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NORTHEAST UTILITIES



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HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
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September 19, 1986

Docket No. 50-245
B12264

7-21-86
51 FR 26196
86-17

Rules and Procedures Branch
Division of Rules and Records
Office of Administration
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Gentlemen:

Millstone Nuclear Power Station, Unit No. 1
Comments on Draft NUREG-0313, Revision 2
and Implementing Generic Letter

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DOCKETED USNRC
RULES & PROCEDURES BR
DRR:ADM

On July 31, 1986, a draft of the proposed Revision 2 to NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," was published in the Federal Register (51 FR 26196). Concurrently, a draft of the proposed implementing Generic Letter was published. The NRC Staff solicited public comments on each, by September 19, 1986.

Northeast Nuclear Energy Company (NNECO), on behalf of Millstone Unit No. 1, is hereby providing comments on the draft documents as an attachment to this letter. Included in the attachment are NNECO's proposed revisions and supporting justifications.

With our continuing effort to ensure the safe operation of Millstone Unit No. 1, NNECO's program to control intergranular stress corrosion cracking (IGSCC) has always met the acceptance standards established by the Staff. Furthermore, the program has surpassed these requirements by examining additional welds of concern.

NNECO considers the draft NUREG and Generic Letter to be reasonable and to provide the proper foundation for a long-term IGSCC program. However, a few refinements have been identified. In light of the fact that the IGSCC problem has cost utilities hundreds of millions of dollars over the past five years, we request that the concerns expressed in our comments be given appropriate consideration.

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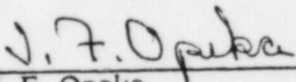
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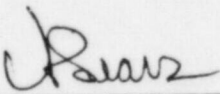
Please feel free to contact my staff with any questions on this matter.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY



J. F. Opeka
Senior Vice President



By: C. F. Sears
Vice President

cc: C. I. Grimes

Docket No. 50-245

Attachment

Northeast Nuclear Energy Company
Comments on Draft NUREG-0313, Revision 2
and Implementing Generic Letter

September, 1986

ATTACHMENT

**Northeast Utilities Comments on Draft Generic Letter
"NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping"
and on Draft NUREG-0313, Revision 2
"Technical Report on Material Selection and Processing Guidelines
for BWR Coolant Pressure Boundary Piping"**

1. The draft letter addresses the generic issue of IGSCC in the weld heat affected zone of wrought austenitic stainless steel piping. NNECO believes that the NRC Staff positions stated in the letter should be confined to this issue. At present, this is not the case. For example, IGSCC in cast stainless steel is not a generic issue, but the Staff position appears to require augmented inspection of castings not meeting specified carbon and ferrite requirements. We believe augmented inspection of such castings is inappropriate considering the favorable service experience and the absence of IGSCC in castings purchased to ASME Code requirements. In fact, the good IGSCC resistance of austenitic stainless steel castings, in comparison to that of wrought pipe, may result in part from differences other than carbon and ferrite content. We note further that the inspection methods to which the generic letter refers are not appropriate for castings.

Similarly, plain carbon steel piping is immune to sensitization and IGSCC, as correctly noted in NUREG-0313, Revision 2. The Generic Letter should not specify strength requirements for carbon steel piping based on considerations other than corrosion cracking resistance. Certainly, the prescribed program of augmented inspection for IGSCC is not the appropriate "remedy" for plain carbon steel that does not meet applicable strength and toughness requirements.

2. The list of resistant weld metals should be expanded to include 309L, 316L, and 308Mo-L grades. The minimum ferrite content for welds is usually specific in terms of ferrite number (FN) rather than percent ferrite, although the two are nearly equivalent numerically. The requirement for butt welds is normally specified as 8FN on an all weld-metal test pad.
3. Wrought material which has been solution heat treated should be clearly identified in the generic letter as a resistant material, as it is in the draft NUREG-0313, Revision 2, Paragraph 5.3.1.1.
4. To incorporate items 1, 2 and 3 above into the Generic Letter, the following rewording of the Staff Position on Materials is recommended:
 - (1) Low carbon wrought austenitic stainless steels are considered resistant to weld sensitization and IGSCC. These materials include the grades and corresponding carbon levels specified in Table 1 of NUREG-0313, Revision 2, as well as other grades with equivalent low carbon contents. These materials must be tested for resistance to sensitization in accordance with ASTM A262-A or -E as appropriate, or in accordance with an equivalent standard.

- (2) Wrought austenitic stainless steel pipe with carbon content not in accordance with Table 1 of NUREG-0313, Revision 2 is considered to be resistant to IGSCC if the pipe assembly is solution annealed by heat treatment following welding.
 - (3) Piping material is considered resistant to IGSCC if the weld heat-affected zone is protected by resistant weld cladding (often referred to as corrosion-resistant cladding, or CRC).
 - (4) Resistant weld metals include type 308L, 309L, 316L, 308Mo-L, and equivalent grades, with a minimum as-melted delta ferrite content equivalent to 8 Ferrite Number (FN).
 - (5) Wrought austenitic stainless steel pipe which does not meet one of the above requirements for resistant material is considered nonresistant and is subject to augmented in-service inspection requirements.
 - (6) The IGSCC resistance of nickel-base alloys will be considered on a case basis. Solution heat treated nickel-base alloys are considered resistant, but Inconel 82 is the only currently available nickel base weld metal considered to be resistant as welded.
5. Table 1 of NUREG-0313, Revision 2, which is referenced by the Generic Letter, should be revised to include Type 347 stainless steel with 0.04% maximum carbon content, to be consistent with current foreign and domestic purchase specifications. Type 347 has been used successfully with even higher carbon content, exhibiting no evidence of IGSCC.
 6. In the Generic Letter as currently written, the Staff Position on Processes is restricted to new or replacement piping. We recommend deleting "new or replacement" in the first sentence of the Staff Position to allow for process applications to existing installed piping systems.

Add item 4, Corrosion-Resistant-Cladding (CRC) to the list of fully qualified processes. This applies to paragraph 2.2.1 of the NUREG.

7. The Staff Position on Water Chemistry in the Generic Letter requires revision to reflect recent experience and, in addition, should be confined to IGSCC of BWR piping (see Item 1). Recommended rewording for the first paragraph is as follows--the second paragraph should be deleted:

The staff believes that HWC is an effective countermeasure for reducing IGSCC in BWR piping. However, the response of BWRs to hydrogen injection differs from plant to plant and the development and verification of a generic HWC specification is not yet complete. For these reasons, reductions in piping inspection frequency based on the use of HWC will be considered on an individual case basis, at least at the present time.

8. The Staff Position on Inspection Methods and Personnel refers to an inspection qualification program that is applicable to IGSCC in wrought material.

We recommend the following wording for the second paragraph:

"All BWR pipe weld examinations should be performed with the procedures, equipment, and personnel qualified by..."

Further, with the current wording of the first paragraph, we are uncertain whether a plant can use the edition of the code under which they were licensed as opposed to the latest version of ASME Section XI. Additional clarification is recommended.

9. Table 1 of the Generic Letter prescribes inspection intervals of 10 years, 3-1/3 years, and every refueling outage for respective categories of weldments. We recommend that "3-1/3 years" be changed to "4 years or 2 refueling cycles, whichever is less." Because the refueling cycle can be as long as 2 years, the 3-1/3 year interval could cause an arbitrary and burdensome requirement to inspect Category D and E welds every outage.

The word "outage" appearing in Table 1 should be changed to "refueling outage" for clarification.

Delete requirement for local leak detection in note (3) of the Table. Leak detection per Section 6 of the NUREG is adequate.

10. Suggest rewording NUREG-0313, Revision 2, Paragraph 5.3.2.5, as follows:

"All repaired and stress improved cracked weldments, Category E, should be examined during the subsequent refuel outage after repair or stress improvement. The 100% of Category E welds should be examined every two refuel cycles."

11. The foregoing comments on the Generic Letter are also applicable to the corresponding and/or referenced sections of NUREG-0313, Revision 2. Additional comments on the NUREG are as follows:

- (1) With respect to the Staff's position on Piping replacement in paragraph 1.5, NNECO supports additional inspections based on economics and ALARA concerns. For Millstone Unit No. 1 it has been more beneficial/economic to inspect and improve upon inspections rather than replace affected piping systems.
- (2) In 3.1.1, change the fourth sentence to read "Weld overlay is performed with water in the pipe during welding..."
- (3) In 4.4.1 insert "... a margin of at least 2.77..." to be consistent with ASME Section XI as discussed in 4.1.

- (4) In 5.3.4, the logic for sample expansion should include welds of the same IGSCC category only.

We recommend the following wording for the second paragraph of 5.3.4:

"If cracks are found during the initial sample inspection, an additional sample (first expansion), approximately equal in number to the initial sample, should be examined. This (first expansion) should be selected from other welds of the same inspection category irrespective of pipe size or system. If cracks are found in this (first expansion) sample then all the welds in that category should be inspected."

12. A proposed addition to the Generic Letter sets a limit on the number of cracked weldments in piping, irrespective of repair or evaluation. The basis for this limit is not discussed in NUREG-0313, Revision 2 and appears to be arbitrary. The position of NNECO is that measures for evaluation, mitigation, reinforcement and inspection, as identified in the NUREG, are adequate to control IGSCC in BWR piping systems, and that the additional arbitrary limitation is not necessary or beneficial. We would prefer to see a requirement to reanalyze the system using the measured shrinkage as secondary stress and the weight as an input to the deadweight and seismic analyses. The proposed NRC position would also require owners to apply increased resources and man-rem exposure toward inspection and sizing of cracks acceptable under IWB-3500. It is recommended that the fifth paragraph under Limits on Number of Cracks Weldments in Piping be replaced with:

"Because crack sizing is difficult and uncertain to determine in the crack depth range of less than or equal to 10% through wall dimension, for acceptability under IWB-3500, two sizing examinations shall be performed by two independent examiners, and both must be qualified for sizing under the NRC-EPRI-BWROG coordination plan being conducted at the EPRI Center at Charlotte, North Carolina when cracks are sized and found to be of this dimension."

13. Under item 2 on page 6 of the Generic Letter, BWR Owners are requested to provide Technical Specification changes incorporating an augmented inspection program. Because the degree of augmented inspection will change as measures are initiated to mitigate IGSCC, we judge that it would be more appropriate to provide the NRC Staff with a plan for an ISI program that can be modified as necessary as mitigating measures are implemented. We recommend the following wording:

Item 2.

A plant-specific ISI plan incorporating an augmented inspection program for wrought austenitic stainless steel piping in accordance with Table 1 and Section 5 of NUREG-0313, Revision 2 and consistent with the Owner's current plan for IGSCC mitigation at the plant.