

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 50-423/82-10

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 9-13, 1982

Inspector: *S. D. Reynolds, Jr.*  
S. D. Reynolds, Jr., Reactor Inspector  
M&P Section, EPB

8/30/82  
date signed

Approved by: *J. Durr*  
J. Durr, Chief, M&P Section, EPB

date signed  
8/30/82  
date signed

Inspection Summary:

Inspection on August 9-13, 1982 (Report No. 50-423/82-10)

Areas Inspected: Routine, unannounced inspection of the licensee conducted by one regionally based Reactor Engineering Inspector. Inspection coverage included facility tour, pipe welding, copper-nickel clad service water piping system, reactor pressure vessel nozzle/piping attachments, reactor coolant pump and pressurizer supports, and welder qualification system. The inspection involved 36 hours on site and 8 hours at regional headquarters by one regionally based inspector.

Results: No violations were identified.

## DETAILS

### 1. Persons Contacted

#### Northeast Utilities Service Company (NUSCO)

- K. W. Gray, Jr., Supervisor CQA
- \* F. Comstock, Senior Engineering Technician, CQA
- \* A. C. Saunders, Technician A, CQA
- A. Ginn, CQA
- \* S. R. Toth, Superintendent New Site Construction
- P. Austin, Manager, Reliability Engineering
- R. Pritchard, ISI Engineer
- W. Landon, Construction Engineer

#### Stone and Webster Engineering Corporation (S&W)

- \* R. Snow, Resident Welding Engineer
- E. McMannus, Assistant Superintendent, Engineering
- R. Hagerman, Field QC Engineer
- I. Sprung, Boston (phone)
- G. Marsh, Senior QC Engineer
- M. Bezanson, Field QC Inspector
- N. Kelly, Welding Supervisor (Construction)
- L. Tracey, Senior Construction Supervisor
- A. Mathes, Senior ASME Documentation Inspector
- R. Powers, FQC (UA Weld School)
- W. Elder, Welding Supervisor (UA Weld School)
- R. Briere, FQC, Inspector
- \* R. D. Flodstrom, Assistant Superintendent FQC
- \* R. J. Rudis, Project EA Engineer
- J. Carty, Superintendent of Engineering
- \* P. Nelson, QA Engineer
- \* G. Palmer, Supervisor QA Project Superintendent
- \* W. H. Vos, FQC Engineer
- \* Mr. R. Matthews, Assistant Superintendent FQC
- \* W. Mackay, Resident Manager

#### Westinghouse Electric Corporation (W)

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

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

\*Denotes those present at exit interview

## 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 and found acceptable.

No violations were identified.

## 3. Licensee Action on Previous Inspection Findings

- a. (Closed) Noncompliance (423/81-08-02). The NRC inspector reviewed the licensee's action on this item of noncompliance concerning insufficient preheat for welding a reactor coolant support and a category 1. platform. Nonconformance and Disposition Report (N&DR) 0902 indicated the weld was removed and the joint reworked for reactor coolant support. N&DR 0897 indicated the platform welds were stopped and the completed portion given an NDE surface examination. Generic corrective actions included specific training sessions for construction supervisors, FQC personnel and welders. Review of MT examination results of the subject cooling coil platform welds indicated "no indications".

This item is closed

- b. (Closed) Noncompliance (423/81-08-03). This item concerned welding of a support to the requirements of Code Case 1644-9 (N-71-9) which required issuance of Revision 1 to Weld Technique Sheet W5S. Welding was being conducted in accordance with Revision 0 which permitted a lower preheat. The inspector reviewed N&DR 0898 which stated that the procedure was qualified on 2 5/8 thick plate welded with a 65F preheat and that the increase in preheat in Rev. 1 does not require requalification. The inspector pointed out that the ASME Section IX QW-406 rules apply only to qualification and do not permit waiver of the minimum fabrication preheat requirements in Code Case 1644-9. The inspector requested information on the surface soundness of the subject support welds. All welds have been visually inspected with successful results prior to painting. The surface soundness of two of the subject welds which were not painted (RHB EIA-B FW42A and 43A) was examined by magnetic particle testing with "no indications". The additional training employed as corrective action for item 423/81-08-02 is apropos for this item also. The Revision to the Welding Specification and special electrode handling requirements was reviewed, found acceptable, and meets Code Case 1644-9 requirements.

This item is considered closed.

- c. (Closed) Unresolved Item (80-05-01). This item was also reported in 50-423/81-10. The inspector reviewed the procedures utilized to weld the three joints requiring a buffer zone of ENiCrFe-3 filler metal. These joints are 3-RCS-029, -1-1-FWI, 029-6-1-FW1 and

3-RCS-029-11-1-FWI. All field welds are "welded out" with the first joint listed through complete inspection. It was reported that there were no indications of dilution related welding metallurgical problems on these welds. A minor amount of microfissuring in the ENiCrFe-3 weld deposit (not at the stainless/inconel fusion zone) was encountered.

This item is closed.

- d. (Open) Unresolved Item (423/81-10-01). This item concerns the suitability for service of the 90-10 copper-nickel clad service water pipe based on melt-through and possible incomplete fusion on joint 3-SWP-27-10-4-3, FW6. The inspector visually inspected the status of the repair on the subject joint. He also reviewed photographs taken during repair and discussed with the NDE inspector the existence of 6-8 inch long parallel penetrant indications apparently in the fusion zone or heat affected zone (HAZ). The inspector visually examined the results of a penetrant test which indicated that defects remain in the clad restoration root portion of the weld with only an estimated 0.040" of clad thickness remaining. The repair welding procedure has not been finalized.

The inspector requested an engineering evaluation of the general condition of the clad restoration portion of the circumferential SWP joints (mostly mitered joints) based on the results obtained in chasing apparent minor surface defects observed visually. The piping system consists of bolted flanged spool pieces. The welds at the flange to pipe joints are not of concern nor those welds where the clad restoration is accomplished from the ID. Only the circumferential single sided (OD) welds are under question.

Review of this item indicated all but 5 of approximately 200 spool pieces are in place. None of this piping is in containment. The inspector indicated that the existence of welding defects in the corrosion resisting cladding on a carbon steel pipe containing salt water require evaluation to insure the satisfactory corrosion service performance of the piping system.

This item continues to be unresolved pending NRC review of the proposed repair procedure and engineering evaluation of corrosion suitability of the piping system.

- e. (Open) Unresolved Item (82-08-05) Reactor Coolant Equipment Support Repair Welding. The subject cast pump and pressurizer supports designed in accordance with ASME Section III, Subsection NF utilize materials not listed in Section IIA, but authorized in Code Case 1644-9 (N-71-9). High strength low alloy steel castings (ASTM: A487, Grade 10Q) made by ESCO Corporation (ESCO) were shipped in the rough machined condition to LAMCO Industries, Inc. (LAMCO). During the finish machining operation casting defects were discovered and reportedly repaired by welding conducted by LAMCO without post weld heat treatment (PWHT).

N&D 1148 dated 1/26/82 and N&D 1462 dated 6/23/82 reported that repair welds were conducted on castings exceeding 0.23% carbon. This carbon content exceeds that permitted for fabrications which are not PWHT in Code Case 1644-9, paragraph 14.6.2 which is a requirement of S&W 2221.180-130. S&W Risk Releases 208 and 209 dated 4/2/82 and 4/5/82 released 7 support castings for installation.

The inspector reviewed the material specification (ASTM:A487-78), ASME Section II-SA487 (which does not include Grade 10Q), and Code Cases 1644-1 through 9. Code Case 1644-9, paragraph 14 includes special welding requirements and paragraph 2.6 indicates the definition of "thickness referenced in the Code". Also reviewed was Addendum #4 to Specification 2221.180-13 dated 5/11/81 which introduces carbon equivalent calculations as justification for eliminating PWHT of repair welds. The carbon equivalency justification is also indicated in page 4 and 5 of N&D 1148.

The licensee indicated that it was the intention of S&W to introduce a Code Case to justify the substitution of a carbon equivalency formula for the 0.23% carbon maximum specified in Code Case 1644-9 paragraph 14.6.2.

The inspector pointed out the following:

1. Repair welding on Q&T material requires PWHT by the material specification.
2. The material is not an ASME Section II approved material and is made to a special ESCO practice with 110,000 psi minimum yield strength rather than the Code Case 100,000 psi minimum.
3. It is not the intent of the waiver of impact test requirements in the HAZ indicated in Code Case 14.8.1 to include 7-inch thick base metals nor the additional waiver of carbon content.

This item remains open pending satisfactory review of the following information from the licensee:

1. Repair weld maps indicating area and depth of repair welds.
2. LAMCO WPS, PQR, WPQ, and weld repair data sheets.
3. Engineering justification for any base metal repair without PWHT.
4. Engineering justification of substituting carbon equivalency for carbon maximum HAZ hardness.
5. What is considered the maximum hardness permissible in the HAZ of welds without PWHT.

6. What is the Code justification of waiving the chemistry (carbon) limitation in Code Case 1644-9.
7. What is the estimated HAZ toughness for the highest carbon materials welded without PWHT.
8. Explanation of the intent of Addendum 4 to M130 page 4 line 4.10.
9. An engineering justification for the selection of a specific carbon equivalency formula and its specific application for Ni-Cr-Mo 4330 type low alloy castings.

This item continues to be open.

#### 4. Reactor Coolant Pipe Welding

The inspector visually observed penetrant examination, indication location, grinding and "weld pickup" on weld joint LP-1 EC-1 FW6 (W identification) which is essentially complete and in the finish ground condition. The status of the welding on this system was reviewed. There are a total of 48 field welds. 48 are welded out, 32 are ground for ISI, and 25 have completed final NDE examination. This includes the previously reported welds employing the ENiCrFe-3 buffer zone. Completed weld data packages for the following welds were reviewed:

3-RCS-029-1-1, FW1  
3-RCS-029-1-1, FW2  
3-RCS-029-2-1, FW3  
3-RCS-031-3-1, FW9

During review of the details of the reactor coolant pipe to reactor vessel nozzle attachments (including the previous reported welds requiring the ENiCrFe-3 buffer zone) the inspector questioned the ISI UT inspectability of these welds. This complex welded attachment consists of the following:

1. The RV P3 nozzle is weld clad on the ID and buttered on the nozzle side of the joint face (with austenitic stainless steel).
2. The 316 safe end is welded to the buttered P3 nozzle with inconel.
3. The 316 safe end is welded to the cast stainless steel pipe and stainless steel weld metal.
4. On three of the joints a inconel buffer zone exists at the stainless safe end/inconel weld joint interface.
5. The length of the protruding safe end varies at different nozzle attachments and various locations on individual nozzles.



Although the metallurgical and mechanical properties for these attachments are not under question, the UT inspectability of this type of double welded joint has been shown to be a problem.

The inspector requested a meeting to discuss this problem. A meeting was held with NUSCO-Construction, ISI, Reliability and NDE personnel to review the status of the inspectability of the subject joints. NUSCO presented information on a meeting held with W on January 27, 1982 where this subject was discussed. The inspector reviewed agenda topics and W minutes from the meeting.

NUSCO representatives indicated that preservice inspection (PSI) will start in January 1983 and that authorization has been obtained to hire two additional experienced and qualified ASME SCXI NDE experts to handle PSI and ISI problems.

This item is considered unresolved pending licensee demonstration of ISI inspectability of the subject piping to nozzle attachments (82-10-01).

5. Welder Training and Performance Qualification

The inspector reviewed the welder performance procedures used by S&W for welders qualified on site and at the Saybrook UA Welding School to insure that welding is being accomplished by qualified personnel. A detailed analysis was made of the controls exercised in the maintenance of identification during welding and evaluation of test assemblies.

A review was made of the S&W qualified welder list which currently indicates approximately 342 safety-related welders. All safety-related pipe welders are initially qualified by radiography on a 6G test assembly welded under limited access conditions. Test requirements are specified in S&W CMP 5.9 and the specific PQM utilized. The PQM provides the "Technique Sheet" parameters.

Radiographic inspection disposition sheets and guided bend test results are permanently attached to the record of welder qualification.

The inspector discussed with NUSCO and S&W the apparent lack of explicit training in the General Welding Procedures (GWP) (e.g., S&W W100). The GWP and the technique sheets which together make up the ASME Welding Procedure Specification (WPS) document. The welders are not specifically trained in the total WPS document during qualification or in later training sessions, but much of this information is covered in training sessions on filler metal control. It is a Code requirement that the welder obtain "directions to the welder" from the WPS document. The welder must receive WPS directions on all essential, non-essential and supplementary essential variables to meet ASME requirements. This apparent deficiency in training is considered an unresolved item pending licensee review of the adequacy of the current training program in covering all required welding variables.

This is an unresolved item (82-10-02).

6. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations or deviations. An unresolved item disclosed during the inspection is discussed in paragraphs 4 and 5.

7. Exit Interview

The NRC inspector met with the licensee's representatives (denoted in Paragraph 1) at the conclusion of the inspection on August 13, 1982. The inspector summarized the findings of the inspection. The licensee acknowledged the inspectors comments.