Department of Energy
Office of Civilian Radioactive Waste Management
Yucca Mountain Site Characterization Office
P.O. Box 364629
North Las Vegas, NV 89036-8629

QA: N/A

OCT 30 2001

OVERNIGHT MAIL

C. William Reamer, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Materials Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Two White Flint North
Rockville, MD 20852

TRANSMITTAL OF U.S. DEPARTMENT OF ENERGY SCHEDULE FOR RESPONSES TO U.S. NUCLEAR REGULATORY COMMISSION (NRC) REQUEST FOR ADDITIONAL INFORMATION: STRUCTURAL DEFORMATION AND SEISMICITY (SDS) KEY TECHNICAL ISSUE (KTI) AGREEMENTS

Reference: Ltr, Reamer to Brocoum, dtd. 8/3/01

The referenced letter requested additional information about the agreements associated with the SDS KTI. The enclosed table summarizes additional information requested by the NRC, and identifies the documentation that is expected to address the information needs, and provides an expected submittal date to the NRC for the documentation identified. The completed documentation providing the requested information will be provided to the NRC as the documentation becomes available.

Please direct any questions about this letter, or the availability of documentation, to Timothy C. Gunter at (702) 794-1343.

Stephan Brocoum
Assistant Manager, Office of
Licensing and Regulatory Compliance

OL&RC:TCG-0130

Enclosure:
Structural Deformation and Seismicity Key
Technical Issue Request for Additional
Information

YMP-5

cc w/encl:
J. W. Andersen, NRC, Rockville, MD
M. M. Comar, NRC, Rockville, MD
D. D. Chamberlain, NRC, Arlington, TX
R. M. Latta, NRC, Las Vegas, NV
S. H. Hanauer, DOE/HQ (RW-2) FORS
B. J. Garrick, ACNW, Rockville, MD
Richard Major, ACNW, Rockville, MD
W. D. Barnard, NWTRB, Arlington, VA
Budhi Sagar, CNWRA, San Antonio, TX
W. C. Patrick, CNWRA, San Antonio, TX
Steve Kraft, NEI, Washington, DC
J. H. Kessler, EPRI, Palo Alto, CA
J. R. Curtiss, Winston & Strawn, Washington, DC
J. R. Egan, Egan & Associates, McLean, VA
R. R. Loux, State of Nevada, Carson City, NV
John Meder, State of Nevada, Carson City, NV
Alan Kalt, Churchill County, Fallon, NV
Irene Navis, Clark County, Las Vegas, NV
Harriet Ealey, Esmeralda County, Goldfield, NV
Leonard Fiorenzi, Eureka County, Eureka, NV
Andrew Remus, Inyo County, Independence, CA
Michael King, Inyo County, Edmonds, WA
Mickey Yarbro, Lander County, Battle Mountain, NV
Jason Pitts, Lincoln County, Caliente, NV
L. W. Bradshaw, Nye County, Pahrump, NV
Geneva Hollis, Nye County, Tonopah, NV
Josie Larson, White Pine County, Ely, NV
Judy Shankle, Mineral County, Hawthorne, NV
R. I. Holden, National Congress of American Indians, Washington, DC
Allen Ambler, Nevada Indian Environmental Coalition, Fallon, NV
CMS Coordinator, BSC, Las Vegas, NV
R. N. Wells, DOE/YMSCO (RW-60) Las Vegas, NV

cc w/o encl:
N. K. Stablein, NRC, Rockville, MD
W. L. Belke, NRC, Las Vegas, NV
L. H. Barrett, DOE/HQ (RW-1) FORS
A. B. Brownstein, DOE/HQ (RW-52) FORS
R. A. Milner, DOE/HQ (RW-2) FORS

cc w/o encl: (continued)
C. E. Einberg, DOE/HQ (RW-52) FORS
N. H. Slater, DOE/HQ (RW-52) FORS
S. J. Cereghino, BSC, Las Vegas, NV
N. H. Williams, BSC, Las Vegas, NV
Donald Beckman, BSC, Las Vegas, NV
K. M. Cline, MTS, Las Vegas, NV
R. B. Bradbury, MTS, Las Vegas, NV
R. P. Gamble, MTS, Las Vegas, NV
R. C. Murray, MTS, Las Vegas, NV
R. D. Rogers, MTS, Las Vegas, NV
Richard Goffi, BAH, Washington, DC
G. W. Hellstrom, DOE/YMSCO, Las Vegas, NV
S. P. Mellington, DOE/YMSCO, Las Vegas, NV
R. E. Spence, DOE/YMSCO, Las Vegas, NV
V. F. Iorii, DOE/YMSCO, Las Vegas, NV
Stephan Brocoum, DOE/YMSCO, Las Vegas, NV
D. R. Williams, DOE/YMSCO, Las Vegas, NV
A. V. Gil, DOE/YMSCO, Las Vegas, NV
T. C. Gunter, DOE/YMSCO, Las Vegas, NV
C. L. Hanlon, DOE/YMSCO, Las Vegas, NV
P. G. Harrington, DOE/YMSCO, Las Vegas, NV
S. A. Morris, DOE/YMSCO, Las Vegas, NV
M. C. Tynan, DOE/YMSCO, Las Vegas, NV
K. D. Lachman, DOE/YMSCO, Las Vegas, NV
D. H. Coleman, DOE/YMSCO, Las Vegas, NV
C. M. Newbury, DOE/YMSCO, Las Vegas, NV
J. T. Sullivan, DOE/YMSCO, Las Vegas, NV
C. A. Kouts, DOE/YMSCO (RW-2) FORS
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Structural Deformation and Seismicity Key Technical Issue Request for Additional Information		
Summary of Information Needed by NRC Staff	**Documentation**	**Expected Submittal Date**
1.02. Technical justification for use of median value or another statistical measure.	Documentation will be provided in a white paper, "Approach to Postclosure Seismic Analyses for a Potential Geologic Repository at Yucca Mountain, Nevada."	November 2001
2.01. Documentation on the process used to provide feedback to experts following their elicitation.	DOE is identifying and reviewing options to provide the information specified, but the decision is pending.	TBD
2.03. Technical justification for use of median value or another statistical measure.	Documentation will be provided in a white paper, "Approach to Postclosure Seismic Analyses for a Potential Geologic Repository at Yucca Mountain, Nevada."	November 2001
2.04. Approach to evaluate seismic risk, including the assessment of seismic fragility and evaluation of event sequences.	Documentation will be provided in a white paper, "Approach to Postclosure Seismic Analyses for a Potential Geologic Repository at Yucca Mountain, Nevada." (The approach will also be summarized in Seismic Topical Report #3, to be issued at a later date.)	November 2001
3.03. NRC item 4.1. Directional bias. Technical basis for conclusion that fracture geometry parameter values for repository host horizon are correct. Provide a set of data corrected for these sampling biases along with a description of the methodology used for sampling bias correction.	Documentation will be provided in a fracture analysis AMR.	September 2003.
3.03. NRC item 4.2. Representativeness of fracture parameters. Technical basis or rationale to support extrapolation of fracture parameters to the repository	Additional data is presently being collected from surface outcrops in two zones of the Topopah Spring Tuff (the crystal-poor middle nonlithophysal zone (Tptpmn) and the crystal-poor lower lithophysal zone (Tptpll)) south and west of the proposed	September 2003

ENCLOSURE

Structural Deformation and Seismicity Key Technical Issue Request for Additional Information		
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footprint that accounts for heterogeneities in the repository host horizon and uncertainties in the fracture characteristics and their distribution.	repository block. The data will be documented in a fracture analysis AMR.	
3.03. NRC item 4.3. Misrepresentation of aggregated fracture characteristics. DOE fracture sets (within each lithologic unit) were defined based on orientation modes, without reference to the origin or timing of fracture formation. DOE needs to provide the technical justification for the selection of fracture sets.	The basis for defining fracture sets and their use in DOE's models do not require information about fracture origin or timing of formation. DOE believes information about origin or timing of fracture formation is not important to performance. Documentation will be provided in a fracture analysis AMR.	September 2003
3.03. NRC item 4.4. Fractures over one meter in length. There is a limited data set of fracture characteristics for fractures less than 1 m trace length. DOE needs to provide a technical basis for using a fracture-length database for various rockfall analyses and other calculations that is truncated at 1 m.	Information needed for the technical basis supporting the drift degradation/rockfall analyses includes those fractures with trace lengths less than 1 meter (see RDTME 3-19). This documentation will be included in a fracture analysis AMR. When this work is completed, fracture trace length will not be truncated at 1 meter.	September 2003
3.03. NRC item 4.5. Orientation variation within fracture sets. DOE reported the single mean orientation of all fractures in a set to represent that particular set. DOE needs to describe the procedure for defining sets, explain the use of single-value orientations to represent fracture set	Documentation of variation within fracture sets will be provided in a fracture analysis AMR. DOE intends to include descriptions of use of single-value orientations to represent fracture set mean orientations and use of statistics representing the range or variation in orientation distribution in a revision of the Drift Degradation Analysis	September 2003 September 2003

Structural Deformation and Seismicity Key Technical Issue Request for Additional Information		
Summary of Information Needed by NRC Staff	**Documentation**	**Expected Submittal Date**
mean orientations, provide statistics that represent the range or variation in orientation distribution within each fracture set, or risk-inform the fracture-orientation variation database.	(ANL-EBS-MD-000027).	
3.03. NRC item 4.6. Fracture trace length and fracture shape. DOE measured the trace length of fractures that intersect the cylindrical exploratory studies facility and cross the drift tunnel walls. DOE needs to provide (1) a technical basis for the method it used to measure fracture lengths in tunnels and drifts to support its conclusions; (2) an assessment of the potential fracture shapes and their significance, if any, to performance; or (3) risk-inform the results of its fracture trace length and fracture shape data and assumptions, respectively.	Item 1: Documentation will be provided in a fracture analysis AMR. Item 2: Additional sensitivity analyses of fracture size/shape on block size development will be included in a revision to the Drift Degradation Analysis AMR (ANL-EBS-MD-000027).	September 2003 September 2003
3.03, NRC item 4.7. Strikes of shallowly-dipping fractures. DOE stated that "strike was not considered since it is of little interest to tunnel stability when examining subhorizontal fractures." The pattern of displacement on shallowly-dipping fractures under thermal and seismic perturbations is sensitive to fracture strike	Documentation will be provided in a fracture analysis AMR.	September 2003

Structural Deformation and Seismicity Key Technical Issue Request for Additional Information		
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and dip directions.		
3.03. NRC item 4.8. Statistical significance of fracture populations in the ESF and ECRB. DOE's numerical analysis of fracture parameters stated the number of samples used in each analysis. DOE assumed that the number of samples studies was sufficient to conclude statistical significance or representativeness of the sample populations. DOE needs to provide a population statistical analysis – unit by unit, set by set – of the fracture data and results and provide the character statistics, or risk-inform the current assumption.	Documentation will be provided in a fracture analysis AMR.	September 2003