

April 21, 2006

Mr. Alex Marion
Senior Director, Engineering
Nuclear Generation Division
Nuclear Energy Institute
1776 I Street, NW
Washington, DC 20006-3708

Dear Mr. Marion,

This letter documents the results of a March 29, 2006, teleconference between Nuclear Regulatory Commission (NRC) staff and members of the Materials Reliability Program (MRP) and Nuclear Energy Institute (NEI) that addressed primary water stress corrosion cracking (PWSCC) in reactor coolant system (RCS) dissimilar metal butt welds in pressurized water reactors and shares our expectations for a follow-up meeting on May 5, 2006.

The purpose of the teleconference was to discuss industry inspection findings under MRP-139, "Primary System Piping Butt Weld Inspection and Evaluation Guidelines," from the Spring 2006 outage season. The NRC staff acknowledges the industry's initiative to establish the MRP-139 inspections controlled under the "mandatory" implementation framework of NEI 03-08. Recent MRP-139 inspection results have reinforced existing NRC staff concerns and raised additional items of interest about the extent of this phenomenon in primary system dissimilar metal piping butt welds.

In an October 12, 2005, letter from M. Mayfield (NRC) to A. Marion (NEI), NRC staff outlined a number of concerns, comments, and recommendations pertaining to MRP-139. On December 19, 2005, a teleconference took place between members of MRP, NEI, and NRC staff to preliminarily address NRC staff issues from that letter. During the teleconference it was agreed to hold a public meeting to allow members of MRP to present a response to those issues. May 5, 2006 has been established as an available day for both the NRC and industry representatives to conduct this meeting. A NRC formal public meeting notice is under development and will confirm the meeting location and time.

In March 2006, three licensees performed primary system piping butt weld inspections at their facilities for various reasons including MRP-139 requirements, risk-informed inservice inspection requirements, and to complete the action specified in the April 2, 2004, MRP letter, MRP-2004-05. The preliminary inspection results from these three plants have identified two circumferential indications, indications in piping less than 4 inch nominal pipe size, and an indication in a "cold leg" temperature location butt weld. Each of these indications are potentially attributable to PWSCC. These findings concerned the NRC staff in their number, categorization, and location and resulted in the NRC staff initiating the March 29, 2006, teleconference. The enclosure summarizes the issues discussed during the teleconference.

A. Marion

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The inspection findings in March 2006 further highlighted the NRC concerns, and the teleconference enhanced our communication on these topics. NRC staff and the MRP representatives agreed to work towards resolution of some of these issues prior to the May 5, 2006, public meeting. We appreciate the industry's proactive involvement in identification and resolution of materials degradation issues, including the impact of PWSCC on dissimilar metal butt welds. If you have any questions regarding this information, please contact me.

Sincerely,

/RA/

John A. Grobe, Director
Division of Component Integrity
Office of Nuclear Reactor Regulation

Enclosure:

Summary of Items Discussed During March 26, 2005,
Teleconference Between NRC and MRP

cc:

G. L. Vine, Executive Director, Washington Representative, EPRI
R. L. Dyle, Southern Company
M. Robinson, Chair, MRP Issue Integration Group
J. Gasser, Executive Chair of PWR Materials Management Program
D. Modeen, Chief Nuclear Officer, Electric Power Research Institute
J. Riley, Senior Project Manager for Materials Issues, NEI
C. King, Senior Project Manager for Alloy 600 Issues, MRP

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SUMMARY OF ITEMS DISCUSSED
DURING MARCH 29, 2006, TELECONFERENCE
BETWEEN NRC STAFF AND
REPRESENTATIVES FROM MATERIALS RELIABILITY PROGRAM
CONCERNING SPRING 2006 DISSIMILAR METAL BUTT WELD INSPECTION RESULTS

The following is a summary of items that were discussed during a March 29, 2006, teleconference between U.S. Nuclear Regulatory Commission (NRC) staff and representatives from the Materials Reliability Program (MRP).

NRC staff inquired when a formal written response to the October 12, 2005, NRC letter from M. Mayfield (NRC) to A. Marion, would be provided. MRP representatives noted that they expected the letter to be completed by the May 5, 2006, public meeting. The MRP representatives noted that there will be a forthcoming list of topics for which additional information from the NRC staff would be useful to discuss during the May 5, 2006, meeting. However, NRC staff expressed that in light of the recent inspection findings in March 2006, waiting until May 5, 2006, to discuss all of the issues would not allow timely discussion of those concerns relevant to recent inspections. MRP representatives agreed to increase communications when such issues arise, prior to the May 5, 2006 meeting.

NRC staff commented that during the Spring 2006 outage season the number of indications attributed to primary water stress corrosion cracking (PWSCC) in dissimilar metal butt welds is higher than in previous outage seasons. The NRC staff noted that these results may be due to more inspections being performed or increased occurrence of PWSCC. The MRP representatives indicated that they would evaluate this issue and discuss it during the May 5, 2006, meeting.

NRC staff explained the concern for volumetric inspections of primary system piping butt welds of piping sizes 2 inch nominal pipe sizes (NPS) to 4 NPS. MRP-139 does not address volumetric inspection of butt welds in piping within this size range with the exception of certain high pressure injection line welds. ASME Code requirements and risk-informed inservice inspection programs only require a surface examination on a sampling basis. NRC staff is concerned that this inspection requirement may not be adequate to address the active degradation mechanism of PWSCC on these susceptible Alloy 182/82 butt welds and is acting through the ASME Code revision process to propose a change in this requirement. Due to the small size of these welds, a flaw would be required to grow through less circumferential length to reach a critical failure size. Therefore, circumferential flaws could grow to critical flaw sizes much faster than circumferential flaws in larger piping. In March 2006, a circumferential indication was identified in a dissimilar metal butt weld in a 2 NPS pipe through volumetric inspection. The NRC staff concern is that while failure of these size lines does not pose a significant risk of core damage, failure could lead to an un-isolable loss of primary coolant accident and subsequent activation of emergency core cooling systems. General Design Criterion 14 requires, "The reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture." The NRC staff notes that an active degradation mechanism which has been identified to cause flaws which can lead to abnormal leakage and possible failure, does require an effective type of examination to prevent abnormal leakage.

ENCLOSURE

Volumetric inspection of the susceptible butt welds meets this type of examination requirement. This item corresponds to NRC staff comment number 16 of the October 12, 2005, letter.

NRC staff also expressed a concern about reporting the results of MRP-139 inspections to the NRC. To aid the NRC staff in assessing the implementation of the MRP-139 inspection program and in efforts to codify butt weld inspection requirements, the NRC is requesting inspection information for primary system piping butt welds, specifically, the number of welds inspected, size of the welds, under what inspection requirement the weld was being inspected, inspection type, limitations of the inspection, and inspection findings. The MRP representatives agreed to compile data for the current spring and upcoming fall outages. Due to the increased number of inspection findings this spring, NRC staff would like to develop with the industry, a process that results in NRC being promptly informed of butt weld inspection results during the outage.

NRC staff raised the concern of sample expansion requirements under MRP-139. During the teleconference, it was not clear what category the requirements for scope expansion applied under MRP-139. MRP representatives clarified the position of MRP-139 and provided some resolution of NRC staff concerns in the area. However, additional concerns remain that correspond to NRC staff comment number 18 of the October 12, 2005, letter. MRP representatives noted that this area requires clarification in a future update to MRP-139 and would be discussed at the May 5, 2006, meeting.

NRC staff identified the need for the volumetric inspection to find any flaws before a stress improvement (SI) process was applied. Application of SI has lead to the inability to volumetrically detect existing flaws after the process is performed. Additionally there is a chance through inspection limitations or deformation after the application of SI, that a crack tip may be missed. During the inspections performed in March 2006, two circumferential indications were identified before a SI process was performed, but were not detectable after the process. While there are discussions about why this occurs, the end result is that long term inspection requirements of dissimilar metal butt welds could be different depending on the performance of a pre-SI volumetric inspection. Under MRP-139 there are different categories of inspection for cracked and uncracked butt welds mitigated by SI. Failure to perform a pre-SI volumetric inspection could result in the selection of an inappropriate inspection category. This item corresponds to NRC comment number 8 of the October 12, 2005, letter.