January 21, 1997

FOR: The Commissioners

FROM: Hugh L. Thompson, Jr. /s/
Acting Executive Director for Operations

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION HIGH-LEVEL RADIOACTIVE WASTE PROGRAM, ANNUAL PROGRESS REPORT, FISCAL YEAR 1996

PURPOSE:

To provide the Commission with the staff's annual progress report for fiscal year 1996 (FY96).

BACKGROUND:

Early in 1995, the staff recognized the need to refocus its prelicensing repository program on resolving issues most significant to repository performance. Since that time, three major events have driven a significant restructuring of the U.S. Nuclear Regulatory Commission repository program: (i) a reduction in Congressional appropriations for the repository program for both the NRC and the U.S. Department of Energy (DOE); (ii) a reorganization of the DOE high-level waste (HLW) work in what became known as the Program Approach in 1994 and its modification in 1995; and (iii) a report issued to the U.S. Environmental Protection Agency (EPA), by the National Academy of Sciences, that contained recommendations for setting a safety standard for a

proposed HLW repository at Yucca Mountain. The scope of the NRC prelicensing program was adjusted to focus on only those topics most critical to repository performance--these topics are called key technical issues (KTIs). Other activities necessary for licensing have been deferred as a result of FY96 budget reductions. The ten KTIs are as follows.

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1) Igneous activity
2) Structural deformation and seismicity
3) Evolution of the near-field environment
4) Container life and source term
5) Thermal effects on flow
6) Repository design and thermal-mechanical effects
7) Total system performance assessment (TSPA) and integration
8) Activities related to development of the EPA Yucca Mountain Standard
9) Unsaturated and saturated flow under isothermal conditions
10) Radionuclide transport.

DISCUSSION:

NRC and Center for Nuclear Waste Regulatory Analyses (CNWRA) staffs jointly produced an annual progress report for FY96 that provides a status of NRC HLW work conducted in FY96, as well as assessments of progress toward resolution of the KTIs. An advanced pre-publication copy of the report is attached and has been transmitted to DOE and other parties. The report will be published in February 1997 as NUREG/CR-6513, No. 1. Highlights of program accomplishments for FY96 are given in the "Executive Summary." Chapter 1 describes the restructured NRC program and provides a programmatic context for the remaining 10 chapters. Chapters 2 through 11 provide succinct summaries of work accomplished for each of the 10 KTIs considered to be critical to repository performance. It should be noted that details of the activities summarized in the annual report are available in separate reports and technical papers, noted in the references at the end of each chapter.

Significant progress has been made in identifying how to resolve various subissues in the ten KTIs. This process of resolution takes into consideration DOE data and analyses, non-DOE data and analyses available in the literature, NRC independent data and analyses, future investigations proposed by DOE, and an understanding of the impact of the subissues on the overall performance of the repository. It should be understood that DOE is ultimately responsible for developing an integrated safety case for the repository, and it may choose different ways to resolve issues than those identified by NRC. If this is the case, the staff's activities will provide additional confidence during the licensing review that alternate approaches also lead to resolution of major issues.

Overall, for most of the KTIs, activities in FY96 concentrated on establishing a sound technical basis for future issue resolution during FY97. For a few KTIs, this involved data collection to improve the understanding of parameters or processes thought to be important to various analyses and for which data were not available. Activities also emphasized refining or in some cases completing development of models and associated computer codes representing various subsystems or processes of the repository. These models were then used to conduct sensitivity/importance analyses in FY96 at the

repository subsystem or process level, to help focus further work on those factors having a dominant effect on the subsystem or specific processes. Subsystem or process models will provide additional value by either calculating parameter input for use in the total performance assessment (TPA) code or being abstracted as modules in the TPA code during FY97. The resulting updated TPA code will be used for sensitivity/importance analyses, in FY97, that integrate the various subsystems and processes, which can then be used to confirm the importance of various parameters and processes to the total system performance measure of dose. Such integrated analyses are necessary to support resolution of individual issues or subissues that cannot be resolved in isolation of the total system. These analyses will also help develop acceptance criteria for reviewing the DOE safety case.

Although the resolution of many KTIs depends on additional work in FY97, some important progress was made this past year. Interactions between NRC and DOE during FY96 were successful in achieving informal agreements which will be documented in issue resolution status reports in FY97. Examples include narrowing the range of tectonic models, identifying an acceptable seismic design methodology, and resolving design control process concerns. Another major step toward issue resolution was made in the TSPA area. An NRC and DOE interaction identified differences between NRC and DOE TSPAs, causes, and potential future resolution actions. Finally, the staff completed a branch technical position giving an acceptable methodology for the use of expert elicitations.

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Attachment (Commissioners, SECY, and OGC only):

NRC HLW Program Annual Progress Rpt
Fiscal Year 1996 (pre-publication copy)