

SEP 4 1992

MEMORANDUM FOR: Joseph Holonich, Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

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

SUBJECT: PHASE I REVIEW OF STUDY PLAN 8.3.1.2.3.2
"CHARACTERIZATION OF THE YUCCA MOUNTAIN
SATURATED-ZONE HYDROCHEMISTRY," REVISION 0
[PPSAS 411421, TACS L60267]

As requested, we have completed the Phase I review of the Study Plan 8.3.1.2.3.2 Revision 0 for Characterization of the Yucca Mountain Saturated-Zone Hydrochemistry (See enclosure). This review was conducted using the Review Plan for NRC Staff Review of DOE Study Plans Revision 1 (Dec. 6, 1990). No objection-level concerns have been identified.

This study plan describes the methods that will be used to provide the hydrochemical information needed in geohydrological and geochemical site characterization efforts. Work in this study will determine water chemistry in the saturated, and immediately adjacent unsaturated rocks beneath and adjacent to Yucca Mountain and in the saturated rocks within the surrounding region. The study is subdivided into four activities:

- 8.3.1.2.3.2.1 Assessment of saturated-zone hydrochemical data
- 8.3.1.2.3.2.2 Hydrochemical characterization of water in the upper part of the saturated zone
- 8.3.1.2.3.2.3 Regional hydrochemical characterization, and
- 8.3.1.2.3.2.4 Synthesis of saturated-zone hydrochemistry

Gas-phase samples, hydrochemical data, and liquid-phase samples will be collected at wells and springs throughout the site and region. The data will include water temperature, specific electrical conductance, concentrations of selected dissolved inorganic and organic constituents, selected dissolved radioisotopes and stable isotope ratios, concentrations, radioisotope activities and stable isotope ratios of selected gaseous elements and compounds. Most new data will be collected close to Yucca Mountain. New regional information will be collected from Gold Flat south to Silurian Valley, and from Death Valley east to the Spring Mountains.

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The data will be used to help identify plausible solid phases and chemical processes that contribute to the spatial compositional variations in the saturated-zone waters. Data will provide insight to the physical nature of the geohydrologic system, the identification and quantification of fluxes, the existence of hydrologic boundaries, and residence times within the saturated and unsaturated zones. The data are also required to describe the transport and fate of radionuclides within the near and far field.

This study plan describes activities that could address Comments 21 and 22 of the SCA. In the Responses to Nuclear Regulatory Commission Site Characterization Analysis (1990), the DOE had identified this study plan as one of the sources of information to address these NRC concerns. Comment 21 recommends that technetium-99 and iodine-129 be added to the list of radioisotopes to be analyzed. The study plan states analyses of groundwater from the first two or three sites will include measurement of the activities of these two isotopes. If significant activities are detected, additional determinations will be made on subsequent samples. Comment 22 recommends collecting water samples as close as possible to the water table. The method of collecting water immediately above and below the water table is described in the study plan.

We continue to be concerned about the lack of explicit discussion of an overall program of iterative performance assessment or a discussion of the timing of this study relative to such a program. This type of program leads to the identification of information and analyses needed to support a license application.

The study plan is a candidate for detailed technical review based on criteria 1, 2 and 3. However, it is expected that the detailed technical review of the study plan would focus on closure of open items, as technical questions must await the outcome of prototype testing. Finally, we request that the references labelled as "not assumed available" be obtained from the DOE. The review was conducted by John Bradbury and Virginia Colten-Bradley of the Hydrologic Transport Section.

Margaret V. Federline, Chief
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Enclosure: As stated

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