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To: Kien Chang 95 DEC 29 A8:27

From: Loren Zarembo JZ

Date: December 22, 1986

Subject: Activity Report, December 8-December 21, 1986

In the two week period from December 8 through December 21 I performed the following consulting services for the NRC. The designated weeks below refer to the number of weeks since I began this contract.

Week 9  
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Dec. 8

Morning - Prepare biweekly report for NRC and complete vouchers.

Afternoon - Enter new data set on NIH computer for TEMPH code which incorporates the new information contained in the BWIP report on thermal analysis by S. C. Yung et al.

DEC. 9

Morning - Run the TEMPH code with the new BWIP data set. Determine temperature histories at the same five locations near the waste package that were presented in the Yung report for comparison.

Afternoon - Learn Chartmaster PC software for preparation of plots comparing results obtained using the TEMPH code with those published by Yung et al.

Dec. 10

Morning - Prepare plots comparing TEMPH code results with those obtained by Yung using HEATINGS. These plots are contained in an attachment to this report which discusses the results of the comparison runs.

Afternoon - Begin to revise a program developed under the Aerospace contract for determining a least squares fit to a table of wasteform relative decay heat vs. time using a set of exponential decay functions. I have realized that this code must be included in the group of codes which I transfer to NRC because it is used to determine the exponential heat decay functions which must be provided as part of the input data to TEMPH. BWIP has change the relative decay heat curve slightly since the Environmental Assessment, and we must be able to change our input data accordingly.

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Dec. 11

Continue revisions of the program QFIT2 for determining a fit to a decay heat curve. The revisions make the program more user friendly and improve the search routine for the fit. I will include instructions for using this program in the User's Manual I am preparing for all of the programs I have developed for the NRC.

Week 10  
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Dec. 15

Review draft Engineered Barrier Analysis Strategy by Ken Stephens. As part of this review I took a careful look at the section of the Yung report which deals with end effects and compared it with the results published by Oliver when he was with Rockwell Hanford. Oliver assumed that the porosities of the packing around the sides of the waste package and the end plug were both 0.38. Yung assumes that the porosity of the packing around the sides starts out with a value of 0.30 and increase to 0.40 when it becomes wet and fills the empty space around the container. Thus the values used in the two analyses for the porosity of the packing around the container are approximately the same. However, Yung also assumes that the porosity of the end plug is initially 0.30 and does not change when wetted, because there is no clearance. Consequently, Yung's predicted end effects would tend to be lower than Oliver's because he used a lower value for the porosity of the end plug (i.e. 0.30 vs. 0.38). I am slightly confused about how the end plug porosity could stay constant after it is wetted. From the figure showing the BWIP package it looks like the end plug material is free to flow back into the space between the container and borehole, and therefore the porosity of the packing around the container and the end plug would be the same after wetting. We should try to clarify this with BWIP when an opportunity arises.

Dec. 16

Morning - Prepare comments on Engineered Barrier Analysis Strategy for Ken Stephens.

Afternoon - Construct and test JCL for the decay heat curve fitting program QFIT2. This program uses a subroutine from the International Mathematical and Statistical Library (IMSL). I have not previously used this package on the NIH computer and had to learn the statements needed to link it to my program.

Dec. 17

Begin debugging the revised version of QFIT2.

Dec. 18

Continue debugging QFIT2. I am having some strange problems with the IMSL subroutine called IFLSQ which performs the least squares fits. I checked IFLSQ with a data set which was a simple straight line and it was unable to fit it. I will try to determine the source of the problem next week.

Plans for weeks 11 and 12  
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I will continue to debug QFIT2 in week 11. However, my work will be limited by the Christmas holidays. In week 12 I hope to finish debugging this program and begin writing the User's Manual for all of my computer programs which relate to thermal analysis.