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Denver Research Center
Ground Control Division

November 30, 1984

Mr. Steve Smykowski
Staff Engineer
Engineering Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
1920 Norfolk Avenue
Bethesda, Maryland 20814

Dear Mr. Smykowski:

Enclosed are interim review comments, compiled by Richard Kneisley and George Schneider, for the Davis Canyon and Richton Dome draft envioronmental assessments. I received the upgraded draft of Davis Canyon and the pertinent chapters concerning the Palo Duro region, all of which will be the focus of our ongoing review. I will continue to forward all additional review comments to your office in the upcoming weeks.

Sincerely,

Matthew J. DeMarco
Mining Engineer

Enclosure

RICHTON DOME

4-1 Section 4.1.1 Field Studies Drilling and Geophysical Borehole Testing

Paragraph 1

Section 4.1.1.2.3 Surface Facilities Foundation Boreholes

Paragraph 1

Inconsistent Planning

In the first section the maximum depth planned for auger drilling is 45 meters; in the second section, 60 meters. In the reviewers experience, the maximum practical depth for soil exploration with auger drilling is about 20 meters. A truck-mounted rotary drill rig should be made available for foundation exploration boreholes beyond 20 meters.

RICHTON DOME (Continued)

4-2 Section 4.1.1 Field Studies

Figure 4.1 and Table 4-2

Section 4.1.1.2.2 Engineering Design Borehole

Paragraph 1

Section 4.1.2 Exploratory Shaft

Insufficient Planning

Through the earth radar has been demonstrated to be particularly applicable to exploring the perimeter of salt domes for petroleum reservoirs in structural traps along the flanks of domes and locating brine pockets and structural discontinuities within domes. Planning should include borehole radar to map the flanks of the dome in the vicinity of the deeper aquifers (Clairborne and Wilcox Formations) to determine the extent of salt removal, if any, by dissolution that might effect the stability of the proposed repository. In-mine studies should be planned both in one-way (transmission) and two-way (reflectance) modes to explore for brine pockets and geologic discontinuities in the dome.

RICHTON DOME (Continued)

6-1 Section 6.3.1.2.3 Analysis of Favorable Conditions

Table 6-14

Guideline (C) Potentially Adverse Conditions

Part (3)

Inconsistent Statement

Minor methane in fluid inclusions with domes indicates chemically "oxidizing" environment. The statement should be reducing environment.

RICHTON DOME (Continued)

6-2 Section 6.3.1.6 Dissolution

Guideline 10 CFR 960.4-2-6

Unsupported Conclusion

The estimate of the rate of dome dissolution based on the thickness of caprock at the site is valid for the upper aquifers but not for the geohydrologically distinct deeper aquifers. Only geophysical exploration, preferably borehole radar in conjunction with the planned seismic reflection and gravity surveys, to map the flanks of the dome, and hydrologic investigations to measure the extent (if any) of downflow salt plumes in the Clairborne and (particularly) Wilcox Formations would conclusively demonstrate the extent of dissolution along the flanks. The estimate based on the formation of caprock is probably conservative for the lower aquifers, but not conclusive.

DAVIS CANYON

6-1 Section 6.3.1.3.3 Analysis of Favorable Condition

Page 6-132, Paragraph 2

Analyses

The use of elastic modeling is questionable for simulating long-term stability of openings in rock having time-dependent properties. While the Paradox Basin salt undergoes little, if any, decrepitation with increased temperature, the text (3-58) notes that creep rate does increase with temperature. Strength and modulus changes also result from radiation. Additional non-elastic modeling should be performed using long-term, high-temperature (250°C) inputs for creep rate and radiation-induced property changes. These results should provide a more realistic basis for determining the minimum required bed thickness.

DAVIS CANYON (Continued)

6-2 Section 6.3.1.3.3 Analysis of Favorable Condition

Page 133

Data

The respoitory must remain stable (1,000 yrs) while subject to increasing temperature (< 250°C) and possibly radiation. The text does not provide evidence of long-term high-temperature or radiation effects on creep and for physical properties changes of the salt or other rock. Additional testing is suggested for property changes due to above effects and for methods to decrease consolidation time of stowed backfill material.

DAVID CANYON (Continued)

6-3 Section 6.3.1.3.4 Analysis of Potentially Adverse Conditions

Page 6-134 to 6-135

Data

Rock conditions are not known precisely for the proposed test site. Existing data are from the GD-1 borehole drilled into a dome and not into the bedded portion of the Paradox salt. Drilling techniques affected core recovery (RQD) which makes the given rock classification suspect. Also possibly questionable is stress-state determinations from GD-1. Hydro-fracturing can determine stress magnitude but not direction unless fracture orientation was also determined. Since the site must remain stable, precise borehole information and stress state must be determined. It is recommended that drilling be performed on site.

6-4 Section 6.3.3.2.4 Analysis of Potentially Adverse Conditions

Page 6-206, Paragraph 1

Uncertainties

I question the statement that no bolting will be required since arch roof design can be used in a material of the quality of the Paradox salt (p. 6-203). As no actual on-site Paradox salt data is available, this statement may be premature; bolting may be required, especially if the arches are shot.

6-5 Section 6.3.4.2 Analysis of Qualifying Condition

Page 6-216

Uncertainties

Although site is located in a favorable tectonic environment, there is a need for determining residual tectonic stresses due to surrounding structures which may influence underground opening stability. In situ stresses can significantly effect the stability of underground openings; especially important is opening orientation to the stress state. The text references horizontal stress of 1 to 1.6 times vertical stress but no data exist regarding direction. Additional drilling at the site, if planned, should include specific stress state determinations in the repository horizon and in the immediate adjacent strata.