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MEMORANDUM FOR: Myron Fliegel, Section Leader
Hydrology Section
Geotechnical Branch, WM

FROM: Neil Coleman and Michael Weber
Hydrology Section
Geotechnical Branch, WM

SUBJECT: TRIP REPORT ON VISIT TO WASHINGTON STATE BY NRC'S BWIP
HYDROLOGY REVIEW TEAM

Staff members Michael Weber, Neil Coleman, and Matthew Gordon visited the Tacoma offices of the USGS on September 9th to discuss the current status of both the NRC and USGS reviews of BWIP site characterization activities. Subsequently, during the period of September 10-12, the group traveled to Richland for a status review of current site characterization activities. A detailed review of our trip activities is attached.

During the visit to Richland, the NRC staff members acted as an extension of NRC's on-site representative's office. The group, along with F. Robert Cook, met with representatives of DOE's BWIP Project to discuss current site characterization and performance assessment work at the Hanford Site.

It is our opinion that this multi-faceted trip thoroughly achieved its specified objectives. Based on our experience we recommend similar on-site reviews for each of the candidate sites for high-level waste disposal to enable our staff to keep abreast of current site issues, characterization activities, and simulation studies. We also wish to thank Matthew Gordon, outgoing hydrology review team member, for his valuable contributions to the trip and to the attached trip report.

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Neil Coleman
Hydrology Section, WMGT

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Michael Weber
Hydrology Section, WMGT

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Enclosure:
As stated

(Return to WM, 623-SS)

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TRIP REPORT

September 9 - 12, 1985

USGS - Tacoma, WA
Hanford Site

Michael Weber, Neil Coleman, and Matthew Gordon visited the USGS in Tacoma, Washington on September 9, 1985, and the Hanford site on September 10 through September 12, 1985. The trip satisfied several objectives:

- 1) To obtain descriptions of BWIP-related programs at USGS and to exchange views on the status of the BWIP hydrologic site characterization program;
- 2) To discuss conceptual hydrogeologic models of the Hanford site with NRC's Onsite Representative, F. Robert Cook;
- 3) To orient Michael Weber, who is joining Neil Coleman on NRC's BWIP hydrology review team;
- 4) To debrief Matthew Gordon, outgoing NRC BWIP team member;
- 5) To hold informal meetings with BWIP staff on the status of BWIP hydrology testing and hydrologic performance assessment programs through an extension of the onsite representative's office.

The following report summarizes NRC visits with the USGS in Tacoma and with Robert Cook in Richland, Washington.

Visit to USGS in Tacoma, Washington

On September 9th, M. Weber, N. Coleman, and M. Gordon met with Dr. William Meyer of the USGS Tacoma district office. This visit helped to re-establish lines of communication that had been dormant since the DWM's reorganization in October 1983. The NRC representatives also met with USGS staff member Brian Drost, who is also participating in the USGS review of BWIP hydrologic modeling and site characterization activities.

Meyer described the organization of the USGS relevant to NRC's BWIP review. The USGS has two groups directly involved with review of the BWIP project: a group involved with the Interagency Modeling Group (USGS-PNL-DOE) and a group

involved with reviewing BWIP's site characterization and assessment efforts. The latter group is based in the USGS Director's office in Reston, Virginia and includes Meyer along with Jim Rollo, Ed Weeks, Paul Hsieh, and Ren Jen Sun. This group reviews BWIP's site characterization efforts on a periodic basis as requested by DOE. The efforts of the review team are independent of the interagency working group efforts.

Meyer and Drost represent the USGS in the Interagency Modeling Group (working group). The interagency group was originally formed at NRC's request to develop a regional model describing Pasco Basin hydrology. The work has expanded in scope to include general discussions of all regional hydrogeologic data. Since the late 1970's, the USGS has been systematically interpreting and mapping the geology of the Columbia Plateau in Washington State. The USGS has also been collecting reconnaissance-level measurements of potentiometric levels in the region to develop working conceptual models of hydrostratigraphic units and the groundwater flow regime. Independent of the working group, the USGS has developed a "second-generation" extended Pasco Basin model. The data and interpretations supporting the extended Pasco Basin model are available to members of the working group, but essentially none of the interpretive information is presently available to NRC or the general public.

The non-interpretive data that is available to NRC is stored in WATSTORE, a USGS data base. By coincidence, Drost had arranged a presentation on the data base for BWIP/Rockwell staff on the same day as NRC's visit, which provided NRC the opportunity to attend the presentation. Drost indicated that some of the data in WATSTORE may be unreliable and recommended that those applying the data base consider this potential unreliability. Much of the data base was collected as a result of Washington state legislation that requires well drillers to provide written summaries of several types of wells installed within the state. These written summaries generally include data on well construction, water levels, and well productivity. The quality of this kind of information is highly variable.

Meyer described seven other USGS efforts in the Columbia Plateau, which are relevant to the BWIP site but not directly related to the project. These projects are briefly summarized below:

- 1) The "Sodium" Project: to help define the geologic setting, flow system, and hydrochemistry of the Columbia River Basalts in Washington state and, in particular, to investigate the occurrence and origin of groundwater that contains high concentrations of sodium;
- 2) Survey of Pumpage Distribution: to estimate groundwater pumpage for irrigation, industrial, and domestic purposes in the Columbia Plateau;

- 3) The RASA (Regional Aquifer-Systems Analysis) Project: to describe the groundwater resources of the Columbia River Basalts, including a model of regional groundwater flow;
- 4) The "Horse Heaven Hills" Project: to assess groundwater availability and development in the Horse Heaven Hills area;
- 5) The "Umatilla" Project: to develop a groundwater model of the Umatilla slope in Oregon;
- 6) The "Pasco Basin" Project: to assess the large water-level rises in the vicinity of the Hanford Reservation caused by irrigation (pending);
- 7) The "Walla Walla" Project: designed to assess the large water level rises east of the Columbia River due to irrigation (pending).

These seven projects are only a portion of the USGS projects with some relevance to BWIP. None of them have strict schedules for product output or project completion. After Meyer's presentation, M. Gordon described NRC's program structure, major activities, and accomplishments since the lapse in USGS/NRC communication in late 1983.

For the remainder of the afternoon, NRC solicited Meyer's views on the regional and BWIP site hydrology, as well as his recommendations for future NRC efforts. Meyer emphasized that the views he presented were his own and not necessarily those of the USGS. He expressed some doubt that the basalts of the Pasco Basin could ever be characterized for repository performance assessment purposes.

The meeting ended with a discussion of future interactions between NRC and the USGS. We agreed to forward to the USGS copies of NRC's major letters to DOE and to try to provide more advance notice to Meyer and the USGS regarding future DOE/NRC meetings and workshops. It was also agreed that quarterly conference calls should be held in an attempt to keep NRC and the USGS informed of the review progress of each other.

Visit to the Hanford site and NRC's On-Site Representative

From September 10th through the 12th, M. Gordon, N. Coleman, and M. Weber visited Richland, Washington on temporary assignment to the NRC's On-Site Representative (OR) Office. F. Robert Cook, NRC's BWIP OR, discussed the review work he has been doing relative to BWIP hydrogeology. The group discussed the potential importance of the subsurface Yakima ridge extension and other large structures relative to groundwater flow in the vicinity of the Cold Creek

Syncline. As a follow-up to NRC's review of BWIP's I-129 assessment, the group discussed the distribution of radionuclides and other contaminants in ground water beneath the Hanford Site.

Cook also arranged informal discussions with representatives of DOE's BWIP office, the hydrology testing group at RHO in Richland and onsite, and the RHO performance assessment group. These meetings were intended to keep the NRC staff abreast of current developments in BWIP's testing and modeling program, in preparation for the upcoming hydrology meeting that is currently scheduled for November 1985. Visits were made to the DC-23 installation site, the completed installation at DC-20C, and the summit of Rattlesnake Hill. NRC viewed videotape taken downhole of the basalt flows, which graphically showed zones of spalling and fracturing in RRL-2C, a recently drilled well located near the proposed location of the Exploratory Shaft. NRC also viewed photographs of cores from boreholes RRL-2A, RRL-6, and RRL-14.

A number of important points were discussed at length with the performance assessment group of Rockwell. For example, we learned how DOE is planning to use transmissivity data derived from the upcoming large-scale, multiple-well hydrologic tests. The resulting bulk values of transmissivity will probably be used as geometric means for conditioning the lognormal distributions of transmissivity as derived from previous single-well test data. With regard to analytical solutions used to evaluate field data, we recommended that the DOE evaluate the numerous inherent assumptions that must be made to apply the techniques. This evaluation is needed to determine whether the assumptions may introduce significant systematic errors in calculated parameters.

We also suggested further evaluation of the circulating tracer tests conducted previously at the DC-7/8 well cluster. These tests provided the only in situ measurements of effective flow thickness that are available for a basalt aquifer at Hanford.

It is our opinion that this multi-faceted trip thoroughly achieved its specified objectives. On the basis of our experiences, we recommend similar on-site reviews at other candidate sites for high-level waste disposal to enable WM staff to keep abreast of current site issues, characterization activities, and simulation studies. We also wish to thank Matthew Gordon for his valuable contributions to the trip and to this trip report.