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MEMORANDUM FOR: David Brooks, Acting Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

FROM: Margaret Federline, Branch Chief
Hydrology and Systems Performance Branch
Division of High-Level Waste Management

SUBJECT: PHASE I REVIEW OF STUDY PLAN 8.3.1.2.2.7 FOR HYDROCHEMICAL CHARACTERIZATION OF THE UNSATURATED ZONE, REVISION 0) [PPSAS 411421, TACS L60195]

As requested, we have completed the Phase I review of the Study Plan 8.3.1.2.2.7 Revision 0 for Hydrochemical Characterization of the Unsaturated Zone (See enclosure). This review was conducted using the Review Plan for NRC Staff Review of DOE Study Plans Revision 1 (Dec. 6, 1990).

This study plan describes the plans for gaseous- and aqueous-phase chemical investigations of the unsaturated zone at Yucca Mountain, Nevada. The two activities of this study plan involve collection of water and gas samples from surface-based boreholes, preparation of the samples for analysis, and methods of hydrochemical analyses to be employed. The chemical and isotopic tests will include analysis for inorganic cations and anions, organic compounds, and stable isotopes. In addition, age dating, gas diffusion, and contamination testing will be conducted.

The objective of the study is to characterize the hydrochemistry of the unsaturated zone by (1) determining transport mechanisms, flow directions, and travel time for gas and water, (2) determining the extent of water/rock interactions, and (3) providing conceptual hydrologic and geochemical models based on the results of the hydrochemical analysis.

The study is confined to the area immediately overlying and adjacent to the boundaries of the repository block. Vertically, the study extends from the near surface of Yucca Mountain down to immediately above the water table. Inasmuch as the locations of the boreholes to be sampled in this study are determined by other studies, this study should not pose potentially adverse effects on repository performance. Interference between tests is difficult to ascertain when all the studies and their schedules are not available for review by the NRC staff. Much of the work is prototypical in nature and so the NRC staff can only go so far as to say that no critical interferences are identified at this time.

The study plan is a candidate for detailed technical review based on criteria 1 and 3. However, we suggest that technical exchanges be used to keep us informed regarding the progress of prototype testing and the development of testing procedures.

The review was conducted by John Bradbury of the Hydrologic Transport Section, who can be reached at 504-2535.

/s/

Margaret Federline, Chief
Hydrology and Systems Performance Branch
Division of High-Level Waste Management

Enclosure: As stated

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