

August 03, 2004

MEMORANDUM TO: Farouk Eltawila, Director
Division of Systems Analysis and Regulatory Effectiveness
Office of Nuclear Regulatory Research

FROM: E. William Brach, Director /RA/
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards

SUBJECT: USER NEED MEMORANDUM – REQUEST TO RESEARCH TO
VALIDATE FLUENT CFD METHODOLOGY WITH INEEL's
VSC-17 EXPERIMENTAL DATA

Background

The Spent Fuel Project Office (SFPO) is very pleased with the technical input and analyses that the Office of Nuclear Regulatory Research (RES) provided in support of the HI-STORM 100 Amendment 2 technical review. RES assistance supported the staff's conclusion that the applicant's analytic methods and results were not acceptable and that the applicant needed to perform additional and revised analyses.

Area of Needed Assistance

SFPO respectfully requests RES to benchmark the analytic methods applied to perform the analysis of a spent fuel storage cask using data from Idaho National Engineering and Environmental Laboratory (INEEL) VSC-17 ventilated storage cask. The purpose for this request is to provide confidence in the analytic methods that will be applied to upcoming licensing reviews involving significant increase in heat loads from high burnup fuel.

SFPO will provide the test cases and the necessary data to build a FLUENT Computational Fluid Dynamics (CFD) model. This benchmark is needed to continue SFPO's review of the applicant's analyses, as well as provide confidence of the staff's analytic methods and assumptions. The benchmark should include a vertical cask configuration for both helium and vacuum conditions. The vacuum condition will remove the convective heat transfer influences inside the canister, thereby allowing us to focus on the heat transfer mechanisms between the canister and the overpack.

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Once the staff's models have been validated, RES should apply this analytic method to the HI-STORM 100 MPC-24 and MPC-32 casks (pressurized water reactor) and assess the maximum heat load for that design, as well as for the MPC-68 for the boiling water reactor fuel. SFPO staff will work with RES in performing some of the analyses and reviewing the developed thermal-hydraulic models. The methods should then be documented in a technical report.

As we have discussed with your staff, this is a high priority activity which will significantly enhance our technical understanding of high burnup fuel and will enable us to certify casks which are needed by reactor licensees to maintain full core offload capabilities. It is our projection that the completion of this task will take approximately 4 months.

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J. Rosenthal, RES Public NMSS r/f SFPO r/f

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