

From: Christopher Boyd / *RES*
To: Jason Schaperow
Date: Wed, Sep 27, 2000 11:04 AM
Subject: Memo with mods

I put in a few sentences. You can cut it down if it is too much.

Chris

Christopher Boyd
USNRC Research
(301) 415 -0244
(301) 415 5160 [fax]
cxb5@nrc.gov

I-5

RES has performed the requested analyses (References 7 and 8). The objective of these analyses was to establish the significance of the three-dimensional natural circulation flows and to estimate the critical decay time. A fully three-dimensional computational fluid dynamics (CFD) model of the spent fuel pool and surrounding building was used in this analysis. The predictions of the natural circulation flow fields provide a basis for the assessment of simplified flow field models typically used with other spent fuel pool codes (such as COBRA-SFS). Sensitivity studies completed in this analysis show the significance of the relevant parameters governing the fuel heatup. Critical decay time estimates are completed over a range of fuel

burnup with the assumption of negligible radiation and clad oxidation energy.

I stopped modifying things here ~~~~~

Critical decay time refers to the time required to ensure that natural circulation air flows will keep the fuel temperatures below a specified value after a complete loss of pool coolant to prevent significant offsite releases. NRR also has requested (Reference 9) a reexamination of the temperature criteria used in conjunction with the thermal hydraulic analysis to assess (a) the decay time needed to provide sufficient time to carry out an ad hoc evacuation prior to significant fission product release and (b) the critical decay time. We expect to provide the results of this reexamination by _____.

With regard to consequences, NRR has requested a quantification of the offsite radiological consequences of spent fuel pool accidents occurring up to one year after final reactor shutdown and analyses of related issues (References 10 and 11). RES has performed the requested evaluations (References 12 through 17). These evaluations included consideration of the reduction in consequences associated with reduced fission product inventory resulting from radioactive decay from 30 days to one year and the additional time available for evacuation associated with spent fuel pool accidents. The focus of these evaluations was for accidents occurring at one year after final shutdown. Recently, NRR requested additional consequence calculations using fission product inventories at 30 and 90 days and one, two, five, and ten years after final shutdown to provide additional insight into the effect of reductions in inventory available for release (Reference 18). We expect to provide the results of these additional consequence calculations by _____.

In addition to the NRR requests for specific RES evaluations of seismic, thermal hydraulics, and radiological consequence issues, NRR requested, in August 1999, RES perform an overall review and comment on a draft version of the technical study (References 19 and 20). RES performed the requested review (Reference 21 and 22). The most recent NRR user need letter (Reference 1) requests that RES review and comment on the final version of the technical study. RES is willing to perform this review. However, the technical study contains separate evaluations of accident frequency, thermal hydraulic response, accident progression, and offsite radiological consequences using a number of bounding assumptions. If not appropriately recognized, these bounding assumptions will tend to drive the decision making process. To preclude the institution of unnecessary conservatism generally associated with bounding assumptions, RES is willing to support a plan for integral analysis of spent fuel pool accidents using more realistic assumptions. We recommend a meeting to discuss such a plan.

- References:
1. User Need Request for Technical Study of Spent Fuel Pool Accident Request at Decommissioning Plants, memorandum from S. Collins to A. Thadani, September 11, 2000
 - 2.
 - 3.
 - 4.
 - 5.
 6. Technical Support for Spent Fuel Pool Heatup Analysis, memorandum from G. Holahan to T. King, April 16, 1999

7. Completion of 3D CFD Analysis for Spent Fuel Pool and Containment, memorandum from F. Eltawila to J. Wermiel, February 4, 2000
8. Final Report: Predictions of Spent Fuel Heatup after a Complete Loss of Spent Fuel Pool Coolant, memorandum from F. Eltawila to G. Holahan, June 29, 2000
- 9.
10. Technical Support for Spent Fuel Pool Zirconium Fire Consequence Analysis, memorandum from G. Holahan to T. King, March 26, 1999
11. Support for Spent Fuel Pool Accident Risk Assessment for Decommissioning Plants, memorandum from J. Hannon to F. Eltawila, December 3, 1999
12. Technical Support for Spent Fuel Pool Zirconium Fire Consequence Analysis, memorandum from C. Rossi to G. Holahan, May 25, 1999
13. Spent Fuel Pool Risk Assessment, memorandum from A. Thadani to S. Collins, November 12, 1999
14. Opportunities to Reduce Uncertainty in consequence Assessment for Spent Fuel Pool Accidents, memorandum from F. Eltawila to J. Hannon, December 10, 1999
15. Issues Related to Spent Fuel Pool Accident Analysis, memorandum from F. Eltawila to J. Hannon, January 19, 2000
16. Effect of Fission Product Inventory and Air Ingression on Spent Fuel Pool Accident Consequences, memorandum from F. Eltawila to J. Hannon and R. Barrett, March 29, 2000
17. Risk-Informed Requirements for Decommissioning, memorandum from F. Eltawila to G. Holahan, August 25, 2000
18. Consequence Calculations for Decommissioning Probabilistic Risk Assessment, memorandum from R. Barrett to J. Flack, August 25, 2000
19. Request of Review of Draft Technical Study of Spent Fuel Pool Accidents for Decommissioning Plants, memorandum from G. Holahan to T. King, August 3, 1999
20. Memorandum from G. Holahan to J. Craig, August 18, 1999
21. Review of Draft Technical Study of Spent Fuel Pool Accidents for Decommissioning Plants, memorandum from J. Craig to G. Holahan, November 19, 1999
22. Review of Draft Technical Study of Spent Fuel Pool Accidents for Decommissioning Plants, memorandum from T. King to G. Holahan, November 23, 1999