U.S. NUCLEAR REGULATORY COMMISSION
REGION I

ENFORCEMENT CONFERENCE REPORT

Report No. 50-423/88-04

Docket No. 50-423

License No. NPF-49

Licensee: Northeast Nuclear Energy Company

Facility: Millstone 3, Waterford, Connecticut

Conference At: NRC Region I, King of Prussia, Pennsylvania

Conference Date: July 20, 1988

Approved by: _____ 7/27/88
E. C. McCabe, Chief, Reactor Projects Section 1B — Date

Conference Summary:

Environmental Qualification (EQ) enforcement conference held to discuss significance of concerns about EQ of certain cable splices, Litton-Veam connectors, and containment high range radiation monitors. The licensee provided their evaluation of the regulatory and safety significance of these matters (Appendix A to this report). The NRC will evaluate the licensee input and separately issue appropriate enforcement action.

DETAILS

1. Conference Attendees

Northeast Nuclear Energy Company

E. Mroczka, Senior Vice President, Nuclear Engineering and Operations
R. Werner, Vice President, Generation Engineering and Construction
P. Blasioli, Supervisor, Licensing
M. Gentry, Millstone 3 Operations Supervisor
R. Peterson, Senior Engineer, Environmental Qualification
A. Roby, System Manager, Nuclear Engineering and Operations
B. Tuthill, Qualification Engineering

NRC Region I

W. Johnston, Acting Director, Division of Reactor Safety (DRS)
C. Anderson, Chief, Plant Systems Section (PSS), DRS
J. Durr, Chief, Engineering Branch, DRS
J. Gutierrez, Regional Counsel
R. Mathew, Reactor Engineer, PSS, DRS
E. McCabe, Chief, Reactor Projects Section 1B, Division of Reactor Projects
R. Paolino, Senior Reactor Engineer, PSS, DRS

2. Conference Scope

The Director, Division of Reactor Safety outlined the enforcement conference considerations as being the following.

-- Environmental qualification (EQ) issues identified during EQ inspection earlier this year.

-- Enforcement criteria are the general criteria applicable to a plant in the operating license issue process, not the enforcement criteria for plants in operation at the time the NRC environmental qualification rule was issued.

-- The specific concerns are Litton-Veam connectors not potted as required, the qualification status of Litton-Veam connectors at the time of the EQ inspection, and high radiation monitor cable qualification under high temperature conditions.

3. Licensee Presentation

The licensee presented their position on the EQ issues of concern, as identified in the appended presentation outline.

4. Raychem Splices Discussion

The licensee stated that their response to the already issued Raychem splice violation will include justification of their position on the acceptability of as-installed splice bends.

5. Litton-Veam Connectors

The NRC asked whether the Litton-Veam connectors were used to initiate a safety function or affected the ability to achieve cold shutdown. The licensee responded that the Litton-Veam connectors are used to initiate safety functions but that their review had found that instrument redundancy, instrument diversity (e.g., use of Veritrac instruments in some channels), and the early time of required instrument actuation (in all cases except a slow loss of feedwater level) all showed that the required safety functions would be performed. Also, the loss of the affected indications had been evaluated through covering the associated indicators on the plant simulator. In that condition, the operators achieved safety shutdown despite the loss of the indications. The licensee identified the only safety concern being the unlikely simultaneous failure of all the affected instruments.

The NRC asked, for the Litton-Veam connectors installed in a configuration for which they were not qualified, whether the two valves of concern were containment isolation valves (CIVs) and if so, were they in the same system. The licensee responded that the two valves were inside containment CIVs in different systems, with the outside containment CIVs valves available to effect isolation not being affected by this problem.

6. Containment High Range Radiation Monitor (HRRM) Discussion

There was extended discussion of the licensee conclusion that the containment HRRMs met NRC Regulatory Guide 1.97 accuracy criterion even with the identified cabling problem. The licensee also affirmed that the HRRM post-accident function was not impeded by this problem. The licensee stated that the magnitude of the error was greater at Millstone 1 than at Millstone 3 and that an exemption from the Regulatory Guide 1.97 accuracy criteria may be requested. (Functional capability is not suspect.)

The NRC questioned the timeliness of licensee resolution of the HRRM cabling when the problem was identified. The licensee stated that their chronology (Appendix A to this report) showed the timing of their resolution. Resolution timeliness will receive further NRC evaluation.

The licensee committed to submit the documentation justifying HRRM operability to the NRC.

ENFORCEMENT CONFERENCE

50-423/88-04

APPENDIX A

Northeast Nuclear Energy Company

Millstone Unit No. 3

Docket 50-423

Equipment Qualification

July 20, 1988

Meeting Agenda
July 20, 1988

Northeast Nuclear Energy Company

EQ Enforcement Conference
for
Millstone Unit No. 3

I. Introductory Comments - NRC Staff

II. Introduction - E. J. Mroczka

III. Background and Summary of Findings - R. P. Werner

IV. Discussion of Potential Violation and Unresolved Items

A. Potential Violations

1. Raychem Splices (50-423/88-04-06) - B. A. Tuthill

2. Litton-Veam Connectors (IR Concerns) (50-423/88-04-05) - A. R. Roby

3. Litton-Veam Connectors (Configuration Concerns) (50-423/88-04-07) - A. R. Roby

4. GA High Range Radiation Monitors (50-423/88-04-02) - R. S. Peterson

B. Unresolved Items

1. GA High Range Radiation Monitor (Potential for a 1.7 rad/hour error) (50-423/88-04-03) - R. S. Peterson

2. JCO for Potential EQ Deficiencies (50-423/88-04-01) - P. A. Blasioli

3. Target Rock SOVs (50-423/88-04-04) - B. A. Tuthill

V. Conclusion - R. P. Werner

NORTHEAST NUCLEAR ENERGY COMPANY

MILLSTONE UNIT NO. 3

DOCKET 50-423

EQUIPMENT QUALIFICATION

JULY 20, 1988

Introduction

Northeast Nuclear Energy Company (NNECO) received a full power operating license for Millstone Unit No. 3 from the NRC on anuary 31, 1986. At that time NNECO had implemented a comprehensive program to address the environmental qualification of electrical equipment (EQ). Both NNECO and the NRC determined that there was reasonable assurance that the plant was in compliance with the requirements of 10 CFR 50.49.

An NRC inspection team conducted an inspection at the plant on March 14-18, 1988, to verify NNECO's implementation of the EQ program. In Inspection Report No. 50-423/88-04 dated July 6, 1988 (EA-88-177), the NRC identified one Severity Level IV violation, four potential violations, and three unresolved items with respect to 10 CFR 50.49. In this presentation NNECO addresses these items. In addition, NNECO will respond separately to the Notice of Violation by August 8, 1988 in accordance with 10 CFR 2.201.

Because Millstone Unit No. 3 received its full-power operating license after November 30, 1985, the NRC's modified EQ enforcement policy of Generic Letter 88-07 is inapplicable to the items identified in the NRC's

inspection report. Accordingly, the potential violations noted in the Inspection Report are addressed below in accordance with the considerations of the NRC's general enforcement policy (10 CFR Part 2, Appendix C).

In summary, NNECO admits the proposed violation regarding the installation of Raychem splices over braided jacketing. NNECO denies the potential violation with respect to bend radius and seal length of Raychem splices. Further, even if such deficiencies are found, NNECO maintains that testing in March 1987 reflects they would have no safety significance. NNECO admits in part the potential violations regarding Litton-Veam connectors, but maintains they also have minimal safety significance given NNECO's demonstration of present qualification, operability and corrective actions. Finally, NNECO denies the potential violation regarding General Atomics (GA) High-Range Radiation Monitors (HRRM). This equipment was qualified when installed. NNECO has since evaluated vendor information to determine whether qualification status is impacted, and concluded that 1) qualification has not been undermined and 2) the identified concerns have no safety significance. In all these cases, NNECO has taken prompt measures to address the underlying concerns and to ensure that qualification is maintained or promptly established.

The EQ Program

NNECO, as the licensee for Millstone Unit No. 3, has implemented an effective program for the qualification of electrical equipment. NNECO has and continues to recognize the importance of the EQ program to safe operation of its nuclear units, and its management is committed to completely addressing any EQ deficiencies or unresolved items at Millstone Unit No. 3.

NNECO's EQ program for Millstone Unit No. 3 has been developed and implemented to assure that appropriate electrical equipment will remain functional in a harsh environment during and following a design basis event. As a result of the program, equipment should also remain qualified and be maintained in a qualified condition throughout the life of the plant.

NNECO Nuclear Engineering and Operations Procedure Number NEO 2.21, "Nuclear Plant Environmental Qualification Program," establishes the Millstone Unit No. 3 EQ program. The program addresses, among other things, the scope of equipment requiring qualification, the actions to be taken in the event any equipment becomes unqualified, and the maintenance of the qualified condition of the equipment. Auditable records of the selection, qualification, and maintenance of the equipment are also maintained. Finally, the program includes the requirements for EQ training, control of purchases of qualified equipment, and control of design changes to assure proper EQ consideration.

Overall responsibility for the EQ program lies with the Senior Vice President, Nuclear Engineering and Operations. Specific responsibility for overall coordination, development, and implementation of the program rests with the Vice President, Generation Engineering and Construction. These individuals are knowledgeable with respect to the program and are committed to its continued success.

In the NRC's July 6, 1988 inspection report, the Staff specifically found that NNECO has implemented its program in compliance with 10 CFR 50.49. The NRC identified one violation, which it classified as Severity Level IV.

In addition, the Staff identified four potential violations and three unresolved items. In terms of both the number of potential deficiencies and the low safety significance of those items (as discussed below), NNECO believes that the EQ Program at Millstone Unit No. 3 has been effective and compares favorably to EQ programs throughout the industry. The deficiencies identified are isolated in nature and do not reflect any programmatic weaknesses.

The following discussions of each enforcement item separately address the questions raised by the NRC in the July 6, 1988 inspection report.

ISSUE NO. 1

(RAYCHEM SPLICES)

A. STATEMENT OF THE ISSUE

NRC Inspection Report Issue 50-423/88-04-06 states, "A review of licensee walkdown records for Raychem splices indicate[s] additional nonconforming conditions involving excessive splice bends (less than the recommended 5 X cable outside diameter) and splice seal length areas of less than 2 inches." According to the Staff, these deficiencies constitute a potential violation of 10 CFR 50.49 in that the splices were not qualified per the instruction procedures in effect at the time of the installation. In addition, the Staff has issued a Notice of Violation proposing a Severity Level IV violation for Raychem splices installed over braided cable jacketing, contrary to the Raychem installation procedures.

B. NNECO POSITION REGARDING THE EXISTENCE OF A VIOLATION

NNECO admits the proposed violation regarding installation of Raychem splices over braided cable jacketing and will provide its written response in accordance with 10 CFR 2.201.

NNECO does not agree that the walkdown records indicate that the Raychem installations had splice lengths less than two inches.

NNECO also does not agree with the Staff's conclusions that installation of Raychem splices with a bend radius less than 5 x the cable outside diameter was contradictory to the Raychem procedure/instructions existing at that time.

NNECO followed existing procedures with regard to these installation at the time the plant went into operation.

In the event the Staff concludes that its assertions are valid, NNECO maintains that the alleged deficiencies should be treated as further examples of the deficiency already addressed in the Severity Level IV Notice of Violation (NOV) issued in Inspection Report 50-423/88-04. A separate violation on these related issues would not be warranted.

Further, should the Staff decide that a separate NOV is appropriate regarding the potential violation based on the information provided below, NNECO believes that the issue has no safety significance. The lack of safety significance of this issue and other relevant factors are discussed below.

C. BASIS FOR DENYING THAT A DEFICIENCY EXISTED

Bend Radius

The original installation of the splices was made in accordance with Millstone 3 Electrical Installation Specification No. E-350. This

procedure stated that Raychem installation instructions shall be in accordance with Raychem's "Product Installation and Inspection Guide - WCSF-N Heavy Wall, Flame Retarded Nuclear Cable Sleeves" - PII-57100-A and installation instructions provided with each kit. E-350 also states that QC shall verify (in accordance with specifications) that proper Raychem components are used, manufacturer's installation instruction have been followed, and an acceptable splice has been made.

During the time at which Raychem Product Guide PII-57100-A (November 1982) was in effect, Raychem did not provide bend radius acceptance criteria. Accordingly, contrary to the inspection report findings, the Raychem installations were made in accordance with procedures in existence at this time. Upon issuance of NRC Information Notice 86-53 (June 26, 1986), NNECO took reasonable and prudent actions to address the issue. Bend radius criteria were first published in PII-57100-D (November 1987).

Seal Length

Contrary to the NRC inspection report, NNECO's review of walkdown records does not reveal any instances where Raychem splices with less than 2 inch seal lengths exist. QC witnessed the installation of some of the splices and did not note any such seal length deficiencies. NNECO has no other indications that such seal length deficiencies exist. Therefore, NNECO denies that the alleged seal length deficiency existed. It should be noted that after issuance of Information Notice 86-53, where this issue was raised, NNECO took reasonable and prudent actions to address it.

D. SAFETY SIGNIFICANCE FINDINGS

These issues have no safety significance because:

1. March 1987 testing has established that application over braid, a bend radius much less than 5 x the outside diameter, and seal lengths much less than 2 inches are qualified configurations. Accordingly, no replacements or modifications of the components were required to establish or maintain qualification.

2. Similar enforcement actions at Ginna (June 10, 1987), Haddam Neck (April 1, 1988), Grand Gulf (March 25, 1988), and North Anna (April 19, 1988) did not have significant safety implications in that the enforcement actions were categorized at a Severity Level IV.

E. OTHER FACTORS THAT SHOULD BE CONSIDERED

1. Notwithstanding the final determination regarding the existence of a violation, craft personnel have received additional training to emphasize the importance of following procedures during component installations.

2. In addition to the above, specific Raychem training was provided by Raychem personnel to ensure that installations were correct.

3. The EQ file was revised prior to the inspection to include test data (dated March 1987) that confirms the qualification of Raychem splices with over braided cable jacket, splices less than a 2-inch seal length and less than 5X outside diameter splice bends. The Staff has concurred with the acceptability of the March 1987 report to further establish qualification. (See Inspection Report 50-423/88-04, at p. 21.)

ISSUE NO. 2

LITTON-VEAM

(INSULATION RESISTANCE (IR) MEASUREMENTS)

A. STATEMENT OF THE ISSUE

NRC Inspection Report Issue 50-423/88-04-05 states that "[t]he inspector was concerned that low IR values during LOCA test could be the result of moisture penetration into the seal. Due to a lack of IR measurements during the LOCA transient conditions, the worst-case IR measurements and hence leakage current could not be established, thus making it impossible to determine the contribution of the connectors to the instrument loop accuracy under a LOCA environment . . . . Thus, for the Litton-Veam multipin connector assemblies installed on instruments located inside containment, the licensee did not adequately establish the equipment performance standards in the test acceptance criteria and did not provide adequate evidence that this equipment would perform its intended function for all service conditions postulated to occur during the qualified life."

B. NNECO'S POSITION REGARDING THE EXISTENCE OF A VIOLATION

NNECO agrees that IR measurements were not taken during LOCA transient extremes and that inappropriate performance standards were used during the evaluation of Litton-Veam qualification test results. This deficiency resulted in insufficient evidence (at the time of the NRC inspection) to fully support an EQ file conclusion that certain

Litton-Veam (L-V) connectors were qualified for a 40-year life. NNECO does not contest this potential violation.

As discussed further below, NNECO believes that because the IR concerns do not apply to un-aged connectors, these connectors were in fact qualified both for their present installed life and for the near term. Moreover, because the associated components would have performed their intended function, there was no resultant safety significance.

C. SAFETY SIGNIFICANCE

This issue is not safety significant because:

1. At a March 21, 1988 meeting, NNECO and the Staff agreed that IR degradation did not unacceptably affect un-aged connector performance requirements. Further, until significant aging of the connector has occurred, NNECO and the Staff agreed that there is reasonable assurance that existing equipment will perform its intended function if called upon to operate in a harsh environment. In that Millstone Unit No. 3 did not receive its full-power operating license until January 1986, the installed connectors have to date not been sufficiently aged so as to affect performance requirements for accuracy to a degree that renders them unqualified. NNECO acknowledges that a definitive long-term qualified life cannot be determined with current test results. However, NNECO also believes that it is reasonable to conclude that the second refueling outage is not beyond qualified life. (See Item 2 below). This will

take place when the connectors have experienced 36 months of service life. At that time the connectors will not have aged more than 1.6_% of end-of-life condition calculated at normal maximum average service temperature.

2. The Staff has previously concurred with NNECO's decision to replace the connectors during the refueling outage currently scheduled for June 1989. This supports NNECO's conclusion that the connectors are still qualified and functional, and that there is no safety significance in using the connectors until replacement.

3. A similar enforcement action at Sequoyah (June 17, 1987) resulted in the aggregation of eight items as a Severity level IV, one of which was failure to meet loop accuracy requirements for Eaton multiconductors signal cables, reflecting no significant safety implications.

D. ROOT CAUSE

The root cause for the L-V testing deficiency is an isolated failure to sufficiently incorporate IR measurements in the testing program and adequately consider the effect of IR changes in determining qualification and qualified life.

E. CORRECTIVE ACTIONS/ACTIONS TO PREVENT RECURRENCE

1. NNECO will take extensive corrective action by replacing the affected Litton-Veam connectors (i.e., 43) with qualified

feed-through devices during the June 1989 refueling outage. This is a conservative action in that we believe that additional testing would likely have justified an extended qualified life.

2. NNECO believes that continuing training addressing the evolving level of knowledge regarding the use of IR data will ensure that appropriate IR requirements are considered during future testing.

F. OTHER FACTORS THAT SHOULD BE CONSIDERED

1. As previously stated, NNECO has conservatively agreed to replace certain affected connectors at the next refueling outage, even though we do not believe that their qualified life will be exhausted at that time.

2. This deficiency was isolated in that a single root cause affected only one type of component. The deficiency identified related only to connectors used in instrument loop applications subject to a LOCA environment.

3. NNECO did establish acceptance criteria prior to testing, but later determined that the criteria were not applicable to the intended use of the connectors in instrument loop circuits.

4. The issue of loop accuracy is an evolving issue which has only recently been fully addressed by either the Staff or industry.

ISSUE NO. 3

LITTON-VEAM (CONFIGURATION)

A. STATEMENT OF THE ISSUE

NRC Inspection Report Issue 50-286/88-04-07 states that "[d]uring the test plan review (NTS QPP No. 558-1657, Revision 1), the inspector observed that the test specimens were prepared following an assembly procedure, VAP 241. This procedure required that heat shrink tubing be applied over the contact wire crimped termination before potting the rear of the connector with epoxy. The licensee's Electrical Installation Specification No. E-350, which was in place from the initial commencement of installation of the connectors on March 6, 1984, until its cancellation on March 26, 1984, did not incorporate the heat shrink tubing over the pin/conductor interface . . . . Of the 21 connectors identified [without heat shrink tubing] only two cases were found that were required to remain functional to mitigate a LOCA/HELB event. These two cases involved position indication for two containment isolation valves."

B. NNECO'S POSITION REGARDING THE EXISTENCE OF A VIOLATION

NNECO agrees that 21 Litton-Veam connectors were found in a configuration for which qualification had not been established. As further discussed below, the safety significance of this finding is minimal.

C. SAFETY SIGNIFICANCE

This issue has minimized safety significance because:

1. Analysis reflects that virtually all components associated with these connectors were qualified for their environments and, as a practical matter, some could likely be removed from the EQ Master List. Discussed further below are specific safety significance findings regarding the 21 connectors. At bottom, only two cases (four connectors) were found where the equipment (see item e below) would have been required to remain operable to mitigate the event causing the local harsh environment. For these two cases, the failure would not have impacted operation of the associated valves, but only valve position indication.

   a. Several connectors and associated limit switches provide (a) isolation of component cooling water (non-safety related return sub-header on a containment isolation Phase A signal (CIA) on a loss of power signal); (b) isolation of redundant reactor plant component cooling water flow (to the Train A non-safety related return sub-header on a CIA and/or loss of power signal); and (c) isolation of Train A/B reactor plant (non-safety related supply sub-header on a CIA signal and/or a LOP signal). The connectors are not located inside containment and are not in a moisture environment. A one-time HELB is postulated for these connectors. However, the Millstone Unit No. 3 design basis does not analyze a one-time HELB in the area of the connectors concurrent with an inside containment HELB. Therefore, the

connectors would have remained functional throughout an inside containment design basis accident or would not have been required to mitigate an accident while in a moisture environment.

b. Several connectors (located outside containment) involve the operation of the charging pump cooling pumps. These pumps are required whenever the charging pumps must operate. A one time HELB is postulated for the affected connectors. However, the HELB is not postulated coincident with an inside containment LOCA or main steam line break (MSLB). Therefore, either the connector will not be in a moisture environment when required to respond to an inside containment design basis accident (for a LOCA and MSLB) or will not be required to mitigate an accident while in a moisture environment.

c. Certain connectors in conjunction with level switches monitor reactor plant component cooling water surge tank level, split flow to the reactor coolant pumps and shut the supply/return valves to the containment air recirculation cooling coils and neutron shield tank coolers on low surge tank level. The connectors/switches are located outside containment in a non-moisture environment. They are postulated to experience a one-time HELB. In that the HELB is not postulated to occur concurrent with a requirement to isolate containment (due to a LOCA), the ability of the connectors/switches to perform intended safety functions has not been impaired. In addition,

these level indication switches provide a control function only. Failure does not provide misleading information and, according to EOPs, would have resulted in the operator utilizing alternate level indication.

d. Certain connectors in conjunction with pressure switches isolate Trains A/B service water system supply to the turbine plant component cooling water (TPCCW) system (closes TPCCW heat exchangers tube side inlet isolation valves on low Train A/B service water header pressure on a Train A/B containment depressurization activation and/or loss of power signal). The connectors are not located in a moisture environment (outside containment) and are postulated to be exposed to a one-time HELB. However, the one-time HELB is not postulated concurrent with an inside containment design basis accident. Therefore, as with several other connectors previously discussed, the connectors will either be able to perform intended functions or will fail without being required to mitigate a design basis accident.

e. Four connectors are associated with providing nitrogen charge to the pressurizer relief tank, and maintaining a supply of primary grade water to the pressurizer relief tank, the reactor coolant pump level standpipes and the neutron shield tank cooling system. These connectors are located inside containment and reasonable assurance that these connectors

would not fail in the event of a LOCA or MSLB was not provided by the qualification file. However, it should be noted that the associated limit switches impacted by such a failure provide only valve position indication. The functioning of associated valves would not be affected should the connectors fail.

2. In a NOV dated November 19, 1987 against the Maine Yankee Atomic Power Company (MY), the NRC cited MY for failing to provide a similarity analysis between the tested specimen and installed connectors (configuration). This NOV was categorized as a Severity Level IV. We believe that the finding at Millstone Unit No. 3 is similar to the MY NOV in that a similarity analysis should have been provided to address connectors without heat shrink tubing. We also believe that the Millstone Unit No. 3 finding is certainly no more safety significant than the MY enforcement action.

D. ROOT CAUSES

1. An engineering design/Stone & Webster interface failure to ensure that a design intent was included in an installation procedure.

2. An engineering design failure to include in the test program adequate requirements to demonstrate operability of connectors without heat shrink tubing being applied and subsequent misapplication of the test report.

E. CORRECTIVE ACTIONS/ACTIONS TO PREVENT RECURRENCE

1. Promptly after it was determined that certain connector configurations had not been fully analyzed, NNECO performed an operability evaluation, modified administrative controls, and "caution tagged" the two affected valves. Position indication for the two valves is assured by tagging them closed except when needed to be opened. This provides continuous administrative verification of valve position.

2. After issuance of a stop work order on March 26, 1984, to terminate installation without heat shrink tubing, the installation procedure was promptly revised (by April 5, 1984). Prior to implementing the procedure to require the correct installation configuration, craft and engineering personnel were retrained.

3. NNECO met on March 27, 1984 with Stone and Webster to discuss requirements for heat shrink tubing. After significant discussion, a revised procedure was initiated to require the use of heat shrink tubing. Additionally, it was decided that connectors without heat shrink tubing would be included in an upcoming qualification test program to demonstrate connector qualification without heat shrink tubing. However, in retrospect, this testing did not resolve the issue of concern.

4. From that time forward, all subsequent Category I engineering and design change requests (E&DCRs) were required to be reviewed by EQ personnel prior to implementation. The plant was also walked-down

100% to verify visually EQ attributes to ensure that they were in accordance with engineering design requirements.

5. NNECO believes that continuing training regarding the use of test data will ensure that appropriate parameters are included in future testing and test results evaluation.

6. The four connectors used for containment valve position indication will be replaced with new connectors with heat shrink tubing during the next refueling outage.

F. OTHER ISSUES THAT SHOULD BE CONSIDERED

1. The deficiencies were of minimal or no safety significance.

2. Once the deficiency was discovered, NNECO took prompt actions by analyzing operational considerations and proposing corrective actions.

ISSUE NO. 4

GENERAL ATOMICS (GA) HRRM

A. STATEMENT OF THE ISSUE

NRC Inspection Report Issue 50-423/88-04-02 concerns GA HRRMs installed in containment prior to the licensing of Millstone Unit No. 3. The Inspection Report states that "there are indications that the GA HRRMs were qualified when installed and prior to licensing of the Millstone Unit No. 3 facility." However, in light of information from the vendor (dated November 6, 1986) indicating IR problems with the HRRM cable assembly, the Inspection Report states that "it appears that the licensee was still in the process of evaluating the qualification . . . at the time of this inspection. The licensee apparently has not followed the guidelines of the NRC Generic Letter 86-15. The licensee has assumed that the GA HRRM is operable until the vendor information is confirmed."

B. NNECO'S POSITION REGARDING THE EXISTENCE OF A VIOLATION

NNECO's position is that this item does not presently represent a violation of 10 CFR 50.49. NNECO had adequate documentation in the GA HRRM file to qualify the components at the time of their installation. NNECO subsequently analyzed additional vendor information and concluded that the equipment is still qualified. To the extent that there are still any open issues regarding these analyses, this item should be more properly classified as an unresolved item rather than as a potential violation.

Should the Staff maintain that a violation exists, NNECO believes that the deficiency has no safety significance for Millstone Unit No. 3.

C. FACTORS SUPPORTING NNECO'S POSITION

As previously stated, the two GA HRRMs were considered qualified at the time they were installed. The inspector reviewed NUSCO engineering assurance audit Finding No. 3-10, contained in Memorandum No. 1103866 (dated July 24, 1987), which incorrectly suggested that the GA HRRMs were being qualified while in use. However, this finding was addressed in NUSCO memo GSP-87-387, B.A. Tuthill to B. S. Kaufman (October 29, 1987). NNECO has taken and continues to take the position that the GA HRRMs installed at Millstone Unit No. 3 were qualified. This conclusion was restated in NNECO's letter to the NRC, B12671, E. J. Mroczka to U.S. Nuclear Regulatory Commission, dated September 30, 1987.

The current issue addresses IR uncertainties addressed in post-startup information supplied by the vendor, Sorrento Electronics (Sorrento). Specifically, the cable used in connecting the detector output to the containment penetrations (Rockbestos RSS6-104) exhibited undesirable characteristics at LOCA temperatures. At these temperatures, the electrical IR decreases, increasing cable leakage currents which in turn would reduce indicated radiation levels. The issue was first raised in Northeast Utilities letter GSP-86-570 to Sorrento, J. S. Nicosia/ W. J. Hayes to Zvi Rendel (dated October 14, 1986). In that letter, NNECO identified IR concerns and sought justification for the factor of 2 accuracy of the HRRM system. Sorrento responded on November 6, 1986.

This information adequately addressed the issue for Millstone Unit No. 3 and confirmed qualification of the GA system.

Subsequently, in February 1987, Sorrento issued a Part 21 notification of cable IR deficiencies. Following notification of this potential problem, NNECO implemented a Sorrento calculational methodology to evaluate the Rockbestos coaxial cables used in the GA HRRMs for Millstone Unit No. 3. (A detailed chronology of NNECO's efforts in this regard is attached.) Using that methodology, the calculated overall loop accuracy equated to a maximum error of <1 R/hr. Thus, the factor of accuracy for this equipment specified in Regulatory Guide 1.97 is met.

With respect to the issues raised in the July 6, 1988 inspection report (i.e., compliance with 10 CFR 50.49), NNECO considers that the HRRMs are qualified. To the extent that there are open questions regarding this conclusion, this item should be regarded as an unresolved issue rather than a potential violation.

NNECO has followed procedures analogous to those outlined in the Generic Letter 86-15 for addressing the potential EQ deficiency. Specifically, as indicated by the chronology of events, NNECO has in a timely fashion addressed the new information and concluded that the equipment is in fact qualified. Pending this determination, NNECO prepared and maintained a JCO only as a conservative approach to be utilized if continued qualification could not be shown. However, this JCO was never implemented.

In this situation, NNECO properly undertook an evaluation to assess the impact on qualification status and to assess reportability. NNECO

maintains that it was not required in this instance, upon receipt of vendor information, to assume that the HRRMs were not qualified (given that they were already considered qualified). NRC regulations in 10 CFR Section 50.72 and 50.73 inherently recognize the time allowed for this evaluation and do not call for interim reports to the NRC of "potentially reportable" conditions. NNECO ultimately completed its reportability evaluation and concluded that this event was not reportable under 10 CFR 50.72 or 50.73.

D. SAFETY SIGNIFICANCE

NNECO has concluded that this item has no safety significance. The GA HRRMs are located inside containment. They are used to detect post-accident radiation levels between 1 R/hr and 10 million R/hr. Any unsatisfactory IR at elevated temperatures could lead to a reduction in the indicated radiation levels at low ranges under certain conditions. However, NNECO has concluded for the following reasons that the HRRMs remain operable and would not mislead the reactor operator.

1. The principal function of these monitors is to assist in making emergency assessment determinations. In this regard, NNECO has performed a conservative evaluation of the HRRM readings under maximum postulated containment temperatures, taking into account cable and penetration current leakages. The Millstone Unit No. 3 HRRMs meet Regulatory Guide 1.97 guidelines, even with maximum potential biases due to reduced cable insulation resistance following a LOCA or MSLB.

2. At the time when assessment of plant conditions would be made in accordance with established (plant-specific emergency action levels) guidance, either containment temperatures are not predicted to be elevated (and, thus, these biases do not exist) or indications independent of the HRRMs (i.e., elevated temperature, reactor coolant system level, and leak rate indications) provide appropriate information to permit valid assessment of plant conditions. Most importantly, determinations concerning public protective measures based even in part on containment radiation levels occur at such high containment radiation levels that the potential biases would be undetectable.

3. In addition, alternative means are available to determine fuel conditions and containment curie inventories. The primary alternative method involves radiation monitors located outside the containment sensing through penetrations. Also, post-accident sampling system samples, process monitors outside containment, and thermal hydraulic parameters provide information that permits assessment of fuel conditions and/or curie inventory.

4. Finally, although they provide no automatic control function, the monitors are used at Millstone Unit No. 3 in making certain decisions under the emergency operating procedures. For Millstone Unit No. 3 there is a decision point at 1 x 105 R/hr for assessing environmentally qualified electrical equipment instrument accuracy. NNECO has concluded that the HRRM biases in the ranges of those

decision points are negligible and, thus, the HRRMs fulfill these functions.

In addition, recent enforcement history in a similar case indicates that this issue has low safety significance. In similar circumstances, the NRC has classified a violation regarding GA HRRM qualification deficiencies as a Severity Level IV. In an enforcement action involving Tennessee Valley Authority's Sequoyah Units 1 and 2 (June 17, 1987), the Staff found that the licensee had not adequately established qualification for GA Technologies RD-23 radiation detectors and the associated Brand-Rex coaxial cable. This was one of eight qualification deficiencies collectively categorized as a Severity Level IV violation. NNECO concludes that the circumstances in the present case are certainly no more significant, and probably less significant given that there is less equipment involved.

E. OTHER CONSIDERATIONS

Inspection Report 50-423/88-04 also includes two unresolved items that relate to the HRRMs. NNECO believes that these items can be resolved.

1. Item No. 88-04-03. This item concerns the potential for an error of about 1.7 rad/hr. over the entire range for the GA HRRMs. The NRC inspector observed that this error "could lead to the detector going off-scale at the low end and the green 'operate' light going off. This could result in subsequent high radiation readings which could confuse the operator even though the readings were accurate."

NNECO committed to revising the operations procedure number OP-3362, "Radiation Monitor System Display and Control System," to address this concern. The revision was completed May 10, 1988. In addition, NNECO committed to incorporate this HRRM alarm response into the Control Room Operator Requalification Training Program and to notify control room operators of the potential problems. These training activities have been accomplished. Therefore, this unresolved item should be closed.

2. Item No. 88-04-01. This item concerns NNECO's procedure NEO 2.25, "Identification and Implementation of NRC Reporting Requirements," and the need to "proceduralize the licensee's JCO process." The Staff was concerned that NEO 2.25 did not contain an express provision requiring preparation of a JCO when a "potential EQ deficiency" is identified. At the exit meeting NNECO stated that it would consider adding directions in the procedure NEO 2.25 to address the need for JCOs for EQ deficiencies.

NNECO does have controls in place to assure adequate evaluation and timely corrective action of identified nonconformances to include equipment governed by technical specifications that has been determined to be inoperable for any reason.

NNECO notes that, well prior to the NRC inspection, a program to strengthen procedural controls regarding EQ was begun. As part of this program, a 1987 internal audit suggested that NNECO's procedures be clarified regarding preparation of JCOs in the event of

identified EQ problems. In response to this internal audit, NNECO has concluded that the need to prepare JCO's are not issue specific and could relate to concerns other than EQ. Therefore, this concern can best be addressed generically in existing NEO 2.25 on reportability.

NNECO has prepared a draft revision of NEO 2.25 to clarify that a JCO will be prepared in appropriate cases. Note, however, that NNECO does not contemplate preparing a JCO for equipment simply if there is information suggesting a possible qualification deficiency. Rather, where NNECO no longer has reasonable assurance of qualification of the equipment, appropriate action, such as preparation of a JCO, will be initiated. The revised NEO 2.25 is currently undergoing internal NNECO review, and is expected to be issued shortly.

UNRESOLVED ISSUE

A. STAT[illegible] OF THE ISSUE

N[illegible]ion Report unresolved issue 50-423/88-04-04 addresses the re[illegible] of the EQ file for Target Rock solenoid operated valves (SOVs). The inspectors were specifically unable to determine if IE Notice (IEN) 84-68, "Improperly Rated Field Wiring to Solenoid Valves," had been addressed for the Target Rock SOVs at Millstone Unit No. 3. In addition, the Staff requested formal documentation of calculations considering the impact on aging calculations of self-heating.

B. NNECO's RESOLUTION

NNECO has previously completed an investigation to determine the applicability of IEN 84-68 for Millstone Unit No. 3. The results of the investigation were documented in a letter, NES-38528, dated May 15, 1985. In part, it stated:

> Solenoid valves manufactured by Target Rock are not impacted. Target Rock has performed a test showing that the internal temperature rise is less than the rating of the field wiring (Reference Target Rock Test Report TRP 4207).

Field wiring at Millstone Unit No. 3 has been determined to be qualified for forty years when applied within its temperature rating. Therefore,

the field wiring which terminates on normally energized Target Rock solenoids is qualified for forty years at Millstone Unit No. 3.

NNECO will add NES-38528 to EQ File Number 654 to complete the documentation and resolve this issue. In addition, formal documentation of aging calculations considering self heating are also being added to the EQ file to close this issue.

SUMMARY

In summary, from the foregoing, NNECO maintains that the Staff inspection findings associated with Litton-Veam connectors and Raychem installed over braided jacketing constitute violations of NRC requirements. However, these violations have minimal safety sigificance, and accordingly, do not individually or collectively warrant escallated enforcement action.

NNECO maintains that all EQ equipment at Millstone Unit No. 3 is presently qualified for the current application, with the exception of four Litton-Veam connectors associated with two valves. NNECO has placed appropriate controls on those connectors until they can be replaced. NNECO acknowledges that certain other Litton-Veam connectors are not qualified for a forty year life, and accordingly, NNECO will replace that equipment at the next refueling outage. However, that equipment is presently qualified and operable.

NNECO notes that while its efforts to implement an effective EQ program at Millstone Unit No. 3 have generally been successful and demonstrate dedication to EQ excellence, there are still some areas needing improvement. NNECO has learned that in EQ, as with all important safety programs, success means a continued effort throughout the life of the plant.

MILLSTONE UNIT NO. 3
CONTAINMENT AREA
HIGH-RANGE RADIATION MONITORS (HRRMs)

CHRONOLOGY OF EVENTS

01/24/86 - NNECO Special Report MP-8655, W. D. Romberg to Dr. Thomas Murley--Subject: Containment Area High-Range Radiation Monitors.

04/28/86 - GA HRRM installation and calibration completed; monitors declared operational.

10/14/86 - NUSCO Memo GSP-86-570, J. S. Nicosia/W. J. Haynes to Zvi Rendel (Sorrento Electronics)--Subject: Request for Resolution of General Atomic HRRM Qualification Ambiguities. (Note: Identifies cable IR value discrepancy based on Rockbestos Report QR-6802.)

11/06/86 - Sorrento Electronics (SE) letter to W. J. Haynes--Subject: Justification of Environmental Qualification of GA Technologies HRRM for MNPS Unit 3. (Response to GSP-86-570; includes cable IR justification and overall accuracy evaluation.)

02/27/87 - SE letter, T. A. Moshenrose to C. H. Clement--Subject: Defective Coaxial Cable. (Note: Initial 10CFR21 notification.)

03/04/87 - MP3 received Sorrento letter dated February 2, 1987. (Note: Reasonable assurance of continued qualification provided by SE letter of November 6, 1986.)

03/06/87 - Millstone Station Controlled Routing 6611 opened to evaluate impact on MP1, 2, and 3.

03/10/87 - MP3 Engineering received CR 6611. Contacted Tom Moshenrose, Sorrento Electronics for additional information. Began collecting drawings, calculations, quality assurance test reports, etc.

03/12/87 - SE letter to C. H. Clement--Subject: Update on HRRM Cable Problem. (Includes technical note with limited cable IR information; states that "SE has not found a solution.")

03/24/87 - SE letter to C. H. Clement from T. A. Moshenrose--Subject: Heat Transfer Methodology for HRRM Cable Acceptability Determination. (Includes first model for analysis of cable response.)

03/24/87 - Opened MP3 Commitment 3-87-0031 to track HRRM cable analysis and response.

04/06/87 - MP3 received SE letter dated March 24, 1987. Started Calculation 3-ENG-094.

04/09/87 - SE letter to C. H. Clement from T. A. Moshenrose--Subject: Revised Heat Transfer Methodology. (Includes revised heat transfer model.)

04/16/87 - MP3 received SE letter dated April 9, 1987. Revised Calculation 3-ENG-094, Rev. 1, to incorporate better model.

04/23/87 - Completed review and approval of MP3 Engineering Calculation 3-ENG-094, Rev. 1--HRRM Cable Operability Determination. (Note: Assurance of cable qualification confirmed.)

05/18/87 - Letter MP-3-928, C. H. Clement to S. Scace. Closed MP3 response to CR 6611.

05/19/87-07/20/87 - NUSCO QA Engineering Assurance Audit (A-30123) of EQ Program.

05/21/87 - MP3 Commitment 3-87-0031 closed.

05/22/87 - Received SE letter dated May 18, 1987, requesting copies of calculations for Millstone units.

05/28/87 - C. H. Clement Letter MP-3-940 to SE forwarded Calculation 3-ENG-094, Rev. 1.

06/29/87 - NUSCO Memo GSP-87-198, B. A. Tuthill/W. J. Haynes to M. F. Samek--Subject: Request Loop Accuracy Calculation for MP3 GA HRRMs.

07/24/87 - NUSCO QA Memo 1103866, V. Papadopoli to J. R. Ferraro--Subject: Report on EEQ Program Audit (A-30123). (Note: Finding 3.10 addresses MP3 HRRMs and is source of potential violation.)

9/30/87 - NNECO letter (B12671) to NRC, stating that the two GA HRRMs satisfied the provisions of Regulatory Guuide 1.97, Rev. 2 and the requirements of 10 CFR 50.49.

10/29/87 - NUSCO Memo GSP-87-387, B. A. Tuthill to B. S. Kaufman--Subject: Response to EEQ Program Audit (A-30123) Findings.

01/13/88 - NUSCO Memo GIC-88-052, D. Robinson to B. A. Tuthill--Subject: MP3 General Atomic HRRM Total Probable Error Calculation (Calc. No. PA-79-236-851-GE, Rev. 1).

01/14/88 - NUSCO Memo QSD-88-5008, B. S. Kaufman to B. A. Tuthill--Subject: Status of Engineering Assurance Audit A-30123, EEQ Program. (Note: Accepted response to Finding 3.10.)

02/02/88 - NUSCO Memo GSP-88-035, P. M. Blanch to R. A. Crandall/E. J. Molloy--Subject: MP1, 2, & 3, and CY HRRM Uncertainty.

02/09/88 - NNECO Radiological Assessment Branch and Generation Electrical Engineering review/approval of reportability evaluation for REF. No. 87-21, Containment High Radiation Monitors. (Note: This evaluation covers MP1 and 2 and CY in addition to MP3.)

03/14/88- - NRC Inspection No. 50-423/88-04, MP3 EQ Audit.
03/18/88