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(Return to WM, 623-SS)

March 4, 1985

John J. Linehan, Section Leader
Salt Section
Repository Projects Branch
Division of Waste Management, MS 623-SS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Linehan:

SUBJECT: NRC INFORMATION REQUEST

In response to an informal request from T. Verma, the attached information is provided concerning the decrepitation experiment referred to in the attached NRC memo from J. Pearring to T. Verma of November 1, 1984.

Sincerely,

J. O. Neff
Program Manager
Salt Repository Project Office

SRPO:LAC:max:6164B

Enclosures:
1) December 14, 1984, Technical Letter Memorandum RSI-0118, Decrepitation Experiment
2) Incoming request

cc: R. Johnson, NRC, w/encl.
T. Verma, NRC-Cols., w/encl.
D. Dawson, ONWI, w/encl.

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H.R. HUME

RE/SPEC INC.

December 14, 1984

TECHNICAL LETTER MEMORANDUM RSI-0118

Copies to: H Hume
Working Files
EG McNulty
Permanent Files

TO: Dr. H. R. Hume
Battelle Memorial Institute
Project Management Division
Office of Nuclear Waste Isolation
P. O. Box 16594
Columbus, OH 43216-6594

FROM: Dr. P. E. Senseny

SUBJECT: Decrepitation Experiment

On July 6 and 7, 1982 an experiment was performed to determine the temperature at which salt disintegrates. Samples from four sites were tested: the Palo Duro Basin (Unit 5), the Paradox Basin (Cycle 6), Richton Dome and Vacherie Dome. Table 1 gives the specimen identification, well, and depth of each of the four samples.

The core samples were nominally 100-mm-diameter, 70-mm-long disks. Each disk was cut into quarters by sawing along two perpendicular diameters. Two quarters from each disk were put in an oven and heated at a nominal rate of 25°C per hour. The samples were placed so that each site would be represented near the middle and near the edge of the oven so that the several degree temperature variation in the oven would not bias the results.

The procedure was to read the temperature measured by a thermocouple adjacent to the specimens in the middle of the oven at approximately one hour intervals. The oven door was then opened for a very short time to view the condition of the specimens. The temperature controller set point was then advanced about 25°C.

Table 2 gives the log maintained for the experiment. Complete disintegration of the two Palo Duro specimens occurred between 294 and 362°C. No other specimens disintegrated before the test was stopped at a temperature of 454°C.

cc: Gary D. Callahan

P.O. Box 725 • One Concourse Drive • Rapid City, SD 57709
Ph. 605/394-6400 • TWX 510-366-8017 • FAX 605-394-6456

Table 1. Decrepitation Experiment Specimens

Site	Well	Specimen ID	Depth Interval (ft)
Palo Duro	Mansfield #1	PE/82/OC-4/2	1470.43 - 1470.67
Paradox	GD1	PA/82/169C/T/1	3337.24 - 3337.42
Vacherie	LSU1	VA/82/LSU1-6/5	1998.53 - 1998.76
Richton	MRIG-9	RI/82/20-6-1/5	1256.83 - 1257.06

Table 2. Decrepitation Experiment Log

Elapsed Time	Interval (min)	Temp. (°C)	Comments
0	0	20	Two specimens from each site placed in oven
40	40	101	
106	66	118.2	
167	61	150.6	
228	61	173.8	
289	61	199.2	
349	60	223.4	Corner popped off one Palo Duro specimen
409	60	248.8	
470	61	271.2	Audible cracking before opening oven door
490	20	292	Top corner popped off "active" Palo Duro specimen
496	6	294	Cracking heard again - no visible breaks
530	34	290.4	
585	55	300	
648	63	329.6	"Active" Palo Duro specimen completely disintegrated
774	126	362.4	Both Palo Duro specimens completely disintegrated
829	55	381.0	
1429	600	420.5	
1490	61	443.8	
1549	59	454.0	SHUT DOWN

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Leslie A. Casey
(614) 424-5916

12/6/84

Ron Helgerson
13-6-119

The NRC has taken a particular interest in the attached section of the EAs and have highlighted an apparently incorrect reference.

Please identify and supply the correct reference to me for transmittal to the NRC.

Please call me and let me know how long you think this will take you. Leslie

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 0 1 1984

MEMORANDUM FOR: Tilak Verma, Salt Repository Projects
On-Site Representative
Division of Waste Management

FROM: Jerome R. Pearring, SRPO Team Member
Rock Mechanics/Design Member
Division of Waste Management

SUBJECT: REQUEST FOR DATA ACQUISITION ASSISTANCE

In Section 6.3.1.3.4 on page 6-135 of the fourth draft of the Statutory Environmental Assessment for the Davis Canyon site, it is stated that "Laboratory tests show that Paradox salt has been heated up to 450°C (844F) without decrepitation effects (Senseny, 1983, p. 88)...".

We have reviewed the above referenced document (which is entitled ONWI-9 (83-1) - "Technical Progress Report for the Quarter October 1 - December 31, 1982") and find that it contains no information regarding the type and details of the reported laboratory testing.

Request your assistance in obtaining information regarding the details of the reported testing to include: a) sample identification information, i.e., boring location, depth of sample, results of petrographic analysis of sample materials, i.e., type and amount of impurities in the samples and presence of banding and interbedding seams); b) testing procedures; c) identification of type and description of testing equipment; d) stress parameters used during test; e) specific test results; and if possible, f) a discussion of the applicability of the results to anticipated repository conditions. The WMEG point of contact for this information request is Dr. Jerome Pearring, x74648.

Jerome R. Pearring, SRPO Team Member
Rock Mechanics/Design Member
Division of Waste Management

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Roedder, E., and I-Ming Chou, 1982. A Critique of "Brine Migration and Its Implications in the Geologic Disposal of Nuclear Waste", Oak Ridge National Laboratory Report 5818, by G. H. Jenks and H. C. Claiborne, U.S. Geological Survey, Open-File Report 82-1131, U.S. Department of the Interior, Reston, VA.

Russell, 1979. 6.3.3.2.2.

Schneider, K. J., and C. E. Jenkins, 1977. Technology, Safety, and Costs of Decommissioning a Reference Nuclear Fuel Reprocessing Plant, NUREG-0278, U.S. Nuclear Regulatory Commission, Washington, D.C.

Schneider and Temkin, 1977. 6.3.1.4.2.

Science Applications, Inc., 1984. Repository Preclosure Accident Scenarios, BMI/ONWI- , prepared for Office of Nuclear Waste Isolation, Battelle Memorial Institute, Columbus, OH, in preparation.

Senseny, P.E., 1983. "Task 2: Laboratory Studies", Technical Progress Report for the Quarter 1 October - 31 December, 1982, ONWI-9(83-1), prepared by Office of Nuclear Waste Isolation, Battelle Memorial Institute, Columbus, OH.

Sharrock, F. W., 1966. An Archaeological Survey of Canyonlands National Park, Miscellaneous Collected Papers No. 12, University of Utah Anthropological Papers No. 83, Salt Lake City, UT.

Spaulding, W. G., E. B. Leopold, and T. R. Van Devender, 1982. "Late Wisconsinan Paleoecology of the American Southwest", S. C. Porter, ed., The Late Pleistocene, Vol. 1 of H. E. Wright, Jr., ed., Late Quaternary Environments of the United States, University of Minnesota Press, Minneapolis, MN.

Stearns-Roger Services, Inc., 1981. Engineering Feasibility Studies for Candidate Salt Domes: National Waste Terminal Storage Repository No. 1, Special Study No. 5, ONWI-283, prepared for Office of Nuclear Waste Isolation, Battelle Memorial Institute, Columbus, OH.

aspects for the shafts penetrating these strata should not present any problems. However, approximately one-third of the next 300 meters (985 feet) of drilling down to the repository floor level exhibited some high core losses and an average RQD value between 65 and 70 percent, which would classify the rock quality as poor to fair (Stearns-Roger, 1982, p. 3-3). However, these conditions may have been caused at least in part by drilling techniques (WCC, 1982b, ONWI-388, v. I, p. 34). Therefore, drilling procedures were altered and RQD was between 95 and 100 percent through salt cycles 6 and 9. Within the depth interval tentatively characterized by Stearns-Roger as poor to fair, from approximately 550 to 850 meters (1,805 to 2,789 feet), shaft construction or drill rates could be slowed (Stearns-Roger, 1982 pp. 3-3 to 3-4). Good seals behind the shaft liner throughout the last 300 meters (984 feet) of depth will be important to control any communication between the aquifers in the Elephant Canyon member and the salt at repository level. No engineering measures beyond reasonably available technology are expected to be required for any of this work.

As noted already, the quality of the salt host rock at repository level is considered good.

> "(2) Potential for such phenomena as thermally induced fractures, the hydration or dehydration of mineral components, brine migration, or other physical, chemical, or radiation-related phenomena that could be expected to affect waste containment or isolation."

A potentially adverse condition is not found.

Thermal fracturing is generally characterized as thermal decrepitation. This destructive mechanism is discussed in Section 3.1.2.6.2. Laboratory tests show that Paradox salt has been heated up to 450 C (844 F) without decrepitation effects (Senseny, 1983, p. 88), and this temperature is well above the maximum allowable design temperature of 250 C (482 F) for the repository salt. The formation of fractures due to thermal uplift, as discussed under the next condition, is not expected to affect waste containment or isolation.

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Dec. 6 1984.

Leslie,

Could you please assist us in getting this info requested by Terry Pearring of our staff.

Thanks.

Teak

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