



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

APR 14 1981

MEMORANDUM FOR: R. H. Vollmer, Director
Division of Engineering

FROM: S. S. Pawlicki, Chief
Materials Engineering Branch
Division of Engineering

SUBJECT: DIFFERING PROFESSIONAL OPINION RELATED GENERICALLY
TO SENSITIZATION OF BWR STAINLESS STEEL WELDMENTS

As I advised you on April 9, 1981, I have received a memorandum from Joe Halapatz (copy enclosed) expressing a differing professional opinion relating to R.G. 1.44 and to sensitization of BWR stainless steel weldments. I have discussed this matter briefly with Warren Hazelton, Roy Gustafson and Bernard Turovlin, and the following is our opinion on the subject:

1. Sensitization of stainless steel is not the only factor contributing to stress-corrosion cracking of stainless steel welds. Environment and stress are others. Lab tests for stress corrosion are not the ultimate answer. Field experience is more important.
2. We do not doubt that some heats of type 304 can become sensitized enough by some welding processes using heat inputs of 110,000 Joules/inch to make them fail ASTM A262 and/or ASTM A393. This fact alone does not mean that they will fail in most BWR applications.
3. Issuance of NUREG-0313 and NUREG-0313, Rev. 1 reports, which implement the Pipe Crack Study Group's recommendations, have in effect made the current R.G. 1.44 obsolete. The updating of R.G. 1.44, which was first proposed some time ago, should be now accorded high priority.
4. NUREG-0313, Rev. 1 will be implemented on Class 1, 2, and 3 piping in all BWRs. It is clear that protection from problems with IGSCC in BWR piping is being provided by compliance with NUREG-0313, not compliance with every regulatory position of R.G. 1.44. In fact, R.G. 1.44 is not even mentioned in NUREG-0313, Rev. 1.
5. Both the Shoreham and La Salle plants have made physical changes to their systems and have made commitments to do augmented inservice inspection in other areas. The staff has determined that Shoreham and LaSalle are in compliance with the recommendations of NUREG-0313.

I recommend that we initiate action to revise the R.G. 1.44 to reflect the recommendations of NUREG-0313, Rev. 1.

S. S. Pawlicki, Chief
Materials Engineering Branch
Division of Engineering

XA

cc: J. Halapatz R. Gustafson H. Levin
W. Hazelton B. Turovlin G. Johnson

XA Copy Has Been Sent to PDR

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APR 7 1981

MEMORANDUM FOR: S. Pawlicki, Chief, Materials Engineering Branch
Division of Engineering

FROM: J. Halapatz, Materials Engineering Branch
Division of Engineering

SUBJECT: DIFFERING PROFESSIONAL OPINION
RELATED GENERICALLY TO SENSITIZATION OF BWR
STAINLESS STEEL WELDMENTS

This memorandum addresses a DIFFERING PROFESSIONAL OPINION, identified by the undersigned in accordance with NRC Manual Chapter NRC-4125. The DIFFERING PROFESSIONAL OPINION relates to 10 CFR 50 Appendix A, General Design Criteria 1 and 4 and Appendix B, as addressed by Regulatory Guide 1.44, "Control of the Use of Sensitized Stainless Steels."

Regulatory Position C.6 of R.G. 1.44 states that welding practices and, if necessary, material composition should be controlled to avoid excessive sensitization of base metal heat affected zones of weldments and that an intergranular corrosion test should be performed for each welding procedure to be used for welding material having a carbon content greater than 0.03 percent.

Process controls invoked in the welding of austenitic stainless steels applied in NTOLS, such as LaSalle and Shoreham, include the restriction of welding heat input to 110,000 joules per inch maximum. The prevailing staff view is, that with respect to weld heat input, this restriction is compatible with the intent of R.G. 1.44. It is the opinion of the undersigned that restriction of welding heat input to 110,000 joules per inch maximum will not preclude sensitization to the degree that the material will not pass intergranular corrosion tests generally applied as acceptance criteria.

Reference is made ^{to} question and response 122.11 on Docket No. STN 50-531 (251 GESSAR), which address a test program to which General Electric company committed to demonstrate that severe sensitization would not occur in 304 SS with carbon near the maximum of 0.08% and using the maximum of 110,000 joules/ inch heat input allowed by GE specifications. The test results do not support the GE premise: materials welded with high heat inputs failed the test. In its response to Q 122.11, GE makes the statement, "Tests by GE have shown that the tests specified by ASTM A262 and A393 are useful for indicating sensitization in only a very gross way, and that neither test provides a precise method of predicting susceptibility to stress corrosion cracking in the BWR environment. A method of detecting detailed subtle differences will be required to indicate the cracking propensity. We are continuing to pursue alternate test methods for measuring the degree of sensitization as part of an extensive program to deal with the susceptibility of welded 304 stainless steel to stress corrosion cracking."

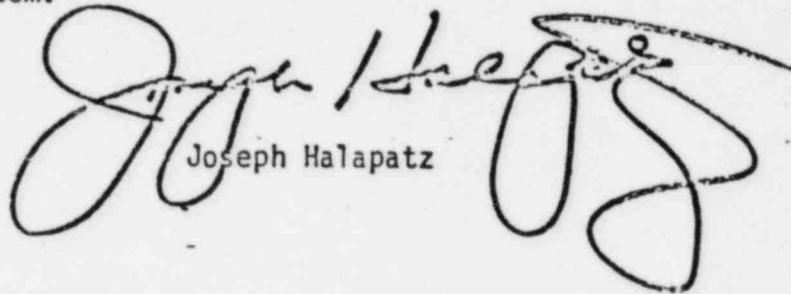
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The undersigned concludes, therefore, that the intent of R. G. 1.44 has not been met in weldments made using the heat inputs allowed by GE specifications.

While NUREG-0313, Rev. 1, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Piping," (Generic Task A-42) has been invoked in the NRC licensing review process, the extent to which it has been applied to the materials of components other than those of the reactor coolant pressure boundary is undetermined.

Absent the demonstrated compliance with the weldment sensitization assessment criteria identified by R. G. 1.44 and alternative criteria, which would provide such assessment, the undersigned concludes that 10 CFR Part 50 Appendix A, GDC 1 and 4, and Appendix B have not been satisfied in the case of BWR's. Pending the development of more definitive information, therefore, the undersigned recommends that the matter be identified in BWR SER inputs as an open item.



Joseph Halapatz