

KS/CURTISS MEMO

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APR 10 1991

MEMORANDUM FOR: James L. Blaha, Assistant for Operations
Office of the Executive Director
for Operations

FROM: Guy A. Arlotto, Deputy Director
Office of Nuclear Material Safety
and Safeguards

SUBJECT: STAFF INPUT REQUESTED FOR COMMISSIONER CURTISS' REMARKS AT
THE INTERNATIONAL HIGH LEVEL WASTE MANAGEMENT CONFERENCE
(EDO 0006376)

In your April 3, 1991 note to me, you indicated that Janet Kotra in Commissioner Curtiss' office had requested staff input for the Commissioner's remarks to be given at the upcoming subject conference. The enclosure to this memorandum provides information on the two areas for which Dr. Kotra requested information: (1) the most significant accomplishments for NRC and the high level waste program during the past year; and (2) the most significant challenge for the future.

Original prepared by G. A. Arlotto

Guy A. Arlotto, Deputy Director
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

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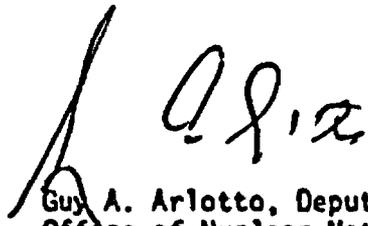
APR 15 1991

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Guy A. Arlotto, Deputy Director
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Among the most significant accomplishments for U.S. Nuclear Regulatory Commission (NRC) and the high-level waste (HLW) program over the past year are:

o Quality Assurance (QA) Program

As a result of the NRC staff review of the U.S. Department of Energy (DOE) Site Characterization Plan (SCP), the staff raised an objection that a qualified QA program was not in place for site characterization activities. Since that time, significant progress has been made in DOE's QA program. NRC has concurred with DOE's findings that six DOE contractor QA programs are acceptable, four of which have limited exceptions on final acceptance. In addition, in January, the NRC found that DOE's Office of Civilian Radioactive Waste Management (OCRWM) QA Program was acceptable to begin limited new site characterization activities, i.e., those related to trenching and the calcite-silica deposits, in Midway Valley, the proposed site for the repository's surface facilities. This indicates that considerable progress has been made towards resolution of the NRC QA objection.

o DOE Exploratory Shaft Facility (ESF) Studies

In the SCP, DOE has indicated that the ESF will become part of the geologic repository operations area if the site is found to be acceptable. In that case, those parts of the ESF that may be important to safety and waste isolation must be designed through a qualified design control process. Based on the NRC staff review of the SCP, the staff was unable to verify the adequacy of the DOE design control process or the adequacy of the design itself and therefore raised an objection. As a result of the concerns expressed by NRC, the Nuclear Waste Technical Review Board (NWTRB), the State of Nevada, and others, DOE has undertaken a study of alternative designs for the ESF. In this study, DOE has made an effort to identify and incorporate regulatory requirements into its evaluation of various ESF alternatives. The ESF Alternatives Study (ESF-AS) is scheduled for issuance in June 1991. Dr. Bartlett, Director of OCRWM, has directed the Yucca Mountain Site Characterization Project Office to proceed with a design study focusing on favorable features of the highest-ranked alternatives for the purpose of producing a design which will enhance the construction and performance of the ESF. Presentations by DOE to the NWTRB and interactions with NRC have indicated that DOE is considering NRC staff concerns as it proceeds with development of the ESF design. However, a final determination by the staff can only be made after it has reviewed DOE's formal submittals.

o NRC Performance Assessment

NRC has commented in its Site Characterization Analysis on the importance of tying iterative performance assessments into site characterization. Performance assessments need to be conducted at an early date to integrate and evaluate data gathering activities during site characterization. An indication

of how important NRC considers these assessments has been provided by NRC's completion of a performance assessment demonstration using limited data and simplifying assumptions. This Phase I demonstration was intended to enhance the NRC staff capability to independently evaluate the DOE's site characterization activities and its repository performance assessments. Phase 2, currently underway, will refine the performance assessment methods and capabilities used in Phase 1. In addition, these Iterative Performance Assessment activities are expected to assist the NRC staff to evaluate proposals related to revision of the Environmental Protection Agency (EPA) high-level waste standards, to evaluate NRC's regulations, and to develop and provide guidance to DOE.

The most significant challenge for the future in the high-level waste program is: dealing with the uncertainties in evaluating compliance of a repository over 10,000 years.

It is inevitable that projections of the performance of a high-level waste repository will be highly uncertain, whatever form the EPA high-level waste standards may take. The nature of the activity--forecasting geologic evolution, climate change, and human activities for thousands of years--ensures it.

Uncertainties in our understanding of a repository system can be generally classified as: (1) data uncertainty, or uncertainty in our knowledge of the state of the system at the time of repository closure; (2) future states uncertainty, reflecting our imperfect ability to predict the future states of the environment within which the repository will exist; and (3) model uncertainty, which is uncertainty in our ability to forecast the performance of a repository within its future environment. Several well-developed techniques exist for propagating data uncertainties (e.g., variations of the Monte Carlo technique), although none of these has yet been determined to be the most appropriate for repository uncertainty analyses. For repository performance assessments, the real difficulty lies in characterizing uncertainties, especially model and future states uncertainties, and in reducing them to manageable levels. The NRC will pursue a number of means for addressing these uncertainties. These include: (1) review work during site characterization; (2) the use of natural analogues; (3) validation and performance confirmation; (4) systematic methods for identification of failure modes in future states; and (5) development of a performance assessment capability. In addition to its own work, the NRC will continue working with EPA, as it revises its standard, to eliminate the need for precise probability estimates of unlikely processes and events.