UNITED STATES
NUCLEAR REGULATORY COMMISSION
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January 23, 1998

Dr. Stephan J. Brocoum
Assistant for Licensing
U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Yucca Mountain Site Characterization Office
P. O. Box 30307
North Las Vegas, Nevada 89036-0307

SUBJECT: RESPONSE TO LETTER CONCERNING APPENDIX 7 ON MAPPING SUBSURFACE FACILITIES, FROM DR. STEPHAN J. BROCOUM TO JOHN T. GREEVES DATED DECEMBER 15, 1997

Dear Dr. Brocoum:

As you stated in your letter, our staffs had a very useful interaction on U.S. Department of Energy's (DOE's) current and planned program for mapping underground facilities at Yucca Mountain. At that Appendix 7 meeting, held in October 1997, DOE briefed the U.S. Nuclear Regulatory Commission and the Center for Nuclear Waste Regulatory Analyses (CNWRA) staffs on its current geological mapping program in the Exploratory Studies Facility (ESF), and its plans for future underground mapping. DOE conducted a site visit to the ESF to examine and discuss various fracture characteristics and the techniques used to map them. DOE presented the fracture mapping aspects of its proposed performance confirmation program under consideration for repository design and construction planning. This letter responds to your comments on the results of the Appendix 7 discussions.

As enumerated in your letter, the objectives of the Appendix 7 meeting were to:

(1) Provide NRC with status, plan, and justification for proposed repository subsurface facilities mapping program;

(2) Discuss past mapping, and process leading to definition of mapping techniques selected; field visit;

(3) Discuss how mapping information is to be incorporated into Total System Performance Assessments/Viability Assessments;

(4) Outline mapping requirements and means expected to fulfill needs meeting those requirements;

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(5) Provide support material and discussion for site visit to the ESF to examine subsurface structural features;

(6) Establish path forward to reach agreement on adequacy and sufficiency of current performance confirmation proposals for future mapping of underground facilities; and

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(7) Establish path forward to obtain NRC feedback on the adequacy and sufficiency (for intended use and purposes) of the proposed mapping approach.

NRC staff considers that the objectives of the Appendix 7 meeting were met, and we summarized the discussions in a trip report, which is enclosed for your information.

With respect to your "...understanding that the NRC representatives agree with DOE that the proposed approach for underground mapping of future repository facilities is both adequate and sufficient for intended purposes for the performance confirmation program.", we are in general agreement, with the following caveat. Because the Appendix 7 emphasized only one area of the performance confirmation program, in particular, geologic mapping for the purposes of repository design and construction, the staff in attendance could comment on the adequacy and sufficiency of the approach for only those purposes.

Regarding your request for our position on "...the resolution of questions related to adequacy and sufficiency of the proposed future repository mapping program.", the NRC/CNWRA staff observed and stated at the Appendix 7, that the proposed mapping program seemed adequate for purposes of pre-closure design and construction planning. However, the staff also noted that process and performance modelers, among other users, apparently had not provided specifications for the geologic features and conditions that they required to be mapped to meet their performance confirmation needs. Therefore, the staff recommended that DOE obtain a complete set of features and conditions (and their respective minimum size and map-frequency requirements) of significance to performance confirmation by combining input from modelers of aspects of waste isolation and performance with the mapping goals presented by the repository designers and constructors. The staff would be willing to formally evaluate such a complete proposed mapping program in the context of a comprehensive performance confirmation program plan.

Your statement, "Thus, the issue of standoff distances should not be tied to NRC determination of sufficiency and adequacy of the proposed mapping program," requires some discussion. DOE's seismic design methodology, discussed briefly in your letter, includes assessment of the location and displacement potential of significant faults for the purpose of demonstrating that: (a) no standoff is necessary, or (b) avoidance is feasible, or (c) a design to mitigate an unavoidable fault-displacement hazard is needed, for a facility planned for a particular location. While standoff distances themselves are not an issue (NUREG-1494, Staff Technical Position on Consideration of Fault Displacement Hazards in Geologic Repository Design, 1994), the successful consideration of standoff, avoidance, or design to mitigate a fault-displacement hazard is related to the adequacy and sufficiency of DOE's program to map significant faults (i.e., Type I faults). Therefore, while we can agree that standoff distances, per se, would not be tied to NRC determination of adequacy and sufficiency of a proposed mapping program, such a mapping program should ensure that Type I faults are identified and mapped.

The staff believes that DOE should proceed with its approach to developing a subsurface mapping program that might support a strategy of mapping drifts at a lesser frequency than is the current practice in the ESF. Such a streamlined mapping program could be compatible with DOE's need to evaluate the adequacy of the information used to determine with

reasonable assurance that the performance objectives for the periods before and after permanent closure will be met.

If you have any questions, please contact me at (301) 415-7252 or Philip Justus of my staff at (301) 415-6745.

Sincerely,

ORIG SIGNED BY:

N. King Stablein, Acting Chief
Engineering and Geosciences Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: See attached list

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