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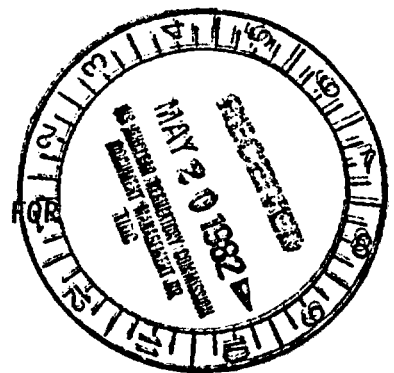
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MEMORANDUM FOR: Michael J. Bell, Chief
High-Level Waste Licensing
Management Branch
Division of Waste Management

FROM: F. Robert Cook
High-Level Waste Licensing
Management Branch
Division of Waste Management

SUBJECT: HIGH LEVEL WASTE FORM PERFORMANCE; WORKSHOP FOR
DEVELOPING MODELING; REPORT OF TRAVEL



A Waste Form Workshop

On October 27 and 28, 1981 I attended and participated in a workshop at PNL Conference Center in Seattle concerning development of modeling for predicting performance of High Level Waste (HLW) forms in a deep geological repository. The workshop was chaired by John Mendel of PNL and was funded by the DOE/SRL office as part of Materials Characterization Center (MCC) Activities.

The stated objective of the workshop was to define and plan qualification of a methodology for waste form evaluation. The workshop was the beginning of a 3 year task. Groups actively working under DOE contracts in the area of waste form development described various models which they had developed in the past for borosilicate glass. A working computer model was described by Don Jackson (LLL). He stated he had recently completed the model which was to be the basic model to be refined and qualified in connection with future workshop activities.

The workshop served primarily to bring participants "up-to-speed" with what their colleges were doing. The conclusions which I consider are noteworthy are as follows:

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1. Mr. Jackson (LLL) has a working computer model which can predict waste form degradation. A detailed description of the program was not provided at the meeting and specific input constants were not offered for review.
2. A conclusion which was generally accepted by most participants was that waste form leachability would not turn out to be an important property, since radionuclide release from waste forms would be limited by solubilities. Saturated solutions around waste forms would be expected because of long groundwater resident times in the vicinity of the waste forms.
3. PNL (Buckwalter) describe the effects of lead on the solubility of borosilicate glass. Tests run at PNL indicate lead in the vicinity of the glass greatly reduces its dissolution rate under static no flow test conditions. The test indicated the importance of considering waste package/waste form interactions in the waste form degradation model. It was indicated by Mendel at the end of the workshop that this capability would be added to Jackson's program.

The formal report of the workshop is on file in the Materials Section.

B. HANFORD VISIT

In addition to participating in the subject workshop I met with DOE and Rockwell International Hanford Operations (RHO) representatives at Richland, Washington on October 28, 1981 and PNL representatives at PNL on October 29, 1981.

Rockwell reviewed their ideas for in-situ storage of about 80% of the high level waste in tanks at Hanford. Rockwell indicated this waste was relatively low activity (1000 c/gr). They believe the hazard associated with repository disposal of the large amount of waste in The Hanford tanks is greater than the hazard associated with permanent in-situ storage.

At PNL I reviewed the organization involved in Waste Management. John Mendel was the lead contact person. I viewed the PNL laboratory facilities being managed by Gary McVay for investigating waste form physical and chemical characteristics.

I toured the PNL 300 Area at Hanford on October 29, 1981. During this tour I viewed on-going engineering development activities concerning

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glass melting technology, including that related to TMI zeolite vitrification.

C. IDAHO FACILITY VISIT

On Monday, November 2, 1981, I met with DOE representatives at Idaho Falls. John Whitsett was the lead DOE representative. We discussed briefly his function which is to administer waste management activities at the Idaho Facilities.

Maggie Whitmayer (DOE) escorted me to a morning meeting with EG&G representatives. We discussed their efforts in the area of TRU and high level waste solidification. EG&G described work where they have solidified varied TRU wastes as well as simulated HLW into a rock-like product with composition similar to that of basalt. A EG&G handout is attached.

In the afternoon of November 2, I toured the Idaho Fuel Reprocessing Facility operated by Exxon at the Idaho Test Site. Facilities which were reviewed were those recently completed for processing high level liquid waste. The facility viewed is described in ENICO 1068 which is attached.

D. CONCLUSIONS OF THE HANFORD AND IDAHO SITE VISITS

1. PNL is interested in doing T/A work for us in area of chemical modeling for barrier component interactions.
2. Hanford (RHO) is planning to proceed with in-situ disposal of much of the defense high level waste in tanks at the site.
3. EG&G has a good process (production of a synthetic basalt) for immobilizing TRU waste and potentially high level wastes as well. For TRU they expect about a 11:1 reduction in volume of existing defense TRU waste if the process were pursued.
4. The Idaho Chemical Reprocessing Facility is a compact operating facility for immobilization and long term storage (500 years) of high level waste. It appears to be a sound, reliable, alternative

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to vitrification being pursued at SRL. Plant technology utilizing fluidized bed calcining operations is proven acceptable.

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