Northern States Power Company

414 Nicollet Mall
Minneapolis, Minnesota 55401
Telephone (612) 330-5500

June 27, 1984

Mr. Harold R. Denton
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

During the meeting with the Boiling Water Reactor Owners Regulatory Response Group (RRG) and the Boiling Water Reactor Owners Group (BWROG) on Pipe Cracking on June 5, 1984, you requested the following:

1. A letter from the RRG to be submitted to you by June 8, 1984 summarizing the meeting and the actions planned by the BWROG on Pipe Cracking, and

2. A letter from the BWROG on Pipe Cracking by June 29, 1984 covering their response to the problem of cracking in the Inconel 182 "butter" welds in the nozzle to safe ends in Pilgrim.

In regard to item (1) the letter was mailed to you by Mr. Tom Dente of the RRG on the date requested.

The purpose of this letter is to respond to item (2) above. The Technical Advisory Committee and the Executive Committee of the Boiling Water Reactor Owners Research Program on Pipe Cracking have approved a program that covers three tasks. These are summarized herein.

Task 1- Non Destructive Examination Activities

Under this task, methods to inspect the Inconel 82-182 "butter" welds will be investigated. While 308-309 "buttering" has not shown cracking in the limited inspections, it will be included in this task. Samples for calibration and training will be prepared. Assuming success of the inspection procedures, workshops and training sessions will be held for the utility members and their inspection teams. The results of this activity will be discussed and reviewed with the NRC staff. This task is scheduled to be completed 24 weeks from the start date in order to have the guidelines available to the utilities for their inspections in the immediate future.

Coon
1/0

Task 2 - Boiling Water Reactor Plant Survey

The purpose of this task is to document the inspection histories of the safe end to nozzle welds that were performed under the I&B Bulletins 82-03 and 83-02. Attention will be directed to the nozzle side of the weld for axial cracks in the buttering material. Plants that have had repairs and/or replacements of the safe ends, both domestic and overseas will be surveyed in greater detail since the inspections will provide direct information on the "buttering" material. A report covering this survey will be prepared and issued within 12 weeks of the start date of this task.

Task 3 - Repair-Replacement Activities

This task will cover the development of generic procedures for repair-replacement of the safe end - nozzle weld. Mock-ups will be used to develop procedures and specifications for partial and full removal of the weld "butter" material. An alternate material for "buttering", Inconel 690 will be considered. Based on laboratory tests this alloy is extremely resistant to IGSCC in simulated BWR environments. The welding characteristics have been evaluated and shown to be suitable for this application.

Induction heating stress improvement will also be investigated as a possible remedy. Procedures will be developed and confirmed by residual stress measurements using nozzle - safe end mock-ups. Confirmatory pipe tests of the various remedies will be performed. Work under this task is scheduled to be completed in 52 weeks but most of the work on the repairs-replacements will be accomplished in 30 weeks.

Work under Task 1, 2, and the planning of the work activities under Task 3 will be initiated immediately, depending on the time to negotiate contracts. If the results of the plant survey investigation reveal a major industry problem, then work under Task 3 will be fully activated.

Inspection Recommendations

The BWROG members have concurred in and recommended that at the next scheduled refueling outage, each unit inspect at least one outlet and two inlet recirculation nozzle to safe end welds. Such inspections are recommended from both nozzle and safe end sides of the weld using "qualified inspections and qualified inspectors" as addressed in NRC SECY-83-267C letter. After successful development of special procedures under Task 1, these inspections should include use of these procedures for direct inspection of the weld "butter". Plants with a corrosion resistant clad layer protecting the "butter" welds are exempt from this inspection recommendation.

If indications of SCC are found in these welds, then the inspection will be appropriately expanded to other welds. However, the individual utilities will be guided by such considerations as ALARA and the availability of inspectors.

We believe that this inspection recommendation is a reasonable approach and is consistent with the NRC SECY-83-267C letter. At this time we believe the issue does not affect continued safe operation of the plants.

After you and your staff have had an opportunity to review this response, the BWROG on Pipe Cracking will be available to review and discuss this program plan with you.

Sincerely yours,

Gerald H Neils

Gerald H. Neils, Chairman
Advisory Committee on Regulation
BWROG on Pipe Cracking

GHN/js