpacks for storage, transport, and disposal of SNF. DOE is considering providing MPCs to those utilities needing additional spent fuel storage capacity, in lieu of an MRS, to meet its NWPA contracts. In June 1994, DOE issued a Request-for-Proposal for the design, certification, testing and initial supply for several types of canisters. Proposals are due to DOE in October 1994. There are to be four basic types of canisters: two canisters (21 pressurized-water reactors (PWR) fuel assemblies, and 40 boiling-water reactors (BWR) fuel assemblies) fitting a large 125-ton cask and two small canisters (12 PWR and 24 BWR) fitting a small 75-ton cask. DOE expects to submit to NRC up to twelve applications for Certificates of Compliance for MPC, and overpacks, for storage and transportation early in 1996.

During this reporting period, the staff had three technical exchanges (February 10, March 30-31, and June 28) with DOE to discuss issues associated with burnup credit in the criticality analysis for spent fuel casks and, in particular, the MPC. DOE is currently planning to prepare up to three topical reports concerning burnup credit. The first report is currently being developed for PWR fuel for storage and transportation, and is expected to be submitted in November 1994. The second report will discuss burnup credit for both PWR and BWR fuel for disposal and is expected to follow the first report by about a year. The third report, is planned to address other disposal aspects of MPC.

On July 13, 1994, NRC staff met with representatives of Newport News Ship Building to discuss its concept for a spent fuel Cask-to-Cask transfer system. This system, if constructed, would allow the transfer of fuel from storage only casks to transportation casks, without having to return the fuel to the spent fuel pool. It could also be used to transfer fuel from the spent fuel pool to a cask that could not go into the pool. In addition, it could allow flexibility in the options of recovering from hypothetical accident situations. Although the system is under development, Newport News indicated that a topical safety analysis report (SAR) would be submitted, for NRC review, later in 1994.

The previous QPR noted that the Sacramento Municipal Utility District (SMUD) has selected the standardized NUHOMS-24P spent fuel storage design as part of a DOE cooperative program to demonstrate the licensing of a dual-purpose storage/transport system for its Rancho Seco ISFSI. Pacific Nuclear submitted an application for 10 CFR Part 71 certification, for its NUHOMS-MP187 transportation cask, on October 8, 1993. The design includes a canister for the spent fuel that can be removed and used for storage. The staff has

completed its initial review of the application and issued its first round of questions on May 2, 1994.

As previously reported on October 27, 1993, SMUD submitted a revised 10 CFR Part 72 spent fuel storage license application and SAR using the NUHOMS-MP187 transportation cask for on-site spent fuel transfer operations and the canisters for storage in Standardized NUHOMS-24P Horizontal Storage Modules. This system would accommodate the removal of spent fuel for further processing or disposal without having to return the fuel to the spent fuel pool for transfer to a shipping cask. The staff continued its safety and environmental reviews, during this reporting period, and on August 5, 1994, issued its environmental assessment related to the construction and operation of the Rancho Seco ISFSI.

Finally, during this reporting period, the NRC staff completed its review of the revised Part 71 application for certification from Nuclear Assurance Corporation (NAC), for its Storable Transport Cask (NAC-STC), and on September 30, 1994, issued a Certificate of Compliance for use as a transport package. NAC submitted a revised NAC-STC SAR for storage under Part 72 on November 5, 1993. The revised application included a design change to the cask basket. The NRC staff completed its Part 71 technical review and, and is finalizing its safety evaluation report. The Part 72 review for storage will continue based on the transportation evaluations.

8. Transportation

On July 22, 1994, General Atomics (GA), on behalf of DOE submitted, a Part 71 application and SAR for its GA-9 legal weight truck spent fuel shipping cask. The GA-9 cask is a Fissile Class I, Type B(U) package, designed to carry up to nine BWR spent fuel assemblies. Also, on behalf of DOE, GA submitted a Part 71 application and SAR on July 26, 1994, for its GA-4 legal-weight truck spent fuel shipping cask, which is designed to carry up to four PWR spent fuel assemblies. The SAR is currently being reviewed by NRC staff.

9. Research

During this reporting period, two CNWRA research projects were completed: one on geochemistry and one on stochastic analysis of flow and transport. The geochemistry project provided an approach to modeling of the effects of zeolites on radionuclide mobility and transport. In particular, the research addressed the effects of Yucca Mountain's zeolite minerals on groundwater chemistry, and the effects of heat on mineral stability, groundwater chemistry, and the evolution of CO_2 gas. The final report for this project is being printed, and will be published as a NUREG/CR shortly. Similarly, the stochastic analysis project provided an approach to the evaluation of hydraulic properties of unsaturated porous and fractured tuff, like that of Yucca Mountain, using a new computational methodology developed at CNWRA.

Also during this period, CNWRA researchers completed preliminary work on a statistical model that could be used to assess DOE's estimates of the likelihood of volcanism in the Yucca Mountain area. This statistical model is

an improvement over approaches that have been used to date, since it provides a more realistic treatment of the area potentially affected by volcanism. A peer review of the CNWRA volcanism research program was conducted the first week of October.

A cooperative effort with the French Atomic Energy Commission to study seismic effects on underground openings and water levels under seismic loads was begun during this period at Garner Valley, CA as a follow-on to the work CNWRA conducted at the Lucky Friday Mine site. This project is using data from shallow boreholes being collected under a reactor research program to complement data from a deeper (520m) borehole drilled specifically for this project. The hole has been drilled and logged and locations for instrument packages have been determined. The next step is to acquire and install the monitoring equipment.

Integration of performance assessment work with Natural Analog projects has been a focus of concern within both domestic and international waste disposal programs. As part of NRC efforts to come to grips with this problem, the CNWRA research project on natural and archaeological analogues hosted a workshop in June, 1994, on the linkage between analogues and performance assessment. NRC and CNWRA performance assessment personnel participated in the workshop. Before the workshop, NRC and CNWRA staff members applied performance assessment techniques to the Peña Blanca, Mexico, and Akrotiri, Greece, analogues that CNWRA is examining. The objective of these preliminary calculations was to provide talking points for the workshop on how analogues could be used to provide constraints on performance assessment-related parameters such as fracture apertures, retardation of transport of radionuclides in fractures, and radionuclide release from spent fuel. Participants in the workshop also discussed how observations from analogues could confirm performance assessment results on the relative importance of fracture and matrix flow and allow testing of performance assessment flow and transport models against well constrained field measurements. The purpose of the workshop was to form a closer working relationship between these parts of the HLW research effort. Also, in September, 1994, the CNWRA prepared and presented a brief workshop report at the European Union's Natural Analogue Working Group workshop in Albuquerque, New Mexico.

10. Nuclear Waste Negotiator

During this reporting period, the NRC staff had no interaction with the Nuclear Waste Negotiator. In view of the hold on funding for MRS study grants, the staff does not anticipate any interaction in the near future.

CONCLUSIONS:

NRC and DOE staff continued to make progress in addressing and resolving issues at the staff level. Consistent with statements made at NRC/DOE management meetings, NRC staff has received more submittals from DOE for resolving important technical issues. Furthermore, the Deputy OCRWM Director has voiced his support for DOE aggressively meeting schedules for submitting

documents for NRC review. The staff's concerns regarding the M&O QA program are significant and aggressive action will be needed to resolve them.

DOE and NRC staff have begun a constructive dialogue on GWTT demonstration. DOE presented its general approach for demonstrating compliance and the NRC staff indicated that it has similar views. However, the NRC staff still has questions regarding DOE's approach that will be pursued at a technical exchange scheduled for November 1994. Likewise, the NRC and DOE staff have advanced their discussions of SCC. DOE submitted new performance goals that the NRC staff considers to be, in principle, a reasonable implementation of the SCC requirement. This topic will be discussed further in a technical exchange scheduled for December 1994.

In addition to these interactions with DOE, the NRC staff is also progressing in developing its rulemaking on "Design Basis Events for the Geologic Repository Operations Area." The staff's work on a rulemaking on "Clarification of Assessment Requirements for the Siting Criteria and Performance Objectives" is also progressing. However, work on this rulemaking will be delayed until the staff has reviewed DOE's PPA and identified its impacts on this rulemaking.

COORDINATION:

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

James M. Taylor
Executive Director
for Operations

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