



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D. C. 20555

December 19, 1983

Honorable Nunzio J. Palladino  
Chairman  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Dr. Palladino:

SUBJECT: ACRS COMMENTS ON THE NRC STAFF REQUIREMENTS FOR REINSPECTION OF  
BWR PIPING AND REPAIR OF CRACKED PIPING

Dear Dr. Palladino:

During its 284th meeting, December 15-16, 1983, the ACRS heard a report from its Subcommittee on Metal Components and its consultants, and presentations from the NRC Staff regarding the Staff's proposed reinspection program of BWR piping and the repair of cracked piping. This matter was also discussed during a Subcommittee meeting held in Charlotte, N.C. on December 7, 1983. The Commission has requested ACRS comments on the NRC Staff's proposed criteria delineated in SECY-83-267C.

The intergranular stress corrosion cracks (IGSCC) that may develop at the welds of stainless steel piping exposed to BWR cooling water grow slowly from the inner wall of the pipe toward the outside. The cracks are usually variable in depth and circumferential extent. The main defenses against the sudden breaking of one of the large cooling water pipes containing cracks are careful inspection and repair, plus the expectation that variation in depth will generally lead to the local leaking of a pipe containing a deep crack long before it would break around most of its circumference.

Through considerable effort during the past year by the industry and the NRC, these cracks can now be detected fairly reliably with ultrasonic inspection techniques. Equipment and procedures that will allow the reliable determination of the depth of the cracks in the field are not yet available. However, some techniques are under development which look promising for reliably measuring the depth.

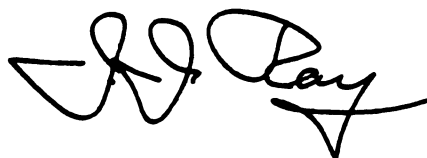
The NRC Staff's proposed schedule for and scope of reinspection seem appropriate in view of past experience. However, their criteria for the repair of cracked pipe are of concern to us. Our concern stems from the uncertainty in the measured crack depth, and the resulting potential lack of margin in the strength of the pipe repaired by weld overlay techniques. With regard to this margin, the industry is correct in pointing out that even in the event of a large diameter pipe break, the risk to the public would be small. However, we feel it is imprudent to risk the challenge of such a large break.

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For essentially through-wall cracks which are 120 degrees or less in circumferential extent, the arguments for leak-before-break seem to be sound. For deep cracks of appreciably greater circumferential extent, the soundness of the argument for leak-before-break is significantly reduced. If one could be sure that the crack depth were measurable, even to within a factor of two, then deep cracks could be distinguished from shallow cracks and a conservative analysis could be made. However, since we have seen no convincing evidence that the techniques now being used in the field are reliable to within a factor of two in measuring crack depth, we recommend that the uncertainty in crack depth be compensated for by the repair of any weld joint with effectively continuous crack indications over greater than 120 degrees in circumferential extent. This approach will require somewhat more careful attention to measurement of length and continuity of cracks than is now customary. If at some time in the future there is good evidence that reliable depth measurements are being made in the field, credit can be given for the strength of the sound metal that remains in the plane of the cracks.

We support the NRC Staff's position that any repairs made by a weld overlay technique be considered as only interim repairs and that the cracked pipe be replaced at an early date by new pipe of a material less susceptible to IGSCC. This recommendation stems from the increased difficulty in assessing the growth of cracks through the overlay, and from some concern about the relative safety margin of the repaired pipes compared to new pipes.

Sincerely,

A handwritten signature in black ink, appearing to read "J. J. Ray". The signature is stylized with loops and a long horizontal stroke at the end.

J. J. Ray  
Chairman

Reference:

U. S. Nuclear Regulatory Commission Information Paper, SECY-83-267C for The Commissioners from William J. Dircks, EDO, "Staff Requirements for Reinspection of BWR Piping and Repair of Cracked Piping," dated November 7, 1983