U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-423/85-41

Docket No. 50-423

License No. CPPR-113 Priority -- Category A

Licensee: Northeast Nuclear Energy Company

P.O. Box 270

Hartford, Connecticut

Facility Name: Millstone Nuclear Energy Station, Unit 3

Inspection At: Waterford, Connecticut

Inspection Conducted: August 5-9, 1985

Inspectors: Frederick P Paulitz 9-30-85
F. P. Paulitz, Reactor Engineer date

Approved by: Clifford J. Anderson 10/1/85
C. J. Anderson, Plant System Section, DRS date

Inspection Summary: Inspection on August 5-9, 1985 (Inspection Report 50-423/85-41)

Areas Inspected: Routine, unannounced inspection of procedures, quality records and work activities related to the inspection and testing of safety-related electrical equipment including the status of previous inspection findings. The inspection involved 35 hours on site by one region-based inspector.

Results: No violations were identified.

Details

1.0 Persons Contacted

1.1 NUSCO/NNECO

*S. Sudigala, Startup
K. Burton, Operations Supervisor
L. Nadeau, Assistant Project Engineer
S. Orefice, Project Engineer
K. Gray, Junior CQA Staff Assistant
G. Olsen, Engineer
R. Baker, QC Engineer
J. Kiss, Production Test
W. Tanner, Production Test
D. Dickerson, Startup Engineer
R. Olson, Engineer
W. Rose, Quality Control

1.2 Stone & Webster Engineering Corporation

*G. Basilfsco, Engineer
*R. Clark, Chief Inspection Supervisor
*J. Kelly, Quality Assurance
*W. Vos, Senior FQC Engineer
C. Kuhns, Assistant QA Program Administrator
R. Rudis, EA Program Manager
J. Allen, FQC Engineer

1.3 Westinghouse Electric Corporation

R. Conway, Nuclear Control Engineer

1.4 U.S. Nuclear Regulatory Commission

T. Rebelowski, Senior Resident Inspector
F. Casella, Resident Inspector
*R. Summers, Project Engineer

*denotes personnel present at exit meeting.

2.0 Licensee Action on Previous Inspection Findings

2.1 (Closed) Inspector Follow-up Item (84-25-01) Modification to Reactor Trip Breaker Shunt Trip Device

The NRC IE Information Notice 83-18 disseminated a summary of Bulletin 83-01 and 83-04 responses from licensees concerning problems with the Reactor Protection System.

The licensee has reviewed this Information Notice and Generic Letter 83-28. The licensee has agreed that Westinghouse should modify the design of the reactor protection system to include the following features:

-- The reactor trip breaker (RTB) should be tripped from the shunt trip device by a reactor trip automatic signal.

-- The RTB trip should be independently verified from either the shunt trip device or the undervoltage trip device.

-- A method to measure trip response time should be provided.

The inspector reviewed the following documents to verify that the above design changes were reflected on controlled drawings. Also, adequate procedures and QA/QC controls were provided for this modification:

-- S&W Engineering & Design Coordination Report No. T-C-00950

-- Westinghouse Field Change Notice NEUM-10563 and NEUM-10565

-- Westinghouse Schematic Diagram Reactor Trip UV Output 1083H88 sheet 13, Rev T

-- S&W Elementary Diagram Reactor Trip Breaker
3RPS*ACB-RTA ESK-11A, Revision 7
3RPS*ACB-RTB ESK-11B, Revision 7
3RTS*ACB-BYA ESK-11C, Revision 4
3RTS*ACB-BYB ESK-11D, Revision 4

-- Westinghouse Connection Diagram Reactor Trip Breaker
Cab. 1 DWG 7038D23, Revision 5
Cab. 2 DWG 7038D24, Revision 6

The shunt trip test and time response panels were installed in the rear of the reactor trip breaker switchgear. This installation was examined, by the inspector, to determine if it was in accordance with the drawings for location and seismic support. Also, the wire terminations were examined for the acceptance criteria established by the licensee for vendors panels.

The inspector concluded that the modification had been made with controlled drawings, adequate procedures, and QA/QC controls. Proper installation and the functional requirements were achieved. This item is closed.

2.2 (Open) Construction Deficiency Report (83-00-04) SD-37, Inspector Follow-up Item (83-06-05) Reactor Trip Breaker Undervoltage Trip Device Failure

The licensee notified the NRC by letter (B10797 May 20, 1983) that a design discrepancy occured in the reactor trip breaker, undervoltage trip device, due to the vendors lack of quality control. The retaining ring on the trip shaft was wider than the shaft groove. This improper engagement could result in the failure of the undervoltage trip device to perform its trip function. The proposed corrective action was the replacement of the undervoltage trip device with one that had the proper retaining ring engagement with the shaft groove.

The vendor supplied new undervoltage trip devices which were installed and tested by the licensee in accordance with S&W Engineering & Design Coordination Report T-C-00950 and Westinghouse Field Change Notice NEUM-10563.

The reactor trip breakers undervoltage trip devices were examined by the inspector for proper retaining ring shaft engagement. Because of the location of the retaining rings this determination could not be made by visual inspection. The licensee stated that the pre-travel, trip margin measurements were made and the breaker function tests were completed in accordance with the vendors procedures. However, the results of these documented measurements and function tests were not available for the inspectors review at the time of this inspection. This construction deficiency remains open pending the licensee furnishing and the NRC review of the above measurements and function test documents.

2.3 (Closed) Construction Deficiency Report (82-00-06) S-D-26 Solid State Protection System (SSPS) Undetectable Failure

The licensee notified the NRC by letter (B10560 September 10, 1982) that a potential undetectable failure could occur when testing the SSPS. The failure of the test relays contacts to reclose, after the relay is deenergized, at the completion of the test, causes the test proving lamp to be in series with the slave relay. The in-series lamp resistance would prevent the slave relay from functioning upon demand.

The proposed corrective action by the licensee was to have the vendor modify the design so the test relay contact failure could be detected.

The licensee changed the test circuit wiring in accordance with the control and guidance of S&W Engineering & Design Coordination Report T-C-00732 and Westinghouse Field Change Notice NEUM-10558.

The inspector reviewed the Engineering & Design Coordination Report, Field Change Notice, and Westinghouse Schematic Diagram 1083H88, Revision P. The inspector determined that the modified circuit did not prevent the failure identified in the construction deficiency report. Howver, the failure would be detectable by the test lamp indication. This modification closes this construction deficiency.

2.4 (Closed) Construction Deficiency Report (83-00-17) SD-48 Main Control Board Wire Termination Deficiency

The licensee notified the NRC by letter (B10906 September 29, 1983) that various terminations supplied by Reliance Electric Company had incomplete or incorrectly crimped termination lugs. Also, the wrong sized lugs were used to terminate resistor leads on Cutler-Hammer type E30 switches and Stanswick terminal blocks. The proposed corrective action by the licensee was a one hundred percent reinspection of the board, by Reliance Electric Company. Those terminals that failed the acceptance criteria were to be replaced.

This reinspection included a visual observation of 150,000 terminal lugs. A rejection criteria was established by the board vendor based upon the terminal vendor (AMP) recommendations and samples taken from the main control board which failed the UL-486 tensile pull test. Ten thousand terminals were replaced on the main control board as a result of this reinspection.

The inspector reviewed the rejection criteria and the UL pull test, that was used for the reinspection. Marked up main control board wiring diagrams were used to identify those terminals reinspected and those that were to be replaced. A number of these drawings were reviewed by the inspector. A number of Noncomformance and Disposition reports for wire terminal problems were reviewed by the inspector for proper disposition and QA involvement. These were also found acceptable.

The inspector discussed both the reinspection, training, rework and crimping tool calibration with the licensee personnel responsible to complete this task, and those responsible for QA/QC. The inspector concluded that the reinspection and rework of the main control board wire termination is acceptable. This construction deficiency item is closed.

2.5 (Closed) Construction Deficiency Report (84-00-04) SD-53 Systems Control Electric Cabinets Wire Termination Deficiency

The licensee notified the NRC by letter (F0500A March 16, 1984) that wire terminations were inadequate in the isolator cabinets, main ventilation panels, air condition panels, and other miscellaneous panels supplied by Systems Control.

The licensee proposed corrective action was a one hundred percent reinspection of the wire terminations. Those terminals which were identified as unacceptable would be replaced.

The licensee determined that the vendor personnel were not qualified to do the reinspection. The reinspection was done by Stone & Webster Engineering using the criteria defined in Engineering & Design Coordination Report F-C-29693. These criteria were reviewed by the inspector. Discussions with the licensee indicate that the rejection rate was about sixty

percent. Based upon a similar review of documents, discussion with licensee, as construction deficiency 83-00-17 discussed in paragraph 2.4, the inspector concluded that the reinspection and rework of wire terminations for the equipment supplied by Systems Controls is acceptable. This construction deficiency is closed.

2.6 (Open) Construction Deficiency Report (85-00-08) SD-75 CVI Corporation Equipment Wire Termination Deficiency

The licensee informed the NRC by letter (F0722A June 12, 1985) that improper terminations had been found in equipment supplied by CVI Corporation. This determination was made as part of the vendor wire termination inspection program conducted by the licensee which is discussed in paragraph 2.8 of this NRC inspection report.

The licensee proposed corrective action was a one hundred percent reinspection of wire termination in all panels supplied by CVI. The acceptance/rejection criteria are discussed in paragraph 2.7 of this NRC inspection report. The wire terminations which are rejected will be replaced.

The licensee has advised this inspector that the wire terminations rework will be complete for the filter panels by August 29 and the air condition panels by September 30, 1985. This construction deficiency remains open pending completion of this work.

2.7 (Open) Unresolved Item (85-01-02) Inspection Criteria for Wire Termination QA Program

The licensee's quality assurance organization identified a need for visual inspection criteria in the NUSCO QA Surveillance Report No. C-3200.

The Panel Vendor Crimp Inspection Criteria dated June 20, 1985 were reviewed by the inspector. These criteria were similar to those used for reinspection of the main control board. The pictures provided by AMP were presented in the form of written criteria. This criteria is acceptable. The licensee has not evaluated the correlation between Systems Control environment equipment qualification report for the maintenance of soldered connections and the crimp type connections as described in the Action Environmental Testing Corporation Test Procedure. This item remains open pending review of this correlation.

2.8 (Closed) Unresolved Item (85-08-01) Vendor Inspection Program for Wire Termination Deficiencies

The licensee was requested to provide assurance that other vendors not identified by Construction Deficiency Reports did not have unacceptable wire terminations. These concerns were raised in NRC Inspection Report 83-11. Stone & Webster conducted a review of thirty nine Purchase Orders

for Class 1E equipment to determine the adequacy of the Vendor QA/QC activities pertaining to the control and verification of the crimping process during equipment fabrication. This report identified that two vendors should have a one hundred percent reinspection of their wire terminations. These vendors are CVI (see paragraph 2.6 above) and Colt Industries (see paragraph 3.0 below). This item is closed.

3.0 Colt Industries Panel Wire Terminations

The Vendor Inspection Program, discussed in paragraph 2.8 above, identified that Colt Industries Panels did not have an adequate QA/QC inspection plan for wire terminations when the Emergency Diesel Generator panels were fabricated. A one hundred percent reinspection was made for panel wire terminations. At the time of this inspection 970 terminal lugs had been replaced for one Emergency Diesel Generator (EDG). The second EGD panels wire terminations rework had not been completed. This is an unresolved item 85-41-01 which remains open pending completion of this work.

4.0 Normal Station Service Transformer Test

The inspector observed a portion of the Normal Station Service Transformer Test T3347BA001, Revision 6, which included bus transfers. This test, step 7.15, was conducted with the Bus 34C energized from the normal source. This source was tripped and the bus reenergized from the reserved source. The inspector examined the visicorder traces for this transfer and noted that total time the bus was deenergized was 4.75 cycles. This time of deenergization is acceptable for the fast transfer.

The inspector also noted during this test, with the bus deenergized, that electromagnetic interference from relay 43X (type GE, HFA) caused misoperation of undervoltage relay 27-R (type ITE, solid state) which in turn caused misoperation of the transfer breakers. This problem is identified as Deficiency No. DDR 597. The solution for the problem is identified in Engineering & Design Coordination Report No. T-C-06750. The solution proposed was to place a diode (part no. 1N4005) in parallel with the 43X relay. This diode would suppress the voltage transient caused when the relay is deenergized. This suppression would prevent misoperation of relay 27-R. The inspector also noted on drawing 12179-ESK-7J that a varisitor had been placed across the reset coil of relay 27Y1 (type GE latch HFA) as the solution to a similar problem with relay 27-R.

5.0 Manual Reactor Trip Switch Circuit Location

Information Notice No. 85-18 identified that in the design of the Westinghouse Solid State Protection System a failure of output transistors Q3 and Q4 (short circuit) would prevent an automatic reactor trip. There existed drawings at some facilities that showed the location of the manual trip to be upsteam of these transistors. Should these transistors short circuit the manual trip would be ineffective.

This inspection was to determine whether the licensee was using controlled drawings that depict correctly the actual location of the manual trip circuit, and to confirm that the manual trip circuits are located downstream of the output transistors Q3 and Q4 in the undervoltage (UV) output circuit.

The following controlled drawings were reviewed and used during a visual circuit verification:

-- S&W Elementary Diagram Reactor Trip Breaker

3RPS*ACB-RTA ESK-11A, Revision 7
3RPS*ACB-RTB ESK-11B, Revision 7
3RPS*ACB-BYA ESK-11C, Revision 4
3RPS*ACB-BYB ESK-11D, Revision 4

-- Westinghouse Solid State Protection System (SSPS) Schematic Diagram Reactor Trip UV Output 1083H88, sheet 13, Revision T

-- Westinghouse Connection Diagram Reactor Trip Breaker
Cab. 1 DWG 7038D23, Revision 5
Cab. 2 DWG 7038D24, Revision 6

-- Westinghouse Schematic Diagram Reactor Trip Switchgear Dwg No. 7038D22, Revision 6

-- S&W Wiring Diagram Reactor Trip Switchgear 12179-EE-5R, Revision 4

-- S&W Wiring Diagram-SSPS
Logic Cabinet Train A 12179-EE-3GK, Revision 3
Logic Cabinet Train B 12179-EE-3GT, Revision 3

-- S&W Wiring Diagram Main Control Board Termination Cabinet
3CES*TB-MB4 Orange Sheet 1 12179-EE-3ED, Revision 6
3CES*TB-MB4 Purple Sheet 1 12179-EE-3EK, Revision 5

-- S&W Wiring Diagram Main Control Board 3CES*MCB
Section MB2 sheet 3 12179-EE-3ACQ, Revision 4
sheet 36 12179-EE-3ADZ, Revision 3

-- Section MB4 sheet 5 12179-EE-3AHS, Revision 3
sheet 7 12179-EE-3AHU, Revision 4
sheet 41 12179-EE-3AKE, Revision 2
sheet 44 12179-EE-3AKH, Revision 2
sheet 50 12179-EE-3AKP, Revision 3

-- Section MB5 sheet 19 12179-EE-3ALU, Revision 2
sheet 28 12179-EE-3AMD, Revision 1

-- Section MB7 Sheet 2 12179-EE-3AQB, Revision 3

The inspector walked down the wiring for the manual reactor trip with licensee and Westinghouse personnel. This walk down was from the Reactor Trip Switchgear to the Main Control Board Termination Cabinets, Main Control Board (Switches) and the SSPS Logic cabinets. The inspector concluded that the manual trip switches are located down stream from the output transistors Q3 and Q4 as shown on controlled drawings and that both S&W and Westinghouse drawings are in agreement.

6.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, or violations. An unresolved item identified during this inspection is discussed in Details paragraph 3.0.

7.0 Exit Interview

The inspector met with the licensee representative (denoted in paragraph 1) on August 9, 1985, and summarized the purpose, scope and findings of the inspection. At no time during this inspection was written material provided to the licensee by the inspector.