April 20, 2000

MEMORANDUM TO: Samuel J. Collins, Director
Office of Nuclear Reactor Regulation

FROM: Ashok C. Thadani, Director **/RA**
by M. V. Federline For/
Office of Nuclear Regulatory Research

SUBJECT: SUPPLEMENTAL USER NEED REQUEST FOR AGE RELATED DEGRADATION OF REACTOR VESSEL INTERNAL COMPONENTS

The referenced user request, dated February 11, 2000, included requests for research on: (1) evaluation of the causes and mechanisms for IASCC in PWR internals, (2) void swelling, (3) neutron irradiation embrittlement (e.g., loss of fracture toughness) of austenitic stainless steels, and (4) synergistic embrittlement of cast stainless steel from thermal and irradiation effects. In the request, you noted that NRR anticipates a need for the results of this research beginning in FY 2005. In addition, your February 11 memorandum requested completion of research addressing the effects of the reactor water environment on the fatigue life of metal components. The expectation was that this work would be completed in FY 2002. RES staff have previously discussed NRR needs in these areas with your staff and developed a revised plan for research in these areas. The overall revised plan for this research, in the general area of environmentally assisted cracking (EAC), was discussed with your staff and included in our January 31, 2000 response to you.

The current EAC research program is conducted for RES by the Argonne National Laboratory (ANL) and addresses the above-noted areas with the exception of void swelling and the synergistic effects of the thermal and irradiation environments on cast stainless steel. The major elements of the ANL program have, thus far, been focused on BWR issues. This existing research program is being expanded and redirected to address NRR's concerns regarding the PWR environment in accordance with the plan forwarded to you with the January 31, 2000 memorandum. In accordance with this plan, a detailed analysis of methods for projecting IASCC crack growth rates and fracture toughness of austenitic stainless steels for PWR components in the license renewal period, will be completed by the end of FY 2003.

The research requested to help NRC deal with industry positions on environmental effects on fatigue life is also being continued, and RES staff are interacting with standards groups to promote the incorporation of results into consensus standards. A significant portion of this research work will be completed by the end of FY 2002. However, fatigue tests on sensitized stainless steel and the effects of loading sequence will not be completed until FY 2003. This schedule was discussed with NRR/DE staff and was considered acceptable to meet their projected needs.

Completion of these research efforts on the schedules referred to above are, of course, contingent on the continued availability of the appropriate level of resources through the budget process. In our budget prioritization process for FY 2002, the EAC research effort was among the most highly ranked of all RES programs. As a result of your requests in this area, we have also requested additional budget resources for FY 2002 and beyond.

We will keep your staff informed of our progress in these areas on a periodic basis. If you have any questions or comments, please contact Michael McNeil at 415-6794 or Edwin Hackett at 415-5650.

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