MAY 18 1993

Mr. Carl A. Johnson
Administrator of Technical Programs
Agency for Nuclear Projects
Nuclear Waste Project Office
Capitol Complex
Carson City, NV. 89710

Dear Mr. Johnson:

SUBJECT: CHARACTERIZATION OF PNEUMATIC PATHWAYS AT THE YUCCA MOUNTAIN SITE

This office has received your letter dated February 4, 1993, regarding the State of Nevada's concern that early excavation of the Exploratory Studies Facility (ESF) may preclude adequate characterization of the pneumatic pathways at the Yucca Mountain site and may therefore prevent the NRC staff from making a finding on the issue of the fastest pathway for radionuclide release.

The NRC staff has expressed similar concerns in its Site Characterization Analysis (SCA comment 123), Phase I review of Study Plan 8.3.1.2.2.5, "Diffusion Tests in the Exploratory Studies Facility" and review of Progress Reports (PR) 6 and 7. A copy of the question asked in the PR review is enclosed for your information. The staff considers that the site characterization program, and a demonstration of how a potential repository will meet 10 CFR Part 60 requirements in the license application should be addressed by DOE. Therefore, your letter has been forwarded to DOE for action. However, we have requested that DOE respond to our concerns before starting operations with the tunnel boring machine.

If you have any questions or comments concerning this matter, please contact Paul Prestholt of my staff at (301) 504-3810.

Sincerely,

/S/

Joseph J. Holonich, Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

Enclosure: As stated

cc: See next page

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SECTION 2.2.1.11 STUDY 8.3.1.2.2.7 - HYDROCHEMICAL CHARACTERIZATION OF THE UNSATURATED ZONE

QUESTION 1

What evaluation has DOE made of the potential for air movement from the ESF to adversely impact the collection of geochemical data necessary for site characterization?

BASIS

This question is a more specific example related to SCA Comment 123. Comment 123 related the concern that "The effects of ventilation of the exploratory shafts and the underground testing rooms may have been underestimated in the evaluation of the potential interference with testing and the potential for irreversible changes to baseline site condition; also, there is not an adequate analysis of the effects of ventilation in the ESF on the ability of the site to isolate waste." Furthermore, the comment suggests that "at an early date, but before construction of the exploratory shafts is begun, DOE should provide an analysis that considers the effects on ventilation of the ESF, including both liquid and gas flows, on the rock adjacent to the ESF."

The NRC staff is concerned that surface-based tests planned to obtain chemical data necessary for site characterization could be adversely impacted by the ESF. Excavation of the ESF could compromise specific geochemical surface-based tests by allowing air to circulate from the ESF through the rocks of Yucca Mountain. Study Plan 8.3.1.2.2.7 identifies chemical species that will be sampled in the Yucca Mountain unsaturated zone. Some of these chemical species such as Deuterium, Tritium, Freon-11, Freon-12, Argon 39, Carbon 14, and Oxygen-18 can move through the unsaturated zone in both liquid and gas phases. If air from ESF drifts moves significant distances along paths of high air permeability, such as open fractures, gases from the drifts could mix with liquids and gases in the rock. At locations where this occurs, future geochemical sampling of predisturbance baseline conditions could be compromised.

Current estimates of air flow through the ESF suggest that a significant volume of rock could come in contact with air containing different concentrations and types of chemical species. For example, a presentation by Peters (1992, Table 2), estimated that 264,533 cubic ft./min. (cfm) of air may eventually circulate through the ESF with 178,000 cfm used by internal combustion engines. Alternatively, in Dennis (1991, p. B-67), it is estimated that air fluxes in the main tunnel could range from 300,000 cfm to 500,000 cfm.

The NRC staff is aware that two studies have been completed estimating the extent of ESF dewatering (Hopkins, 1987, and Sobolik, 1991), but those investigations do not address the impact the ESF on the gathering of chemical data. In addition, we have been unable to find where this concern is addressed by the Site Characterization Plan, or Study Plans 8.3.1.2.2.1, 8.3.1.2.2.3, 8.3.1.2.2.4, and 8.3.1.2.2.7.

Study Plan 8.3.1.2.2.7 references geochemical tests to characterize the Yucca Mountain site. Of the tests described in this study plan, we are particularly concerned with surface-based tests using boreholes, such as geochemical sampling associated with the deep unsaturated zone boreholes described in Study Plan 8.3.1.2.2.3.

RECOMMENDATION

Consideration should be given to the anticipated effect of air movement from the ESF on surface-based geochemical tests. If air movement from the ESF is anticipated to significantly affect the gathering of geochemical data necessary for licensing from surface-based tests, it is recommended that this data be collected before it can be compromised. This recommendation should be considered in a timely manner.

REFERENCES

Dennis, A.W., 1991, Exploratory studies facility alternatives study final report: Sandia National Laboratories, SAND91-0025, v. 2, p. B-67.

Hopkins, P., 1987, Effect of drift ventilation on repository hydrology and resulting solute transport implications: Sandia National Laboratories, SAND86-1571.

Peters, J.W., 1992, Ramp sizing by ventilation requirements: Presentation to Nuclear Waste Technical Review Board Structural Geology & Geoengineering Panel Meeting, Las Vegas, Nevada, Nov. 4-5, 1992.

Sobolik, S.R., Fewell, M.E., and Eaton, R.R., 1991, Movement of shaft and drift construction water in Yucca Mountain, Nevada - an extended study: Sandia National Laboratories, SAND91-0791.