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December 16, 1985

MEMORANDUM:

Robert E. Browning, Director
Division of Waste Management

FROM:

F. Robert Cook, Senior On-Site Licensing
Representative, Basalt Waste Isolation
Project (BWIP)

SUBJECT:

OBSERVATIONS, COMMENTS AND RECOMMENDATIONS
FOR THE PERIOD OCTOBER 19 TO NOVEMBER 29, 1985

TECHNICAL ITEMS

1. Waste Package--

a. RNC has modified the conceptual design of the waste package for the BWIP project to include a thin (about 3/8 inch) carbon steel liner outside of the packing material to facilitate handling in the repository and provide greater control for the assembly of packages. With the liner in the concept package assembly can be accomplished at the surface with its lower cost and improved control.

The new conceptual design with the liner may not allow the packing material to expand into fractures in the emplacement hole side walls and hence reduce the isolation capability of the engineered system by allowing increased groundwater circulation around the waste packages relative to the previous concept. This characteristic of the new design should be recognized in NRC Staff reviews of the BWIP waste package reliability and sensitivity analyses.

b. BWIP is planning to use the CHAINT-NC program for sensitivity studies of waste package performance. Software modifications to the this program have been compiled. A preliminary Reliability Analysis Report is nearly complete and will be forwarded by separate correspondence as soon as DOE provides the document to me.

c. In my last report I noted that I was attempting to obtain a copy of the "POST-TEST EVALUATION OF BASALT CLIMAX MATERIALS INTERACTION TEST CAPSULE CONTENT" prepared by Westinghouse. This report was sent to the Staff, T. Johnson, on December 12, 1985. I again draw attention to the conclusion of that report, page 40, that under wet conditions most of the corrosion degradation occurred by pitting. This is inconsistent with the failure mode, "general corrosion", assumed by BWIP in conceptually designing (sizing) the container in the current waste package concept.

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Attachment A is a "Waste Package and Repository Design Interaction Logic." From this logic it is not apparent where a failure modes analysis is properly accomplished, however, it would appear necessary to have completed such an analysis prior to completion of the block, "Waste Package ACD (Advanced Conceptual Design) Phase I", which is intended to feed information to the Site Characterization Plan, including corrosion test planning. The Phase I report is scheduled to be complete about the end of February, 1986. It would appear warranted for the staff to review this report as soon as possible and discuss NRC comments at the forthcoming BWIP Waste Package Workshop or forward them separately to DOE. NRC response to this report would be important in BWIP's formulation of the SCP and could provide a framework for preparing a detailed Staff Technical Position for waste package testing and analyses analogous to the ST 1.1 prepared for the hydrologic test program.

I recommend including an item on the agenda for the Waste Package Workshop which calls for working out a NRC/DOE interactive testing strategy, again analogous to the strategy in existence for hydrologic testing and analysis for the BWIP project.

2. Repository Engineering--

Extensive interaction with Staff occurred in this area in connection with the ES Workshop early in December. I have no additional items to report.

3. Geology--

a. Coring operations in the Grande Ronde in RRL-17 to the Northeast of the proposed exploratory shaft will begin the week of December 15, 1985.

b. An earthquake occurred in late November near the Snively Basin seismic station about 5-6 miles SSW of the RRL exploratory shaft location. It was reported to be a single event at a depth of 200 to 800 meters and at a magnitude of about 0.8.

c. Attachment C is a report prepared in connection with the design of the FFTF. It contains information which appears pertinent to the BWIP repository design. It is called JABE-WADCO-04, "Supplementary Geologic Investigations For Seismic Evaluation of the FFTF Site Near Richland Washington", February, 1971. Among other things it contains a description of the Horn Rapids Lineament, which is pertinent to understanding the structure at DB-7, and description of basaltic gravels in the Horse Heaven Hills indicative of a substantial stream or river bed running to the West or Southwest before the Hills were pushed up. (See discussions, Part 1. Section 1, pages 38 and following and page 18 respectively for these discussions.) Also Attachment D, draft thesis by M. C. Hagood, "Structure and Evolution of the Horse Heaven Hills in South-Central Washington," February 21, 1985, contains evidence pertinent to the existence of the stream or river, including its age, suggested in the JABE-WADCO-04 REPORT.

4. Performance Assessment--

a. As noted above CHAINT-MG is being used for performance evaluations of the BWIP waste package. It would appear warranted to develop NRC

Staff familiarity and user capability regarding this program in order to assess the BWIP evaluations. Verification and benchmarking of this program has been completed. I will forward documents regarding these tasks as soon as DOE provides them to me.

b. An assessment of the possibility of areal depressurization has been completed. This document, SD-BWI-TA-020, "Groundwater Drawdown as a Factor in Long-term Repository Assessment" is currently available. I requested this document on November 5, 1985 and will forward it as soon as DOE provides it to me.

5. Geochemistry--

a. BWIP is spending additional effort to incorporate hydrochemical and radiochemical testing into the drilling program with minimal support from DOE. A focus exists on accomplishing the hydrologic test program without establishing the groundwater hydrochemistry and radiochemistry baseline or background situation. I have taken this up with both RHO and DOE management in an attempt to understand the reasons for neglecting this area of investigation. Expediency in the physical hydrologic testing, without integration with the hydrochemistry and radiochemistry concerns, appears related to the schedule for starting the exploratory shaft, which is still set in August 1985.

b. I took steps to attend a technical meeting concerning the hydrochemical and geochemical studies and investigation plans with representatives from the USGS, DOE, RHO, Weston, and a DOE Headquarters consultant, J. Apps. Initial indications were that DOE did not want NRC to attend the meeting. This was resolved, not without considerable effort on my part and interaction between other NRC staff and the USGS, with my attendance. Attempts to get a second NRC representative, a consultant, G. Jacobs, admitted to the meeting was unsuccessful, since DOE indicated that there was only room for one NRC observer. Ironically, Dr. Apps is an active NRC consultant with RES and his presence at the meeting should add significantly to his ability to accomplish NRC research activities in the geochemistry area.

6. Site/Environmental--

a. DOE has announced plans to release information concerning the contamination of the Hanford groundwater system with radioisotopes in the past, back to the beginning of the project. This involves declassifying various old documents to eliminate information which would allow determination of special nuclear material production rates in the past. The information should allow better understanding of the hydrology in the unconfined and confined aquifers in and around the Site.

As indicated in my memoranda earlier this year, vertical mixing between the unconfined and confined groundwater systems on the Site is indicated by the presence of various isotopes in confined systems on and off the Hanford Reservation. Attachment E, ARH-2837 of June 7, 1973, provided to me by DOE, reflects this concern. This document apparently initiated a drilling program to investigate the indicated off-site migration in the confined aquifers. The "DB" series wells as well as a well planned

on the East side of the Columbia River (see page three, first bullet) the designation for which I currently do not know, were installed and sampled for radioisotopes.

Understanding the vertical mixing phenomena is important in understanding potential groundwater travel paths for the proposed repository. Since the geologic structures, for example the Umtanum Ridge/Gable Butte/Gable Mountain structure and the Yakima Ridge structure appear to have been involved in causing the vertical mixing hypothesized above and since these same structures may be involved in the fastest travel path from the repository to the accessible environment, determination of their hydrologic characteristics is warranted.

7. Hydrology--

a. During the period I reviewed the drilling operations conducted by Fenix and Sisson Inc. for DOE in the period from about 1970 to 1980. (The drilling contract with Fenix and Sisson was just closed out in May 1985.) This review indicated that various rotary bore holes, for example DC-7 and DC-5 were drilled with water as the drilling fluid in the Grande Ronde basalts. It was previously indicated by BWIP that these holes were drilled with mud in the Grande Ronde. The summary drillers report for DC-5, BWI-RHO-C-7 reflects water drilling for that hole. This report is enclosed as Attachment B.

I note that this report also indicates a possibility of a high pressure, water-bearing zone at about 3340 feet, since the well produced water at the surface at about 15 to 20 barrels per hour. It would appear that this zone is about 100 to 150 feet below the Cohasset flow bottom. The drilling situation at 3340 feet contrasted to the situation in the Grande Ronde flows above this point, which flows were reported to be taking water at about 15 to 20 barrels per hour. The report does not indicate the spotting of any lost-circulation-prevention material in the Grande Ronde above the 3340 foot elevation.

The actual production from the 3340 foot point may have been significantly greater considering the losses in the zones above and may have been caused by local free gas pockets. Another possibility is that the flowing zone is connected to the Grande Ronde source giving rise to the pressure in the McGee well west of the Yakima Barricade. Since the DC-5 well is at the north boundary of the repository, understanding the causes of the anomalous observations appears warranted, and appropriate considerations should be made in formulating the hydraulic test program and analysis of test results.

b. The Fenix and Sisson operations contributed significantly to the investigation of the RRL and surrounding area. Many of the technical records associated with the drilling operations are still retained by that company and are available for review if DOE authorizes same. A spot comparison of certain geophysical logs in the Fenix and Sisson files with the BWIP records appears to indicate information not available to BWIP. I plan to visit the Fenix and Sisson office to further review this data. Rockwell personnel have indicated an interest to accompany me on this review. They noted that attempts to obtain the Fenix and Sisson records in the past through DOE have been unsuccessful.

c. The comment under 6(a) above pertains to hydrologic concerns.

8. Quality Assurance--

a. I observed that preparation of QA plans at BWIP and DOE do not address their application to systems, structures and components which are required to assure compliance with 10CFR20 requirements, for example, limits on the radiological exposure of workers. NRC rules do not explicitly require application of QA criteria in this area such as those in 10CFR50 Appendix B, specified for "important to safety" issues and "isolation" issues. I consider application of QA to activities required to meet Part 20 requirements is equally important as is application to assuring and proving at licensing compliance with other public health and safety related requirements. And unless the NRC rules make it mandatory, DOE may apply inadequate QA in this area.

I recommend that this issue be reviewed by staff to determine whether or not the Scope and Applicability sections of Subpart G of 10CFR60 should be modified to cover all technical requirements of Part 60, especially those associated with the Part 20 requirements.

MISCELLANEOUS ITEMS

a. Problems remain unresolved in the area of my interactions with DOE and their contractors and subcontractors. For example, I recently was excluded from a DOE/RHO meeting concerning the data obtained from the drilling of DH-27 and DH-28 which was being conducted in preparation for conversation with NRC Staff. Upon raising the issue with the RHO BWIP Director I was informed that the agreements of Appendix 7 have not been transmitted to RHO or other contractors by DOE. This is a specific item covered by the Appendix 7 Agreement itself, i.e., notifying contractors and subcontractors of the Appendix 7 provisions. If and when notification is accomplished, my interactions with contractors and subcontractors should be improved. I note that the inaction on DOE/RL's part is not paralleled by the other repository project offices.

DOE BWIP project also seems to have misgivings about allowing my attendance at technical meetings concerning the project's activities, particularly those related to Site investigations. As noted above the latest issue involved attendance of a meeting concerning hydrochemistry and geochemistry with the USGS. Although my attendance was finally permitted, it was not without involvement of the RO Manager's Office. Such raising of issues concerning attendance at meetings, although consistent with the provisions of Appendix 7 itself, appears to me to be inconsistent with the spirit of the agreements in the Procedural Agreement and the Site Specific Agreement.

F. Robert Cook

F. Robert Cook, Senior
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5 Attachments

cf:
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