



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

October 31, 1996

MEMORANDUM TO: David L. Morrison, Director  
Office of Nuclear Regulatory Research

FROM: Frank J. Miraglia, Acting Director  
Office of Nuclear Reactor Regulation

*Frank J. Miraglia*

SUBJECT: NRR USER NEED REQUEST FOR SUPPORT OF RESOLVING PROBLEM OF  
STRESS CORROSION CRACKING OF REACTOR VESSEL INTERNAL  
COMPONENTS

By memorandum dated December 2, 1994, the Office of Nuclear Reactor Regulation (NRR) requested that the Office of Nuclear Regulatory Research (RES) develop additional information to assist in NRR's assessment of industry's actions to solve the problem of the cracking of reactor vessel internal components. Specifically, it was requested that RES address the following materials-related issues for both boiling water reactors (BWRs) and pressurized water reactors (PWRs):

1. causes and mechanisms of intergranular cracking;
2. potential mitigation measures to limit the extent of cracking;
3. crack initiation and growth analysis including the development of through-wall cracks;
4. assessment of industry crack growth models;
5. flaw acceptance criteria;
6. post-weld heat treatment effects on crack initiation and growth; and,
7. effectiveness of non-destructive examination methods in detecting and sizing cracks.

In addition to the above, NRR also requested RES to assess the potential consequences and risks of the failure of BWR internal components caused by intergranular stress corrosion cracking (IGSCC), including the synergistic effects of multiple cracks in one or more internal components. RES has initiated several programs to address the above issues, and the NRR staff has been actively following the development of these programs.

Since the December 2, 1994, memorandum, the industry special review group, Boiling Water Reactor Vessels and Internals Project (BWRVIP), which was formed to focus on resolution of reactor vessel and internals issues, has developed and submitted for review approximately 12 reports on inspection, assessment, and repair of reactor pressure vessel internals. These reports are being

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evaluated by the NRC staff. Further, the BWRVIP has informed the NRR staff that it plans to develop and submit approximately another 12 inspection, assessment, and repair reports for review over the next year.

In light of this increased generic activity on the part of the industry to address reactor vessel and internals issues, NRR requests that RES expand its original scope of confirmatory research to include the following:

- a. confirmation of underwater welding technology;
- b. verification of low-alloy steel crack growth models; and,
- c. validation of weldability at various fluence levels.

We have discussed this request with RES, and understand that, as a result of budget limitations and other priorities in funding, some of the above work might not be initiated immediately. In order to assure that the results of the RES effort in the above areas can be effectively utilized by NRR in a timely manner, the specific details regarding scope and schedule of the tasks involved should be developed through close interoffice coordination between NRR and RES. We suggest that a detailed program plan be completed in early 1997.

The NRR contacts for the internal components cracking problems are David Terao and C. E. (Gene) Carpenter, Jr., in the Division of Engineering, and Kerri Kavanagh in the Division of Systems Safety and Analysis. Please keep the NRR staff informed of your progress.

Your continued support in this area is appreciated.

cc: L. C. Shao, RES  
M. E. Mayfield, RES

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