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June 28, 2004
Contract No. NRC–02–02–012
Account No. 20.06002.01.091

U.S. Nuclear Regulatory Commission
ATTN: Mr. Jeffrey Pohle
Office of Nuclear Material Safety and Safeguards
Division of High Level Waste Repository Safety
TWFN, Mail Stop 7-D13
Washington, DC 20555

SUBJECT: Thermal Effects on Flow KTI IM 06002.01.091.450: Temperature and Relative Humidity Along Heated Drifts With and Without Drift Degradation, CNWRA 2004-02

Dear Mr. Pohle:

Enclosed please find CNWRA Report 2004-04 titled "Temperature and Relative Humidity Along Heated Drifts With and Without Drift Degradation." This technical document fulfills the requirements for the subject milestone, which is due June 30, 2004.

The subject report contains the information presented in Thermal Effects on Flow KTI Intermediate Milestone 06002.01.091.410 "Environmental Conditions in Drifts." The report was converted to a numbered CNWRA report and the title was changed to better reflect the subject of the report. The technical content of the subject report remains unchanged, but significant programmatic revisions were made throughout chapter 1 and in the introductions and summaries of chapters 2 and 3. In addition, an appendix describing the in-drift algorithm was added to the subject report.

The report provides estimates of temperature and relative humidity along a typical drift for drift degradation and no degradation scenarios. Results from repository edge cooling and thermohydrology analyses show early onset of conditions favorable to localized corrosion of Alloy 22. Drift degradation leads to large increases in waste package and drip shield temperature, but delays the onset of conditions conducive to localized corrosion. Estimates of temperature gradients along drifts from an abstracted model are supported by a three-dimensional thermohydrological model. The temperature gradients along the drift are then used as boundary conditions for computational fluid dynamics modeling of natural convection associated with the cold-trap process. Descriptions are provided of ongoing laboratory experiments intended to support model development and parameterization of computational fluid dynamics simulations of emplacement drifts.

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If you have any questions about the technical content of the report, please contact Mr. Randy Fedors at (210) 522-6818 or Dr. David Farrell at (210 ) 522-5208.

Sincerely yours,

Gordon Wittmeyer, Ph.D.
Hydrology Section Manager

GW/ph
Enclosures
cc:

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