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Wm-11 (2)
Wm-16 (2)

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April 25, 1987

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Washington DC 20555

WM DOCKET CONTROL CENTER
87 APR 29 P12:11

Dear Kien:

SUMMARY OF EFFORT, APRIL 20 - APRIL 24, 1987

This letter describes the tasks which have been addressed during the time period indicated.

1. Reviewed comments on Methodology Demonstration Report. Prepared detailed response on specific comments.

2. The subroutines for calculating the temperature data base and interpolating, as necessary, have been completed. These are currently included in PROGRAM CONV, listing attached.

The temperature calculations in CONV use the analytical expression

$$T = (Q/4\pi kr)\exp(-(r^2/4kt))\ \mathrm{Re}\ w[\sqrt{t(\ln 2)/H}\ +i(r/\sqrt{4kt})]$$

where

T is temperature
Q is strength of heat source
k is thermal diffusivity
r is radial distance to source
t is time since activation
H is half-life of radionuclide being considered
Re w[z] is the real part of the complex error function
$w(z) = \exp(-(z^2))\mathrm{erfc}(-iz)$.

CONV constructs the response surface of temperature as a function of diffusivity and time. Precise temperature values are determined at discrete diff/time values. Interpolation between these precise values is accomplished using a bicubic spline interpolator which guarantees smoothness of fit. The complex error function calculations could not be done in the complex plane with the available compiler (MS FORTRAN77, version 3.3). These calculations were done with real functions/arguments and then the complex functions were reconstructed and the real /imaginary parts used as needed. The IMSL was not available and no attempt was made to obtain the routines contained in it.

The decay heat data used in CONV is identical to that used in Zaremba's analysis, dated March 1987, and is based on the Oak Ridge ORIGEN2 results.

Enclosed is a Voucher for Professional Services for this time period.

The tasks planned for the next period are:

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1. Continue the PC-izing of CONVO. The corrosion models will be coded next and the transport model TRANS3, previously delivered, will be included. Then the simulation capability will be developed and the program will then be complete. User documentation will be prepared and provided as part of the final product.

It is recognized that the included listing is not readily usable in its present form. The program is currently in development and will be integrated into the overall PC version of CONVO in the next few weeks.

If you have any questions, please call me.

Very Truly Yours,

Gary

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