U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-423/81-10

Docket No. 50-423

License No. CPPR-113 Priority -- Category A

Licensee: Northeast Nuclear Energy Company

P.O. Box 270

Hartford, Connecticut 06101

Facility Name: Millstone Nuclear Power Station, Unit No. 3

Inspection At: Waterford, Connecticut

Inspection Conducted: August 3, 4, 6 and 7, 1981

Inspectors: Samuel W Reynolds 9/8/81
S.D. Reynolds, Jr., Reactor Inspector date signed
Materials and Processes Section, EIB

L. E. Tripp, Chief, Materials and Processes Section, EIB date signed

Approved By: L. E. Tripp 9/9/81
L.E. Tripp, Chief, Materials and Processes date signed
Section, EIB

Inspection Summary:

Inspection on August 3, 4, 6 and 7, 1981 (Report No. 50-423/81-10)

Areas Inspected: Routine, unannounced inspection of the licensee by one regional based inspector and one section chief. Inspection coverage included previous inspection findings, facility tour, pipe welding, fabricated service water piping spool pieces, reactor pressure vessel outlet safe ends, and filler metal issue system. The inspection involved 42 inspector and section chief hours onsite and 8 inspector hours at regional headquarters by one regionally based inspector.

Results: No items of noncompliance were observed.

DETAILS

1. Persons Contacted

Northeast Utilities Service Company (NUSCO)

*Mr. D.G. Dedrick, QA Manager
*Mr. K.W. Gray, Jr., Supervisor CQA
*Mr. S. Orefice, Superintendent New Site Construction
*Mr. J.L. Peterson, Senior Project Technician
*Miss K. Murphy, Const. QA Specialist
Mr. T.F. Sullivan, Resident Engineer, Electrical

Stone and Webster Engineering Corporation (S&W)

*Mr. A.M. Prusi, Resident Engineer
*Mr. F.S. Sullivan, Resident Engineer
*Mr. G.G. Turner, Superintendent, FQC
*Mr. J. Carty, Head, Site Extension Office
*Mr. P. Gagel, QA Program Administrator
Mr. C. Hall, Materials Engineer
Mr. V. Zilverstein, Materials Specialist
Mr. D. Snow, Resident Welding Engineer
Mr. F. Silvia, Pipefitter Welder
Mr. G. Higgins, Pipefitter Welder
Mr. L. Martin, Pipefitter Welder
Mr. L. Earvolino, Welding Engineer

Westinghouse Electric Corporation (W)

Mr. C. Peterson, Resident Welding and NDE Engineer
Mr. E. Harlow, Resident Engineer

*Denotes those present at exit interview.

The inspector conferred with other licensee and contractor personnel during the course of the inspection.

2. Plant Tour

The inspector observed the construction status, work activities in process and completed work in several areas of the plant. The housekeeping was reviewed. No items of noncompliance were identified.

3. Copper-Nickel/Clad Service Water Piping

The NRC inspector inspected several service water piping spool pieces in outside storage at the site. The piping inspected was flanged spool pieces containing straight lengths and elbows made from copper-nickel roll bond clad plate. The clad plate was ordered as ASTM:B432

with 0.075" thick SB402 90-10 Cu-Ni (C70600) material on SA516, grade 70 backer plate. The subject pipe will be used as Class 3 piping above ground (not buried). The NRC resident inspector questioned the appearance of the pipe whereas the circumferential welds were shiny and the longitudinal (long seam) welds were rusty. Visual inspection by the NRC inspector of the subject piping (example-SWF 15035WP 28 R/1) indicated the following:

a. The drawing indicates the longitudinal weld joints were fabricated by "stripping" the cladding and welding ID and OD with carbon steel filler metals.

b. The stripped cladding on the straight longitudinal weld joints is restored with an automatic oscillated GMAW-P process with two wide beads. On some of the longitudinal cladding it appears that the overlap area of the GMAW weld beads has been given a GTAW wash pass.

c. The stripped cladding on the elbows has been restored with a semi-automatic or manual process.

d. Some of the circumferential joints appear to be welded completely from the OD and at least one joint has gross burn-through (large "grapes") probably from excessive heat on the first pass above the root pass.

Review of the drawings and some filler metal certifications indicates that the clad restoration of the "stripped back" areas was conducted with ERCuNi directly on carbon steel as was the flange face cladding. The circumferential seams were made by machining back the carbon steel to produce a protrusion of wrought Cu-Ni that is welded with ERCuNi filler metal and the manual GTAW process for the root pass. Following the root pass, a manual GTAW pass is deposited with ERNi-3 filler metal. The remainder of the joint is welded semi-automatically with ERNi-3 and the GMAW-P process. The purpose of the nickel filler is to permit dilution products from the carbon steel and copper-nickel without hot cracking.

The NRC inspector requested the licensee to have S&W conduct an evaluation of the significance of the "grapes" and apparent lack of fusion on the same joint (3-SWP-27-10-4-3, FW6) and to evaluate the suitability for service of the copper-nickel weld metal acting as clad restoration.

The following Southwest Fabricating and Welding Co., Inc. WPS and PQR documents are currently being reviewed by the NRC inspector:

SW-42-1 Revision 1

P-1-34H Revision 1

P-42-34-H Revision 2

P-1-S OVERLAY Revision 1

34-34-02 Revision 0

This item will be classified as unresolved until the licensee provides a satisfactory engineering evaluation of the gross burn-through and evaluation of the suitability for service of the clad restoration. (81-10-01)

4. Welding Material Control

The NRC inspector reviewed the applicable filler metal certifications for the reactor coolant pipe welding observed and inspected the filler metal issue station (Rod Room 3). The paperwork system, oven temperature controls and control of the filler metals in the Rod Room were reviewed. It was observed that S&W is currently stocking both E308-15 and E308-16 SMAW electrodes for P8 to P8 welding.

No items of noncompliance were identified.

5. Visual Examination of Welds-Reactor Coolant Loop Piping

The NRC inspector visually examined the following welds:

a. 3-RCS-029-16-1, FW2 (RCS-LP4) (pipe to valve weld). The root and 3 Hot passes (GTAW) were completed.

b. 3-RCS-275-4-1, FW8 (RCS-5) (pipe to valve weld). The weld was completed and being blended to produce a 10^{o} taper per Westinghouse requirements.

c. 3-RCS-029-1-1, FW2 (RCS-LP1) (pipe to valve weld). The NRC inspector observed the joint fitup and a portion of the root pass.

d. 3-RCS-029-11-1, FW2 (RCS-LP3) (pipe to valve weld). SMAW welding by two welders was observed.

The welding documentation including applicable WPS, PQR, WPR, filler metal certifications and weld data records were reviewed.

The NRC inspector reviewed a current radiographic interpretation problem on the cast CF8A pipe to cast CF8M valves. A straight line appears on some of the radiographs (for example, the weld of 3-RCS-275-19-1 to 3-RCS-275-V-7). The characteristics of this indication have made final film interpretation very difficult. On the aforementioned joint, a cutout cavity was made to further evaluate the indication. The NRC inspector reviewed the film of the original joint

and the excavated joint and inspected the excavation. The NRC inspector also reviewed the Westinghouse to NUSCO memo dated 8/5/81 on this subject which proposed further radiographic examinations. As no final disposition on the film has been made, no NRC action is indicated.

No items of noncompliance were identified.

6. Licensee Action of Previous Inspection Findings

(Closed) Unresolved Item (423/81-05-03): Cracked tack welds. This unresolved item concerned the observation of tack weld cracking during fitup of flued penetration joints. Due to dimensional constraints caused by the use of specially designed clamping devices and the inherent dimensional constraints of the penetration, electrical resistance strip heaters could not be employed for preheating. Preheating was accomplished with a gas fired ("rosebud tip") torch. The combination of the factors mentioned contributed to the cracking of some tack welds. The NRC inspector discussed technique variations which could further minimize cracking of these tacks and reconfirmed that all cracked tack welds are removed prior to welding in the cracked tack locations. No violations of procedure or ASME Code violations were identified. This item is considered closed.

(Closed) Unresolved Item (423/81-05-04): The NRC inspector reviewed the technical information presented by S&W on the "hydrogen annealing" of bimetallic penetration joints. The terminology was discussed. The "hydrogen annealing" term as used by S&W is a post weld low temperature soaking operation often employed in heavy section carbon and low alloy steel fabrication to promote the evolution of hydrogen prior to final austenite to martensite tranformation and therefore minimize hydrogen underbead cracking. To achieve maximum benefit it must be employed immediately following welding prior to loss of preheat. The NRC inspector questioned the need for this additional operation especially where Ni-Cr-Fe filler metals are employed. The NRC inspector also questioned the licensee on whether this constituted a "post weld heat treatment" in accordance with ASME SCIX QW-407.1 (b). A question was also raised concerning the additional stress imposed by heating a localized band of restrained materials with differing coefficients of expansion. The response by S&W indicated that this process has been successfully used on many joints with no apparent problems. S&W, in a phone conversation with the Chairman of SCIX, indicated that PWHT as used in SCIX QW-407.1 (b) only referred to heat treatments conducted in the ranges indicated in the Code and not to post weld soaking operations below the 900F temperature. Calculations by S&W indicated that the stresses introduced by the additional thermal cycle of the dissimilar metal weld would have negilgible effect on the weld.

The SCIX QW407.1 (b) answer is considered to meet the intent of the Code. Negligible metallurgical changes occur at the soaking temperature; therefore, requalification of the procedure should be unnecessary in

accordance with Code interpretation that requalification is only required when a change in the procedure may produce a change in the metallurgical or mechanical properties. The subject item is considered closed upon review of the engineering evaluation presented by S&W.

(Closed) Unresolved Item (423/81-05-05): The NRC resident inspector requested engineering evaluation of base metal laminations in weld joint CLP-3, FW9 dispositioned to "accept as is" in N&D #0698. Discussions with the S&W engineer on the fracture mechanics significance of these exposed base metal inclusions indicated that the material met the soundness level required by the base metal material specification and the orientation of the laminations with reference to the pipe axis and weld joint would have no degrading effect on the quality or performance of the weld. This item is considered closed.

(Open) Unresolved Item (80-05-01): Reactor Vessel Outlet Nozzle Safe Ends. The NRC inspector continued inspection of the lack of sufficient length of stainless steel protrusion on the subject safe ends. The NRC inspector reviewed the following documents:

a. Report and Evaluation of Reactor Vessel Outlet Safe-Ends Potentially Reportable Deficiency-Westinghouse Electric Corp, S.L. Abbott, 6/19/80.

b. R.L. Hofer (Westinghouse) to J.H. Fletcher letter reference NES-24701 dated 7/7/81.

c. R.L. Hofer (Westinghouse) to J.H. Fletcher letter, Subject "Safe End Welding Nonconformance and Disposition Report" dated 7/14/81.

d. S&W N&D Report 0788 forwarded by S&W letter 8/6/81 NESF-4736.

e. S&W N&D Report 0787 dated 6/10/81 (Initiator).

The original concern of shortened or skewed machined piping weld preparation with insufficient stainless protrusion on the OD to meet Westinghouse requirements (< 1/2") was compounded by CE inprocess weld repairs. The RPV nozzle safe ends have been acid etched and the results indicate that special welding techniques and procedures are required to complete the joints. These techniques will employ the use of ENiCrFe-3 filler metal in a portion of the stainless to stainless joints. This will commence 1/4" below the lowest P8-F43 bond line indicated by etching and the patch will be 1/2" wide at the bottom with a 20^{o} minimum level angle. S&W will develop special welding procedures and PQR's to accomplish this welding operation. This item will remain open until the procedures are reviewed and satisfactory welds are obtained.

consumable insert filler metal specification insert shape and composition identification. A comment was also made that less confusion would be generated if the technique sheets used a dual E308/E308L designation rather than having to hunt through S&W W-100 general welding procedure to identify that either filler metal is permissible.

8. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of non compliance or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 2.

9. Exit Interview

The NRC Reactor Inspector, Resident Inspector, and Chief, Materials and Processes Section, EIB met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on August 7, 1981. The inspectors summarized the findings of the inspection.

The licensee acknowledged the inspectors comments.

7. Comments at Exit Interview

The NRC inspector commented at the exit interview that when revisions are made to existing technique sheets of consumable insert root welding that consideration should be given to using the new SFA 5.30 consumable insert filler metal specification insert shape and composition identification. A comment was also made that less confusion would be generated if the technique sheets used a dual E308/E308L designation rather than having to hunt through S&W W-100 general welding procedure to identify that either filler metal is permissible.

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