



Department of Energy
Office of Civilian Radioactive Waste Management
Office of Repository Development
1551 Hillshire Drive
Las Vegas, NV 89134-6321

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OVERNIGHT MAIL

ATTN: Document Control Desk

Chief, High-Level Waste Branch, DWM/NMSS
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

**TRANSMITTAL OF REPORT *TECHNICAL BASIS DOCUMENT NO. 5: IN-DRIFT
CHEMICAL ENVIRONMENT* ADDRESSING 15 KEY TECHNICAL ISSUE (KTI)
AGREEMENTS**

This letter transmits *Technical Basis Document No. 5: In-Drift Chemical Environment*, Revision 1 (enclosure 1) and a CD format of the report (enclosure 2). This technical basis document contains a summary of the current conceptual understanding of the evolution of the in-drift chemistry and provides the context within which individual KTI agreements related to in-drift chemistry are addressed. Appendices A through L provide direct responses to the following Container Life and Source Term (CLST), Evolution of Near Field Environment (ENFE), Total System Performance Assessment and Integration (TSPAI), Thermal Effects on Flow (TEF) KTIs, and related General (GEN) 1.01 agreements:

- Appendix A – Credible Range of Brine Water Chemistry and Consistency between Corrosion Testing Environments and Models
(Response to CLST 1.01, TSPAI 3.12, TSPAI 3.13, and GEN 1.01 [Comments 50, 113, 118, 122 and 124])
- Appendix B – Uncertainty and Variability in the Near-Field Geochemical Environment
(Response to ENFE 1.05 and TSPAI 3.09) and GEN 1.01 [Comments 81, 93, 98, 104, and 110]
- Appendix C – Evaluation of Trace Elements and Fluoride
(Response to ENFE 2.04)
- Appendix D – In-Drift Geochemical Data and Model Uncertainties
(Response to ENFE 2.05)
- Appendix E – The Range of Local Chemistry Conditions at the Drip Shield and Waste Package Surfaces (Response to ENFE 2.06)
- Appendix F – Modeling of Salt Interactions at Low Relative Humidity
(Response to ENFE 2.09 and ENFE 2.15)

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-2-

NOV 25 2003

- Appendix G – Range of Water Compositions That Could Contact the Drip Shield or Waste Package Surfaces (Response to ENFE 2.10)
- Appendix H - Kinetics of Chemical Processes (Response to ENFE 2.11)
- Appendix I – The Impacts of Dust Deposition on the Salt Analysis (Response to ENFE 2.13)
- Appendix J – Analysis of Laboratory Solution of Introduced Materials (Response to ENFE 2.14)
- Appendix K – Assessment of Data Uncertainty and Documentation of Data Used to Calibrate Models and Support Model Predictions (Response to ENFE 2.17 and GEN 1.01 [Comments 47 and 109])
- Appendix L – Multiscale-Thermohydrologic Model (Response to TEF 2.04)

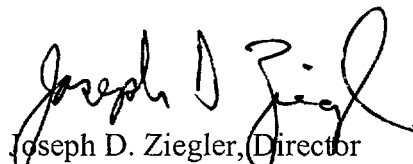
The subject report is one in a series of technical basis documents that are being prepared to describe the Yucca Mountain, Nevada, repository system components and processes that are important for predicting the likely postclosure performance of the repository. The information presented in these documents, along with the associated references, responds to open KTI agreements made between the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE). Placing the DOE responses to individual KTI agreements in the context of the applicable repository system components and processes allows for a more direct discussion of the relevance of the agreements to the postclosure safety analyses that will be presented in the LA. The goal of this approach is to provide a more direct and transparent discussion of the relevant KTI agreements.

The enclosed technical basis document discusses the methods used to model the conceptual understanding of the in-drift chemical environment. It includes a description of processes and associated models that are important to understanding the evolution of the chemical system within the engineered barrier system. As part of the model development, testing for validation purposes are discussed, and uncertainty associated with data and models are also addressed. This document places the responses to individual KTI agreements, related to in-drift chemical environment, within the context of the overall conceptual understanding of the evolution of chemical processes in the drift, explains their relationship to the postclosure safety analyses, and provides a discussion of the relevance of KTI agreements.

The DOE considers the KTI agreements covered in *Technical Basis 5: In-Drift Chemical Environment* to be fully addressed, and pending review and acceptance by NRC, they should be closed.

NOV 25 2003

There are no new regulatory commitments in the body or enclosures of this letter. Please direct any questions concerning this letter and its enclosures to Deborah L. Barr at (702) 794-1479 or Joe C. Price at (702) 794-1343.



Joseph D. Ziegler, Director
Office of License Application and Strategy

OLA&S:TCG-1942

Enclosures:

1. *Technical Basis Document No. 5: In-Drift
Chemical Environment*, Revision 1
2. CD of Enclosure 1

cc w/encls 1 and 2:

G. P. Hatchett, NRC, Rockville, MD
R. M. Latta, NRC, Las Vegas, NV
W. C. Patrick, CNWRA, San Antonio, TX
W. D. Barnard, NWTRB, Arlington, VA
J. B. Garrick, ACNW, Rockville, MD

cc w/encl 2:

D. D. Chamberlain, NRC, Arlington, TX
D. B. Spitzberg, NRC, Arlington, TX
H. J. Larson, ACNW, Rockville, MD
Budhi Sagar, CNWRA, San Antonio, TX
J. R. Egan, Egan & Associates, McLean, VA
J. H. Kessler, EPRI, Palo Alto, CA
M. J. Apted, Monitor Scientific, LLC, Denver, CO
Rod McCullum, NEI, Washington, DC
R. R. Loux, State of Nevada, Carson City, NV
Pat Guinan, State of Nevada, Carson City, NV
Alan Kalt, Churchill County, Fallon, NV
Irene Navis, Clark County, Las Vegas, NV
George McCorkell, Esmeralda County, Goldfield, NV
Leonard Fiorenzi, Eureka County, Eureka, NV
Andrew Remus, Inyo County, Independence, CA

NOV 25 2003

cc w/encl 2: (continued)

Michael King, Inyo County, Edmonds, WA

Mickey Yarbrow, Lander County, Battle Mountain, NV

Spencer Hafen, Lincoln County, Pioche, NV

Linda Mathias, Mineral County, Hawthorne, NV

L. W. Bradshaw, Nye County, Pahrump, NV

Mike Simon, White Pine County, Ely, NV

R. I. Holden, National Congress of American Indians, Washington, DC

cc w/o encls:

C. W. Reamer, NRC, Rockville, MD

A. C. Campbell, NRC, Rockville, MD

L. L. Campbell, NRC, Rockville, MD

J. D. Parrott, NRC, Las Vegas, NV

N. K. Stablein, NRC, Rockville, MD

NOV 25 2003

bcc w/encl 2:

BSC CCU Administrator, BSC, Las Vegas, NV
CMS Coordinator, BSC, Las Vegas, NV
G. L. Smith, DOE/ORD (RW-50W), Las Vegas, NV
OLA&S Library
Records Processing Center = "11"

bcc w/o encls:

Margaret Chu, DOE, FORS
T. J. Garrish, DOE, FORS
C. A. Kouts, DOE/ORD (RW-20E), FORS
A. L. Capoferri, DOE/HQ (GC-52), FORS
R. D. Brown, DOE/OQA (RW-3), Las Vegas, NV
Richard Goffi, BAH, Washington, DC
M. R. Wisenburger, BSC, Las Vegas, NV
S. J. Cereghino, BSC, Las Vegas, NV
N. H. Williams, BSC, Las Vegas, NV
R. B. Bradbury, MTS, Las Vegas, NV
R. P. Gamble, MTS, Las Vegas, NV
R. C. Murray, MTS, Las Vegas, NV
W. J. Arthur, III, DOE/ORD (RW-2W), Las Vegas, NV
J. R. Dyer, DOE/ORD (RW-2W), Las Vegas, NV
K. W. Powers, DOE/ORD (RW-2W), Las Vegas, NV
D. L. Barr, DOE/ORD (RW-40W), Las Vegas, NV
W. J. Boyle, DOE/ORD (RW-40W), Las Vegas, NV
A. V. Gil, DOE/ORD (RW-40W), Las Vegas, NV
T. C. Gunter, DOE/ORD (RW-40W), Las Vegas, NV
C. L. Hanlon, DOE/ORD (RW-40W), Las Vegas, NV
S. P. Mellington, DOE/ORD (RW-50W), Las Vegas, NV
C. M. Newbury, DOE/ORD (RW-40W), Las Vegas, NV
J. C. Price, DOE/ORD (RW-40W), Las Vegas, NV
S. L. Rives, DOE/ORD (RW-2W), Las Vegas, NV
P. F. Sanchez-Bartz, DOE/ORD (RW-2W), Las Vegas, NV
M. C. Tynan, DOE/ORD (RW-40W), Las Vegas, NV
J. D. Ziegler, DOE/ORD (RW-40W), Las Vegas, NV