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426.1/DJB/B0287/85/04/26

APR 29 1985

Susan K. Whatley, Manager
Engineering Analysis and Planning
Chemical Technology Division
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, TN 37830

Dear Mrs. Whately:

SUBJECT: CONTRACT NO. NRC-50-19-03-01, FIN B-0287, ORNL NO. 41-37-54-92-4, "TECHNICAL ASSISTANCE IN GEOCHEMISTRY," MARCH (1985) MONTHLY PROGRESS REPORT"

I have reviewed the March monthly progress report dated April 11, 1985. Based on my review, I have the following comments:

Task 1 - BWIP Geochemical Technical Assistance

° Progress to date is satisfactory.

° I am drafting an NRC STP on the use of hydrazine to simulate DOE-Hanford site redox conditions. This STP is based on work done under B-0290 (i.e. Kelmers et al. 1984). In order to complete this draft, I would like to have sent to me three references used in the Kelmers et al. report. They are: 1) Bleakely (1968), 2) El-Messide(1977), 3) and Huff(1971). Each of these references has to do with hydrazine disaggregation of rock/clay minerals. The point I am checking is whether or not hydrazine actually disagregates both the mineral structure of the clays, as well as disaggregates clay minerals from the rock matrix, or both (as suggested by Kelmers et al.)

° Attachment 1 contains our BWIP EA comments (FYI). Call me if you have any questions.

° Comments on the ORNL solubility topical report will be transmitted to you during the week of April 29, 1985.

Task 2 - NNWSI Geochemical Technical Assistance

° Progress to date is satisfactory.

WM-RES
WM Record File
B-0287
ORNL HL

WM Project 10, 11, 16
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° Attachment 1 contains our NTS EA comments (FYI). Call Linda Kovach if you have any questions.

Task 3 - Salt Geochemical Technical Assistance

° Progress to date is satisfactory.

° Attachment 1 contains our review of the DOE Salt sites (FYI). Call Walt Kelly if you have any questions.

° Please review EA comment 3-16 for Richton Dome (Attachment 2). In addition to the cited reference (i.e. Thorstenson et al., 1979), are there additional references that can be cited to support the metastable existence of lignite and pyrite under oxidizing conditions?

Task 4 - Short-term Geochemical Technical Assistance

° Progress to date is satisfactory.

° I received Gary Jacobs' letter report concerning geochemical models of radionuclide solubility/speciation. We share his conclusion suggesting that interpretive, rather than predictive applications of geochemical models needs to be emphasized. Copies of the letter report and the associated Rai and Ryon paper are being sent to NRC Research, Mal Siegel (A-1756), and Art White (B3040) for their comments.

Task 5 - Project Management

° Progress to date is satisfactory.

° The geochemical modeling conference proceedings were sent to the printer on April 25, 1985.

The action taken by this letter is considered to be within the scope of the current contract NRC-50-19-03-01/FIN B-0287. No changes to cost or delivery of

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contracted services and products are authorized. Please notify me immediately if you believe that this letter would result in changes to cost or delivery of contracted products.

Sincerely,

Original Signed By

David J. Brooks
Geochemistry Section
Geotechnical Branch
Division of Waste Mangement
Office of Nuclear Material Safety
and Safeguards

Enclosures:
As Stated

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

NRC ISSUES COMMENTS ON DOE'S NINE DRAFT ENVIRONMENTAL ASSESSMENTS OF POTENTIAL HIGH-LEVEL WASTE REPOSITORY SITES

The Nuclear Regulatory Commission (NRC) staff has completed its review and issued comments on the Department of Energy's (DOE) Draft Environmental Assessments (EAs) for nine potential high-level waste repository sites for permanent disposal of high-level radioactive waste. The EAs were issued by the DOE on December 20, 1984 in support of the site-selection process established by the Nuclear Waste Policy Act (NWPA) of 1982 and will eventually lead to the selection, by DOE, of three sites for characterization. The EAs contain assessments of the nine potentially acceptable sites that DOE has identified for the first repository in accordance with the requirements of the NWPA. The NRC will consult with the DOE on the characterization of at least three of the nine sites, which are located in Louisiana, Mississippi, Nevada, Texas, Utah and Washington. The NRC will not receive an application from DOE to license one of those sites until 1991, at the earliest.

The NWPA and NRC regulations governing licensing of the geologic repository provide for consultation between DOE and NRC prior to a formal licensing application. NRC review and comments on the EAs is part of the continuing interaction between NRC and DOE staffs, and is aimed at assuring that potential licensing issues are being identified so that they can be addressed during site characterization. In addition, the NWPA requires the NRC to adopt the DOE Environmental Impact Statement (EIS) for the chosen site to the extent practicable.

In commenting on the EAs, the NRC has recognized that the level of information which exists on each site is not equivalent to what will be necessary to make findings about the suitability of the one site that is proposed for development as a repository. The NRC comments focus on areas in the EAs where reexamination by DOE is necessary. No attempt was made to rate or compare the sites. In conducting the EA review, the NRC staff attempted to give equal attention to all nine EAs. NRC will continue to consult with the DOE in their preparation of the final EAs, in the development of the site characterization plans and in the preparation of an EIS for the site selected by DOE.

A copy of the NRC comments on each of the nine EAs is available for public inspection at the NRC's Public Document Room, 1717 H Street, N.W., Washington, D.C. Copies of each set of comments are available through the Public Document Room at a cost of 7¢ per page. The number of pages vary for each set of comments but the average approximate cost per set would be ~~$12.00.~~ 7 ¢

AH Comment 2-2

NRC COMMENTS

ON

DOE DRAFT ENVIRONMENTAL ASSESSMENT

FOR THE

RICHTON DOME SITE

March 20, 1985

draft EA, Tammemagi et al (1984 ONWI-364), incorrectly referenced as Tammemagi (1981), does not give actual stress measurements in salt mines in the Gulf Coast Region (although on p. 16 a number is given for the Paradox Basin). Hoek and Brown (1980) include one data point from a Louisiana salt dome for which the rate is approximately 0.023 MPa/m. Lindner and Halpern, (1977) include one number from a Louisiana salt dome in their data base, but give no details. Of the three empirical prediction equations given by Lindner and Halpern, 1977, two, including the one proposed by the authors, suggest a stress rate increase substantially above 0.023 MPa/m. It is recommended that the discussion be expanded to present the rationale for proposing a stress rate increase of 0.023 MPa/m which is significantly lower than the rates proposed by either Hoek and Brown (1980), of 0.027 MPa/m, or by Lindner and Halpern (1977).

3-14

Section 3.2.6.1.2, Geomechanical Properties of Caprock and Salt, Page 3-40, Paragraph 3

No information or data are provided on either the state of stress outside the salt stock at repository levels or in the overburden (including caprock). Estimates of stress conditions for these regions are required when modeling thermomechanical response prediction calculations. It is recommended that the discussion be expanded to address proposed methods of estimating the state of stress in the non-salt strata adjacent to and above the salt stock and to explain the rationale used to support the assumptions presented.

3-15

Section 3.2.6.2, Thermal Properties, Page 3-40, Paragraphs 4/5

BMI/ONWI-522, (Lagedrost and Capps, 1983) p. 15, identifies the difficulties encountered in preparing samples from Richton Dome core. These difficulties suggest that Richton Dome might have weak caprock and salt rock and that samples used, and hence thermal properties listed, might be biased towards the strongest salt formations. It is recommended that the discussion in this section be expanded to clearly identify the representativeness of the data listed, i.e., include an estimate of the sampling bias and address the above sample preparation difficulties.

3-16

Section 3.2.7.3, Geochemistry of Ground Water in Sediments Adjacent to the Dome, page 3-53, paragraph 6

The indirect evidence presented here does not strongly support the contention that reducing conditions exist in the sediments around the dome. There are

many problems associated with the concept of redox conditions in groundwater (see Stumm, 1966, and Lindberg and Runnells, 1984). The presence of "reducing" mineral assemblages (lignite and pyrite) and dissolved gases (methane and hydrogen sulfide) are indirect indicators of reducing conditions. However, data such as these are not conclusive, because these minerals and dissolved gases can exist metastably under oxidizing conditions (e.g., see Thorstenson et al., 1979). Their presence indicates reducing conditions at some time in the past (e.g., during formation), but not necessarily in the present. Without additional data (e.g., Eh measurements, several dissolved redox couples, dissolved oxygen content, etc.), the existence of reducing or oxidizing conditions in groundwater cannot be demonstrated unequivocally. Although there is uncertainty associated with all types of data related to redox conditions, consistency among various types of data and measurements generally provides a reasonable indication of reducing or oxidizing conditions.

It is stated that the groundwaters become more reducing with increasing depth because "dissolved oxygen combines with minerals along the flow path." This is an important statement and a reference to available data should be included. If supporting evidence is not available, then the statement should be deleted, because these types of reactions are kinetically sluggish and cannot be arbitrarily presumed to occur.

3-17

Table 3-15, Surface Water Quality Data, Pages 3-67 and 3-68

The water quality information cited for Bogue Homo, Beaver Dam Creek and Thompson Creek is old for describing the waters of the site vicinity. In addition, the number, frequency and continuity of the data collection represented by the summaries in the table is not described. It is suggested this information be provided to allow an independent assessment of the value of the data.

3-18

Section 3.3.1.3, Flooding, Page 3-69

The analyses presented in LETCO (1982) may not be adequate to define the flood potential for the Richton Dome site or to support conclusions reached with regard to flooding. Based on an examination of the drainage areas of adjacent streams, particularly Thompson Creek and Beaver Dam Creek, it appears that a potential for backwater effects due to flooding in these streams exists. These backwater effects could influence peak water levels on smaller streams, making site protective features more elaborate or expensive. Since Fox Branch and Linda Creek produce estimated flood levels that could affect repository operations, it is important that the maximum water levels and velocities on those streams be determined with a reasonable degree of accuracy. Based on the