Summary of Recent Work

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Methodology Demonstration Report

For the five working days covered by the current voucher, my activities were devoted to the Methodology Demonstration Report and associated activities.

During this period, I prepared responses to the March 1987 Sandia comments on the September version of the Demonstration Report. The response document was delivered to NRC on Friday, May 1.

The Sandia comments and our responses deal with a wide variety of issues associated with the demonstration. Concurrent with the preparation of responses, I researched the issues and considered modifications to the report. Part of the time was spent in discussions with Mick Apted of PNL. He heads the DOE generic team whose activities are similar to ours for NRC.

Discussions with Mick Apted (and follow-up)

Our discussion centered around two recent papers he shared with us. One was presented recently in Tucson[1] , and the other will be presented later. In addition, we discussed how his team is handling certain issues that are considered in our Demonstration Report and the Sandia comments.

In the thermal work associated with the waste packages, they have considered the sensitivity to particular spent fuel burnup. However, the waste package thermal modeling includes only the particular package and its nearest neighbors.

One issue of interest to us is the degree to which the assumption of diffusive radionuclide transport is correct. Mick said that Thomas Pigford and the Performance Assessment National Review Group (PANRG) are convinced that diffusion will dominate and that advection is unlikely. Mick mentioned that diffusion is a good assumption if the packing material performs its intended function. He recognizes, as we do, that if surface diffusion occurs, the diffusion coefficients are different from those that characterize matrix diffusion. Apparently, BWIP is quietly examining this issue.

He and I discussed the current state of corrosion modeling, and he shares our feeling that there are no consensus models. His

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[1] "Spent Fuel as a Waste Form: Analysis with AREST Performance Assessment Code", M.J. Apted, et al, Waste Management 87, Tucson, Arizona, March 1987.

team is now beginning sensitivity analyses to examine the influence of different uniform corrosion models on the overall waste package lifetime.

One item of interest to us in our engineered barrier work is whether DOE will continue to rely on only the waste package to meet NRC requirements for the engineered barriers. Our research has shown that for the time being at least, DOE is placing virtually all the emphasis on the package. That is consistent with Mick's observations. He said that DOE is quietly considering alternate approaches, but has not changed its philosophy.

Another issue that has intrigued us is the question of whether there will be synergistic effects among the waste packages. That is, whether the failure of one package will affect the likelihood and nature of other packages' failures. In our work to date, we have assumed no synergistic effects, because it has not been possible with current information to analyze synergisms or quantify their likelihood. Mick said that DOE is doing the same. Although people recognize that synergistic effects might occur in principle, there has been no body of work to date that would justify their inclusion. After more modeling and sensitivity studies have been completed, it will be easier to evaluate whether synergisms should be examined further.

The PNL team has now begun a cooperative program through which the results from the Canadian SYVAC vault submodel will be compared with those of the PNL work, using common inputs. The first reports from the comparison will be available in September.

In summary, my discussions with Mick showed that our assumptions and performance assessment practices are consistent with those used by the PNL team, although the particular implementations may be different.

Upcoming Work

My work in the next few weeks will involve putting the Demonstration Report into NUREG format. During that time, if the NRC staff has any observations on the report with respect to the Sandia comments and our responses, we can incorporate them into the revision.