June 20,2008

MEMORANDUM TO: Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

Michael R. Johnson, Director
Office of New Reactors

FROM: Brian W. Sheron, Director **/RA/**
Office of Nuclear Regulatory Research

SUBJECT: IMPENDING PUBLICATION OF NUREG/CR- 6964, "CRACK GROWTH RATES AND METALLOGRAPHIC EXAMINATIONS OF ALLOY 600 AND ALLOY 82/182 FROM FIELD COMPONENTS AND LABORATORY MATERIALS TESTED IN PWR ENVIRONMENTS"

I am forwarding for your information the enclosed final version of NUREG/CR-6964, "Crack Growth Rates and Metallographic Examinations of Alloy 600 and Alloy 82/182 from Field Components and Laboratory Materials Tested in Pressurized Water Reactor (PWR) Environments." The Office of Nuclear Regulatory Research (RES) will submit this NUREG-series report for publication within 2 weeks from the date of this memorandum.

The U.S. Nuclear Regulatory Commission (NRC) supported research at Argonne National Laboratory (ANL) on environmentally assisted cracking (EAC). ANL evaluated crack growth rate (CGR) data and surface fractures in simulated Pressurized-Water Reactor (PWR) environments. Specifically, ANL examined results from cyclic loading and primary water stress-corrosion cracking (PWSCC) tests of field-procured and laboratory-prepared specimens of Alloy 600 and its weld alloys. In addition, this report presents (1) CGR results for Alloy 182 shielded-metal-arc welds in a simulated PWR environment and (2) the activation energy for crack growth in Alloy 182 welds.

This report is one of a series of reports documenting the results of CGR testing in vessel head penetration materials. This report focuses on the Alloy 82 and Alloy 182 weld metals. This report also presents results from tests of the Alloy 600 base metal. The researchers tested (1) a laboratory-fabricated, shielded-metal-arc deposit of Alloy 182; (2) a weldment sample from the J-groove weld of a control rod drive mechanism nozzle from the Davis–Besse Nuclear Power Plant; and (3) hot leg nozzle-to-safe end weld from the Virgil C. Summer Nuclear Station.

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301-415-0703

The impetus for EAC research comes from User Need Request NRR-2006-006. The staff considers this research to be especially relevant because of the upcoming new license applications and license renewal applications, as well as the disposition of relief requests pertaining to flaw evaluations for vessel penetration and piping butt welds. The data on cyclic loading effects are commonly used in fatigue analyses required for flaw evaluations. Licensees must complete these evaluations in accordance with the recommendations set forth in Section XI, including IWB-3660 and Appendix O, of the Boiler and Pressure Vessel Code promulgated by the American Society of Mechanical Engineers.

RES coordinated drafts of the enclosed report with the cognizant staff in the Office of Nuclear Reactor Regulation's Division of Component Integrity (NRR/DCI) and the Office of New Reactor's Division of Safety Systems and Risk Assessment (NRO/DSRA). The reviewers were satisfied with our resolution of their comments. Nonetheless, please feel free to notify the responsible RES contact (identified on the previous page), if you have any questions concerning the impending publication of this report.

Finally, as you know, RES has established an online quality survey, with which user offices can evaluate the usefulness of RES products and services. This survey can be found at http://cio5-dev.nrc.gov/isea/index.cfm?useaction=Survey.Welcome&SurveyUUID=1593F137-F3EF-08F8-0EFC429A952B8B1D. If your office has not yet completed this brief survey, I would appreciate your support in ensuring its completion (which will take approximately 5 minutes) within the next 10 working days.

Enclosure:
As stated

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