**From:** Susan Abrahams, NRR
**To:** Susan Abrahams
**Date:** Tue, Aug 29, 2000 1:27 PM
**Subject:** Consequence Calculations For Decommissioning Probabilistic Risk Assessment

Good Afternoon,

The document above has been signed/approved and is ready for distribution. The accession no. is ML003744099 and the template no. is NRR-106. This is a memorandum from Richard J. Barrett, Chief, SPSB./DSSA/NRR to
John H. Flack, Chief, RES/DSARE/REAHFB concerning the subject above.

If you have any quesitons concerning the above document, please contact
Robert Palla at 301-415-1095. Thank you.

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August 25, 2000

MEMORANDUM TO: John H. Flack, Chief
Regulatory Effectiveness Assessment
and Human Factors Branch
Division of Systems Analysis and Regulatory Effectiveness

FROM: Richard J. Barrett, Chief */RA/*
Probabilistic Safety Assessment Branch
Division of Systems Safety and Analysis

SUBJECT: CONSEQUENCE CALCULATIONS FOR DECOMMISSIONING PROBABILISTIC RISK ASSESSMENT

Research Request

As discussed in the August 10, 2000, task force meeting, we would like to show the reduction in the consequences of a spent fuel pool (SFP) fire as a function of time after shutdown. We expect that certain consequence measures will drop off rapidly within the first few years (due to decay of ruthenium) and that after 5 years the consequences would be driven by cesium, which has a much longer half-life. The impact of various evacuation assumptions would need to be assessed as part of these calculations since early evacuation, which is not generally expected in a large seismic event one year after shutdown, would become increasingly likely in later years when release times exceed 1 day even under adiabatic heat up conditions.

We request that the consequence calculations be performed for 30 days, 90 days, and 1, 2, 5, and 10 years after shutdown based on the assumptions below. As a separate action, we are developing estimates of the frequency of a SFP fire at these times. Thus, in addition to displaying the reduction in consequences with time, we will be able to show the reduction in risk (frequency x consequences) with time.

| | |
|---|---|
| Reactor: | 3440 MWth at Surry site with Surry population |
| Release Fractions: | 0.75 iodine and cesium, 0.75 ruthenium, 0.01 fuel fines (i.e., the same as Case 45b) |
| Fission Product Inventory: | Determine values at 30 days, 90 days, and 1, 2, 5, and 10 years after shutdown based on participation of 3.5 cores |
| Plume Model: | Same as used in Appendix 4 calculations, unless RES believes modifications are appropriate |

CONTACT: Robert Palla, SPSB/DSSA/NRR
415-1095

Evacuation: Three cases for each time

(1) No evacuation, but relocation at 24 hours (This model is based on the NUREG-1150 model for high g earthquakes. Additional information is provided on p. 4.2 of NUREG/CR-4551, Volume 3, Revision 1, Part 1)

(2) Early evacuation of 95 percent of the population (Use the same timing and relocation as in your previous calculations that assumed early evacuation, i.e., evacuation starts and is completed prior to the release.)

(3) Late evacuation of 95 percent of the population (Use the same timing and relocation as in your previous calculations that assumed late evacuation, i.e., evacuation starts after the release.)

Risk Measures of Interest: Early fatalities, latent cancer fatalities (entire region), person-rem within 50 miles, interdicted land area, condemned land area, and economic cost.

On a related matter, in NUREG-1150 latent cancer fatalities were reported for the "entire region". Based on discussions with people involved with 1150 (and depending on who you talk with) the entire region corresponds to a 1000 mile radius, but might have alternatively been based on a 500 mile radius with a specified rain event in the last interval. Since we are comparing the latent cancer fatalities for a SFP accident with 1150 results for a reactor accident, we need to have equivalent results for the consequence cases we are using in our comparison. These cases are: Base case, 13, 45a, 45b, 46b.

Please contact Robert Palla at 415-1095 to discuss this request before proceeding with the calculations.

cc: T. Collins
G. Hubbard
M. Rubin

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