U. S. NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NOS: 50-245/94-11
50-336/94-08

LICENSEE: Northeast Nuclear Energy Company
Waterford, Connecticut

FACILITY: Millstone Nuclear Power Station, Units 1 and 2

DATES: April 4-22, 1994

INSPECTOR: R Bhatia 6-10-94
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Area Inspected: This was an announced inspection to review the corrective actions taken to address electrical distribution system functional inspection (EDSFI) team unresolved items. In addition, two issues regarding the reserve station service transformer load shedding under accident conditions and a shutdown panel low pressurizer pressure indication discrepancy were also reviewed by the inspector.

Results: Of the 13 open items reviewed, eight Unit 1 and four Unit 2 unresolved items were closed. The remaining item regarding the voltage for the motor control centers control circuits was left open. In general, the calculations and analyses developed to address these issues were technically sound and thorough. The status of these items is summarized as follows:

MILLSTONE UNIT 1 UNRESOLVED ITEMS

Item No.	Title	Discussed in Paragraph	Status
91-81-01	345 kV grid stability studies	2.1	Closed
91-81-02	23 kV grid stability studies	2.2	Closed
91-81-03	Adequacy of fast transfer scheme	2.3	Closed
91-81-09	Violation regarding the qualification of ventilation system cooling coil units.	2.4	Closed
91-81-12 & 93-20-01	Violation regarding the failure to perform the biennial review of procedures.	2.5	Closed
91-81-14	Lack of heat load calculation for the gas turbine building.	2.6	Closed
91-81-15	Inadequate periodic testing of molded case circuit breakers (MCCBs).	2.7	Closed

MILLSTONE UNIT 2 UNRESOLVED ITEMS

93-81-03	Incomplete emergency diesel generator loading calculations.	3.1	Closed
93-81-10	Maximum calculated intake structure temperature differs from Final Safety Analysis Report (FSAR).	3.2	Closed

93-81-11	Maximum calculated high-voltage switchgear room temperature differs from the temperature stated in the FSAR.	3.3	Closed
93-81-13	Violation regarding EDG testing.	3.4	Closed
93-81-15	Insufficient pickup voltage for motor control centers control circuits.	3.5	Open

OTHER ISSUES REVIEWED

1. Design modification for the reserve station service transformer (RSST) load shedding under loss of coolant accident (LOCA) conditions PDCR 1-023-94.

2. Hot shutdown panel pressurizer pressure low range indication calibration (work order WO M2 93-04917).

DETAILS

1.0 PURPOSE

The purpose of this inspection was to review the adequacy of the licensee's corrective actions to address the unresolved items identified during the Nuclear Regulatory Commission (NRC) electrical distribution system functional inspections (EDSFIs) for Millstone Station Units 1 and 2. The inspector also reviewed the licensee's corrective actions, taken in response to the Notice of Violations transmitted with the EDSFI reports, as documented in the licensee's response letters, dated February 10, 1992, and July 26, 1993, for Units 1 and 2, respectively. In addition, two issues regarding the reserve station service transformer load shedding under loss of coolant accident (LOCA) conditions and a shutdown panel low pressurizer pressure indication discrepancy were also reviewed.

2.0 MILLSTONE UNIT 1 INSPECTION ITEMS

2.1 (Closed) Unresolved Item 91-81-01, 345 kV Grid Stability Studies

The EDSFI team reviewed several Northeast Utilities Power Pool load flow and stability studies, which were completed in 1979, to verify that the offsite power for Millstone Unit 1 was reliable and stable. The team noted that the studies had not been recently updated, and made the update of the stability study an unresolved item. The licensee addressed this unresolved item by developing a four-part report titled, "Review of the Effect of Changes Within NEPOOL On 345 kV System Stability at Millstone Station, Parts I, II, III, and IV." The licensee provided additional information regarding the grid stability in a letter to the NRC, dated January 13, 1993.

This unresolved issue was updated in June 1992, as documented in NRC Inspection Report 50-245/92-15. During the 1992 inspection, Part I of the licensee's grid stability report was reviewed. The grid stability study determined that grid stability was acceptable under normal contingencies, and stressed transfers across the Connecticut East-West interface with all critical elements in service. However, the study indicated that the stressed transfers across Millstone Station output interface was unacceptable. The unacceptable condition was that the three Millstone units could lose synchronization during a double phase to ground fault on the Millstone-Mountville and Millstone Card transmission lines. The analysis also indicated that a combined Millstone Station output of 2680 MW could no longer be supported by the bulk power system without affecting stability. The NRC inspection report stated that the licensee had reported this condition to the NRC and had implemented appropriate administrative controls to prevent the potential for grid instability.

During this inspection, the remaining three parts of the 345 kV system stability study were reviewed. Part II of the study focussed on assessing the impact of extreme contingencies that could occur in the vicinity of Millstone. In addition, this part also reviewed the system behavior with the Millstone Station net generation output of 2620 MW (developed in Part I

review) to determine whether the administrative controls, installed earlier, were sufficient. The study concluded that additional modifications should be installed at the Millstone Station to provide mitigation for extreme contingencies. The inspector reviewed the applicable documentation and noted that the recommended modifications had been installed by the licensee.

Part III of the grid stability report reviewed the 345 kV system stability limits required when all critical system elements supporting Millstone Station were in service. This part of the study confirmed that the flat 2620 MW generation limit for Millstone Station was adequate. In addition, a variable Millstone generation limit was developed for certain New England Power Pool (NEPOOL) conditions. The study also reviewed the applicable planned system changes through 1998. The inspector concluded that this part of the report had adequately addressed the EDSFI concerns.

Part IV of the grid stability report reviewed the feasibility of installing new transmission system hardware to eliminate some or all of the Millstone stability limit administrative controls. This part of the report focused on the installation of a special protection system (SPS) and its affect on the reliability of the bulk power system. This modification was designed to enhance the overall stability margins for normal contingency and extreme contingency conditions. The first SPS modification, for installation of a double line trip detector for Unit 1, was implemented in 1992. The second SPS modification, to install a switchyard breaker failure detection system for Unit 3, was completed in 1993. Part IV of the grid stability study also demonstrated that the bulk power system can withstand the effect of a large load loss and a three-phase fault, with one of the transmission lines out of service. Based upon the results of the Part IV study and installation of two SPS modifications, the net generation limits for Millstone Station were eliminated. The inspector reviewed Part IV of the grid stability study, and concluded that the study was technically sound and the actions taken to remove the generation limits were appropriate.

Based on the above review of the licensee's completed corrective actions concerning the 345 kV stability studies, the inspector concluded that the licensee has adequately addressed the EDSFI concerns. This item is closed.

2.2 (Closed) Unresolved Item 91-80-02, 23 kV Grid Stability Studies

The EDSFI inspection identified that studies to demonstrate the reliability of the 23 kV offsite power source had not been developed. An unresolved item was documented to track the resolution of this issue. This unresolved item was subsequently updated in NRC Inspection Report 50-245/92-15.

The licensee completed an evaluation to assess the reliability of the 23 kV offsite power source (Flanders Line) by analyzing the following cases:

1. Effects on the 23 kV incoming line voltage and frequency, considering a major disturbance in the Card Street 345 kV transmission system;

2. Effect on the 23 kV system voltage and frequency, following a three-phase to ground fault on the nearest 115 kV line to the station (line 1605); and

3. Protection between the five cycles breaker on the 23 kV incoming bus 14G and the eight cycles breaker on bus 14A.

The first case postulated a condition where a three-phase bolt fault occurred on one of the 345 kV transmission lines feeding the Millstone switchyard. The analysis postulated that Millstone Units 2 and 3 were operating at rated output, and Unit 1 had tripped and required a safety injection. The review of the voltage profile at the 23 kV line and 4.16 kV bus motor terminals indicated that, during the fault, the voltages recovered to prefault values with no unstable conditions. The review of the frequency results indicated that the frequency also decays during the fault. The frequency increases to a peak value of 60.13 cycles and then slowly dampens out to 60 cycles, once the fault is cleared. The inspector noted that the safety loads voltage and frequency were adequate to support equipment operation. The inspector concluded that all safety loads would function as designed during this scenario.

The second case assumed the same plant conditions as Case 1, with the exception of the 345 kV transmission fault. In this case, a three-phase to ground fault was assumed on a 115 kV transmission line (line 1605), which is located close to Millstone Station. The inspector noted that the 4.16 kV buses and motor terminal voltages decreased to approximately 0.56 per unit on the 23 kV bus during the fault, and the voltages for the plant electrical system returned to prefault voltage levels with the clearing of the fault. The system frequency increases approximately 60.05 cycles during the fault, and returns to its normal 60 cycles within 3.3 seconds. The results indicated that the motor speeds decreased approximately 4% from the normal running speed and returns to rated speed within 0.4 seconds. The inspector concluded that a 115 kV line fault has a minimal effect on the operation of the plant electrical systems.

The third case evaluated the breaker coordination concerns between the 23 kV breakers (five cycles) and bus feeder supply breakers (eight cycles), associated with the 4.16 kV buses and installed protection systems. The results of the analysis indicated that, under various fault conditions and power supply options, the feeder breakers were adequately coordinated to protect and supply the required loads. The inspector concluded that the breaker coordination was acceptable.

Based on the above review, the inspector concluded that the licensee had demonstrated that the 23 kV system was capable of performing its intended design function to supply the plant electrical loads during both normal and accident conditions. The inspector concluded that the licensee's corrective actions were acceptable and this item is closed.

2.3 (Closed) Unresolved Item 91-81-03, Fast Transfer Scheme

The EDFSI identified a potential deficiency with the fast transfer scheme, which transfers loads from the normal system service transformer (NSST) to the reserve system service transformer (RSST), following a main generator trip. The team noted that the completion time for sending the signal and tripping the Millstone Unit 1 main generator output breaker was longer (8.5 cycles) than previously assumed (four-five cycles). Therefore, the total allowable fast transfer time, including the full six-cycle, fast transfer block signal, was approximately 14.5 cycles. The team was concerned that there may be an unacceptable phase angle difference between the unit running loads and the incoming offsite power source. This condition could damage running safety-related motors. Furthermore, the Class 1E motor specification did not specify a transfer requirement for motor design. The team was concerned that the Unit 1 motors may not be suitable for this type of service. As a result of these concerns, the licensee suspended the operation of the fast transfer scheme, and connected plant loads to the RSST.

The licensee performed a computer simulation of the fast transfer schemes for three scenarios. The licensee also conducted fast transfer scheme testing to verify fast transfer design parameters. The licensee's studies to verify the adequacy of the fast transfer scheme included the following plant scenarios:

- A fast bus transfer of the normal plant electrical loads from the NSST to the RSST;
- A fast bus transfer from the NSST to the RSST, assuming a simultaneous high drywell pressure signal to start the emergency core cooling system loads when the RSST breakers close; and
- A fast bus transfer from the NSST to the RSST, initiated by a three-phase fault on the low voltage winding of the generator step-up transformer.

The licensee conducted tests to more accurately establish the fast transfer time. The test results indicated that the feeder breakers on each 4.16 kV buses (14 A, C, and D) take a maximum of 3.5 cycles from initiation of the fast transfer to open the breakers; the alternative supply breakers from RSST take a maximum of 5.75 cycles, respectively. The switchyard breakers opened a maximum of five cycles.

The simulated-by-computer models of the first two scenarios evaluated indicated the resultant volts per hertz torque value remained less than the 1.33 PU. For the third scenario, the fast transfer would occur with a worst-case volts per hertz value of 1.56 PU. The licensee's contracted with a vendor to determine the volts per hertz capability of affected motors during the fast bus transfer. The analysis assumed data of similar type design motors. The analysis

determined that the Millstone motors can withstand up to 1.8 volt per hertz value, which enveloped the worst-case values found in the above analysis. The licensee concluded that the Millstone motors can withstand the transient voltage condition and mechanical stresses during a fast transfer.

The inspector concluded that the licensee analysis was technically sound and adequately addressed the above concerns. This item is closed.

2.4 (Closed) Violation 91-81-09, Qualification of Ventilation System Cooling Coils

The EDSFI team identified that the emergency diesel generator room cooling system cooling coils were inappropriately replaced with nonsafety-related coils. As part of the corrective action for this violation, the licensee evaluated other safety-related ventilation system replacements for similar discrepancies. This evaluation identified three additional air handling units, associated with the feedwater coolant injection system (HVH-3A, 4A and 5), that had been inappropriately replaced with nonsafety-grade parts. This issue was previously updated in NRC Inspection Report 50-245/93-20. The unresolved item was left open pending the completion of the equipment upgrades.

At the time of this inspection, the licensee had completed the evaluation to upgrade these parts to safety-grade equipment. In addition, the licensee had updated the production maintenance management system (PMMS) data classification for these components to safety-related.

A weld repair was made on the HVH-3A unit without the controls applied to safety-related equipment. Nonsafety Category I inboard/outboard bearings and a rebuilt fan shaft were installed in the HVH-4A ventilation cooling system. In addition, a motor sheave, motor bearings, and a fan sheave (Pulley) were installed in the HVH-5 ventilation system. The licensee did not replace these components with safety grade parts, but documented an analysis to dedicate them for safety-related equipment service. The analysis compared the performance of two other ventilation units to those with the nonqualified parts and weld repair. The licensee found no significant performance differences between the ventilation units. Based on the performance data, the licensee concluded that the non-QA parts and weld repair had no deleterious effects. The inspector reviewed the evaluation and verified that the conclusions were technically sound. The licensee also replaced the nonsafety-related fan motor on the HVH-3A unit with a safety grade motor in April 1993.

Based on the review of the licensee's evaluation of nonconforming parts, revision of quality classification documentation, and the replacement of certain components with safety-related parts, the inspector concluded that the licensee had addressed the above concerns adequately. This item is closed.

2.5 (Closed) Violations 91-81-12 and 93-20-01, Biennial Review of Station Procedures

The EDSFI team identified that over 100 station procedures had not received biennial reviews, as required by Administrative Procedure ACP-QA-3.02D, and issued a violation. In their response to the Notice of Violation, the licensee stated that full compliance with ACP-QA-3.02D would be achieved by December 31, 1992. A follow-up inspection (Inspection Report 50-245/93-20) in September 1993, identified more than 200 station procedures that had overdue biennial reviews and issued a second violation for failure to implement adequate corrective actions. In response to this violation, the licensee committed to full compliance with ACP-QA-3.02D by December 15, 1993.

The inspector concluded that the licensee had made a significant effort to review all outstanding procedures in accordance with the applicable administrative procedures. This conclusion was based on an independent review of the procedures, December 1993 quality assurance audit findings, and discussion with the licensee's staff. At the time of the QA audit, only eight station administrative control procedures were determined to be late for biennial review. The licensee has issued a new Administrative Procedure DC-1, "Developing, Modifying, and Maintaining Millstone Procedure and Forms," Revision 1, on March 3, 1994, to provide additional instructions for performing biennial procedure reviews. To assure that all station procedures had been reviewed, the inspector reviewed the documentation control department computer data base and determined that a total of three procedures (one in each unit) were outstanding. The licensee explained that these procedures were in the process of being rewritten or being superseded.

Based on the corrective actions completed by the licensee and a satisfactory sample review of controlled procedures, the inspector concluded that the licensee has addressed the above concerns adequately. This item is closed.

2.6 (Closed) Unresolved Item 91-81-14, Heat Load Calculations for Gas Turbine Building

The EDSFI determined that adequate heat load calculations were not available to demonstrate that the electrical gas turbine unit (EGT) would operate without heating and ventilation support systems functioning. The licensee's technical staff stated that the building heating and ventilation system was not safety-related and was not required for the operation of the safety-related gas turbine. The licensee stated that they would perform calculations to verify that the EGT would operate under various ambient conditions.

The licensee performed calculation No. 91-105-559M1 to demonstrate that the gas turbine building had adequate passive cooling to maintain the inside temperature within an acceptable temperature band. The calculation assumed an initial building temperature of 92°F in the summer and 0°F in the winter. The calculation also assumed that the exhaust fans were not inservice. The calculation determined that the gas turbine building temperature ranged from 21-116°F. The calculation also evaluated the temperature affect on all safety-related

electrical components located in the gas turbine building and determined that they would not be adversely affected, provided that the building temperature remained within the calculated band. The calculation established that with a gas turbine building temperature between 21-116°F, the gas turbine could perform its intended design function.

Based on the calculation, which demonstrated that EGT operation would not be adversely affected by a loss of gas turbine building ventilation or cooling, the inspector concluded that this issue had been adequately addressed. This item is closed.

2.7 (Closed) Unresolved Item 91-81-15, Molded Case Circuit Breakers Testing

The EDSFI identified that the licensee was not conducting periodic testing of molded case circuit breakers (MCCBs). This item was updated during a NRC inspection in July 1993 (Inspection Report 50-245/93-20). At the time of this inspection, the licensee had developed some test procedures, but had not begun to implement the MCCB test program. The licensee stated that they planned to implement the test program during the January 1994 refueling outage.

The inspector verified that the test program was implemented during the January 1994 refueling outage. The MCCB test program divided the breakers into three groups. The first group of breakers were classified as QA outage-related and are tested every refueling outage. The second group of breakers were classified as QA nonoutage-related and are tested every four years. The third group consisted of all non-QA type breakers, which are tested every four years. The inspector reviewed the results for several breakers tested during the 1994 refueling outage. The inspector concluded that the MCCBs were being adequately tested in accordance with test procedure PT-1421B. The inspector determined that approximately 200 MCCBs out of the total of 1000 breakers had been tested during the last refueling outage.

Based on the implementation of the breaker testing program, the inspector concluded that this issue has been resolved. This item is closed.

3.0 MILLSTONE UNIT 2 INSPECTION ITEMS

3.1 (Closed) Unresolved Item No. 50-336/93-81-03, Emergency Diesel Generator (EDG) Loading Calculation

The EDSFI team identified several nonconservative assumptions used in the EDG loading calculation (calculation PA 79-126-855GE). In addition, the review of a draft loading calculation indicated that a maximum load of the EDG-B was 2842 kW, which was greater than the continuous rating for the diesel generator. The draft calculation also determined that the calculated minimum diesel generator output voltage at sequence Step 1 could drop from 83% to 73% of nominal voltage. This minimum output voltage was slightly less than the

minimum 75% of nominal stated in NRC Regulatory Guide 1.9, "Selection, Design, and Qualification of Diesel-Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants." The licensee provided the NRC team with additional information to demonstrate that the EDGs could perform their design function, as documented in NRC Inspection Report 50-36/93-81. However, the team had several concerns with the technical adequacy of the calculation, and this item was left unresolved pending the licensee's resolution of the team's concerns and finalization loading calculation.

During this inspection, the inspector noted that the licensee had finalized the Millstone Unit 2 EDG loading calculation (PA-79-126-1027-E2, Revision 0). The calculation was issued on January 18, 1993. The NRC concerns were reevaluated by the licensee's specialty engineering groups and were adequately included in this calculation. In addition, the FSAR was updated to reflect the results of this calculation. The following describes the discrepancies identified by the EDSFI, associated with both the steady state and transient loading analysis, and provides the licensee's resolution of these issues:

Steady state concerns:

1. The EDSFI identified that under the worst-case loading condition, the high pressure safety injection (HPSI), low pressure safety injection (LPSI), and containment spray pumps loads were considered as being nonconservative. The revised calculation had adjusted the required load requirements for HPSI, LPSI, and containment spray pumps under worst-case loading conditions by reevaluating the peak brake horse power and considering the manufacturer's certified pump curves data. This concern was adequately resolved.

2. The swing pump loads, such as service water and reactor building closed cooling water (RBCCW) pumps, were not included. The swing pumps would be added to the emergency bus, in addition to the required pumps, for a short time period once a month. This switchover is done to balance run time on the pumps. In regard to the swing pumps loads, the licensee's PRA group reevaluated the swing pump load requirements during this short switchover time period (15 minutes) once a month; the conclusion was that the probability of considering a LNP event, the demand on the EDG would then be 0.25/720 hour, or $3.4E^{-4}$. This was found to be small compared to the calculated unavailability time of an emergency EDG bus of 0.07 from all causes. Therefore, the licensee concluded that the impact of this postulated condition to the core melt frequency was much less than 10^{-7} per year and was insignificant in this case. Therefore, additional swing loads were not included in this calculation. The inspector concluded that the licensee's logic to not include the swing loads was sound and this concern was adequately resolved.

3. The draft calculation did not included cable losses. The revised calculation included adequate cable losses (20 KW).

4. A nonconservative value of the efficiency and power factor for the motor-operated valves (MOV) was considered. The revised calculation included appropriate MOV power factors and efficiency values.

Transient analysis concerns:

1. The draft calculation assumed 4000 V rated motor voltage instead of EDG-rated output voltage of 4160 V to determine the starting kVA of motors. The revised calculation corrected the starting kVA based on 4.16 kV.

2. The calculation assumed 2.0 times the breakdown kW starting horsepower for the EDG in a given sequence load step versus the 2.2 indicated as a typical value for this ratio in Appendix A of IEEE Standard 387, 1984. The licensee provided additional documentation that determined that the assumed 2.0 times the breakdown kW starting horsepower for the EDGs was correct for the Millstone Unit 2 EDGs. The inspector reviewed this evaluation and determined that the licensee's conclusion was technically sound.

3. The EDSFI was concerned that the licensee used two equations for motor-operated valve loads that were not appropriate. The first equation determined pull-in kW by multiplying starting horsepower by a 2.0 multiplier. The second equation determined starting KVA by multiplying starting horsepower by 6.5. In both of these instances, it was found that, while the equations could be justified for continuous duty motors, they were not necessarily reflective of motor-operated valves. However, the MOV's load assumption of continuous duty motor loads was conservative because the calculation considered 100% of the MOV load, while in actuality, only 60% of MOVs would operate at a time. Since the total MOV's load is approximately 2% of the total EDG loading, the licensee assumed that the loads for the MOVs was adequately represented. The inspector concluded that the licensee's assumptions were appropriate.

4. The EDSFI noted that a six-second sequence time interval was used in the calculation. However, Section 4.8.1.1.2 of the technical specifications specified the sequence time interval of 5.5 seconds. The inspector determined that the six seconds sequence time interval in the transient analysis considered by the licensee corresponded to the actual designed sequence and setpoint time of the relays. The licensee explained that the identified 5.5 seconds time in the Technical Specification is considered to be the minimum allowable for testing. The inspector concluded that the use of a 5.5 second interval was acceptable.

Based on the revised calculation, the licensee determined that under a worst-case loading condition the EDG A and B loads would be 2572 kW and 2616 kW, respectively. These loading values are within the continuous rating load of 2750 kW for the EDGs. The inspector concluded that the licensee has adequately addressed the above concerns and has

incorporated the worst-case loads in the EDG loading calculation. Since the worst-case EDG loading indicated 134 KW below the EDG continuous rating, the load assumptions for the MOVs were reasonable, based on the EDG loading conditions. This item is closed.

3.2 (Closed) Unresolved Item No. 50-336/93-81-10, Intake Structure Temperature

The EDSFI team identified that, following a loss of ventilation, the calculated intake structure temperature was in excess of the design operating temperature for the service water pumps, as stated in the FSAR. Assuming an outside air temperature of 95°F, the intake structure temperature could reach a maximum of 115°F. The FSAR states that the service water motors (SW) are designed to operate in a 113°F ambient temperature. It also states that the post-accident environmental conditions within the intake structure would not exceed the SW pump motor service rating upon loss of ventilation.

The licensee completed a Supplemental Calculation 91-004-373M2, "Natural Ventilation Cooling of Intake Structure," to address this issue. This calculation used a more sophisticated evaluation methodology than the existing calculation. This calculation demonstrated that the worst-case temperature in the intake structure, assuming 95°F outside air ambient conditions with a total loss of ventilation, would be 112°F. The calculation used the standard industry stack effect method with zero wind and did not credit heat transfer from the service water piping. In addition, the licensee had updated the applicable section of the FSAR to reflect the 112°F maximum intake structure temperature.

Based the licensee's calculation that demonstrated that the maximum intake structure temperature does not exceed the service water pump motors designed operating temperature, the inspector determined that this item is closed.

3.3 (Closed) Unresolved Item No. 50-336/93-81-11, Switchgear Room Temperature

The EDSFI team identified an inconsistency between the calculated switchgear room temperature and the maximum switchgear room temperature specified in the FSAR. The licensee's heat load reevaluation calculation concluded that the maximum switchgear room temperature was 112°F under worst-case accident conditions. This exceeded the maximum switchgear room temperature of 104°F, as specified in Section 9.9.15 of the FSAR. To resolve this concern, the licensee contacted the electrical equipment manufacturer and determined that the electrical equipment could function properly with ambient temperature up to 122°F. The licensee stated that they would resolve this inconsistency between the FSAR and calculation.

During this inspection, the inspector noted that the licensee had performed a system analysis of the service water system to address the Generic Letter 89-13 concerns, and determined that the temperature in the switchgear rooms could reach up to 122°F. The inspector noted

that this temperature was still within the electrical component's capability. Based on this revised evaluation, the licensee had revised the applicable sections of the FSAR to reflect the 122°F temperature design limit for the switchgear rooms.

Based on the above corrective actions to resolve the inconsistency between the revised calculation and the FSAR, this item is closed.

3.4 (Closed) Violation No. 50-336/93-81-13, Inadequate EDG Testing

The EDSFI team identified that inappropriate surveillance test methods were being used to test the emergency diesel generators. While performing technical specification-required EDG surveillance tests, one EDG was parallel with the grid for a short time, while the other EDG was declared inoperable. This condition was considered adverse to quality because this EDG configuration could reduce the reliability of the EDGs if called upon to operate. The team also noted that, on August 29, 1984, an NRC Information Notice (IN) 84-69 was issued informing all licensees of the potential safety consequences of loading both EDGs simultaneously in parallel with the grid. Supplement 1 to the Information Notice was issued on February 24, 1986, informing licensees of the potential safety consequences when one EDG is loaded in parallel with the grid, while the other EDG is declared inoperable. A Notice of Violation (NOV) was issued regarding this issue.

The licensee promptly resolved the safety concern during the EDSFI inspection by issuing a night order: (1) prohibiting loading both EDGs simultaneously in parallel with the grid; and (2) prohibiting loading one EDG in parallel with the grid, while the other EDG is declared inoperable. The licensee stated that the EDG surveillance procedures would be appropriately revised.

During this inspection, the inspector noted that the licensee's independent safety engineering group (ISEG) had performed an evaluation of the NRC IN program and had documented the findings in ISEG Report E93-011 (November 15, 1993). This evaluation examined the effectiveness of the IN review program between January 1992 and July 1993 and concluded that all IN responses evaluated for technical accuracy were adequate; however, a programmatic improvement to the IN review program was identified. To address this finding, the licensee revised the procedure NEO 4.01 to require that the nuclear licensing department be made responsible to receive and coordinate with all departments to ensure proper IN disposition. The inspector reviewed a sample of INs being reviewed and found them to be dispositioned in accordance with the established procedures. The inspector also reviewed the Unit 2 EDGs Surveillance Procedure OP 2346A, Revision 16, and determined that the licensee had added a bold "CAUTION" note to avoid synchronizing the other EDG, while one is operated in parallel mode. By reviewing the lesson learned documentation distributed to the engineering staff personnel and discussion with Units 1 and 3 staff members, the inspector determined that the licensee's staff was cognizant with the revised IN process and their responsibilities established in the revised procedure.

The inspector concluded that the corrective actions to assure that both EDGs will not be tested in parallel with the grid, and the process for reviewing INs were adequate. This item is closed.

3.5 (Update) Unresolved Item No. 50-336/93-81-15, Insufficient Pickup Voltage on Class 1E MCC Control Circuits

The licensee identified that under certain configurations the cha.ging pumps could have insufficient control power to start during a postulated accident with degraded voltage on the emergency busses (Licensee Event Report (LER) No. 50-336/93-008). The postulated degraded voltage condition was that offsite power was being provided by the RSST and the voltage on the emergency busses was slightly above the degraded voltage bistable setpoint. The licensee informed the EDSFI team of this issue following the exit meeting, and the team opened an unresolved item to further review this issue.

The LER documented three short/long term corrective action as follows:

1. Establish administrative controls on the electrical configuration of the charging pumps to ensure that the Technical Specification requirements were satisfied;

2. Conduct additional analysis and tests to verify that the analysis for the charging pumps was correct and ensure that other safety-related pump motor starter control circuits have adequate voltage; and

3. Install modification(s) to eliminate this deficiency.

During this inspection, the inspector noted that the licensee had established adequate adminstrative controls on the electrical configuration of the affected charging pumps. The licensee had issued four night orders to assure proper pump alignment to assure that at least two charging pumps would be available to satisfy the technical specification requirements. The inspector also noted that licensee's Engineering Department was keeping the operational staff informed of the design concerns identified during the analysis and bench-testing of the charging pumps. The inspector determined that the operations staff was aware of charging pumps operability concerns. Based on the latest bench-testing results and the final analysis completed by the licensee, the night order was revised to maintain the "C" charging pump running with the "B" charging pump in the standby mode. The inspector concluded that the licensee had implemented adequate adminstrative controls to address the charging pump operability concerns. The licensee stated the night orders would remain active until modifications were inplemented, eliminating the need for the administrative controls.

The inspector reviewed the results of the licensee's March 1993 simulated bench-testing on spare similar MCCs units and the July 1993 testing on the actual MCCs charging pump units. The test results demontrated that all charging pumps control circuits would have sufficent voltage to perform their standby function, with the exception of the "C" charging

pump. By performing additional simulated bench-testing and calculation (PA-004-290E2, Revision 0), completed on April 27, 1993, the licensee determined that the safety-related control circuits for other safety-related equipment had adequate voltage to perform their intended design function. The inspector reviewed the licensee's simulated test results and the calulation and determined that the licensee's conclusions were technically sound.

At the conclusion of this inspection, the inspector noted that the licensee was in the process of developing a design change package (PDCR 2-020-93) to add interposing relays in the "A" and "C" charging pumps control circuit. This modification would eliminate the voltage concerns with the charging pump control circuits. The licensee stated that upon completion of this modification, the "C" charging pump could be successfully started from standby mode with degraded bus voltage. This would eliminate the need for adminstrative controls. In addition, the "A" charging pump margin would be improved from the existing marginal voltage condition. The modification was scheduled to be completed during the next refueling outage in 1994.

Based on the completed corrective actions, the inspector concluded that the licensee had adequately addressed the corrective actions for the charging pumps. However, this item will remain open pending NRC review of the licensee's finalized design modification and its implementation.

4.0 OTHER ISSUES REVIEWED

4.1 Reserve Station Service Transformer (RSST) Load Shedding Under LOCA Conditions (PDCR No. 1-023-94) - Unit 1

The inspector reviewed a plant design change request (PDCR) modification package (PDCR No. 1-023-94) to ascertain that the revised design modification was technically sound, was completed in accordance with the established procedures, and met the regulatory requirements.

While performing the preliminary analysis on the Unit 1 RSST in December 1993, the licensee determined that the combination of nonsafety-related loads and safety-related loads on this unit transformer could result in a bus voltage below the degraded voltage relay setting. As a result, the loads would be transferred over to standby onsite emergency power. Since the offsite power is considered the preferred power source, the licensee initiated a design change to correct this condition.

The inspector reviewed PDCR No. 1-023-94, issued by the licensee in April 1994, to assure that sufficient voltage exists at the emergency buses to allow the emergency core cooling system (ECCS) loads to be loaded onto the RSST during an accident condition. The inspector noted that the licensee had made the following design changes to resolve the above voltage concern:

- Added logic to monitor the running status of all circulating water pumps and condensate pumps.

- Added trip logic to trip up to two circulating water pumps and one condensate pump, upon receipt of a LOCA signal.

- Revised Procedure ONP503E to secure feedwater loads such that only one reactor feed pump, one condensate booster pump, and two condensate pumps remain in operation, while supplying power to Millstone 2 from the Millstone 1 RSST, as per the Unit 1 FSAR.

The inspector reviewed the associated design documentation, and found it to be adequate. The inspector noted that the licensee had performed a revised station load profile calculation to demonstrate that, with the reduced loads with above-logic actuation, the emergency bus voltages (14 E & F), during the worst-case scenario, would recover higher than the undervoltage relay reset value of 0.913 PU. Based on the results of this calculation, the inspector noted that emergency bus voltages would be recovered to 0.914 PU in 6 seconds, instead of the allowed eight seconds.

The licensee also analyzed the present design, considering a design basis accident with offsite power available and subsequent loss of offsite power (LNP) due to degraded voltage as the most limiting condition. The analysis also assumed a loss of condenser vacuum, loss of feedwater accident and equipment failures, and concluded that the above-functional changes will have no adverse affect on the consequences of a previously-evaluated accident.

At the conclusion of this inspection, the modification implementation was still ongoing; therefore, the inspector's review of the design package was limited to design details documentation. The inspector concluded that the design change package was technically sound, was completed in accordance with the established procedures and met the regulatory requirements.

4.2 Pressurizer Pressure Low Range Pressure Indicator's Work Order Review-Unit 2

The remote hot shutdown panel pressure indicators, PI-103-1B and PI-103, monitor the pressurizer pressure over a range of 0-1600 psig. Technical specifications require a monthly channel check surveillance (SP 2402B) of both remote hot shutdown panel (C21), low range pressurizer pressure indicators. The acceptance criteria for the channel check requires that the two channels be within 64 psig of each other. At normal operating pressure (2250 psig), both indicators would be pegged high. During the routine surveillance on April 1, 1993, conducted at normal operating pressure, PI-103-1B and PI-103 were indicating approximately 1560 and 1600 psig, respectively. While the surveillance test satisfied the acceptance criteria, the operators were concerned with the operation of PI-103-1B, and created work order AWO M2-93-04917 to address this issue.

The licensee conducted troubleshooting activities to resolve AWO M2-93-04917 in April 1993. The calibration of the pressure indicator was checked, and the span was out of adjustment. A new meter was installed and the calibration was checked satisfactory. During the troubleshooting, the technicians determined that the voltage-to-current (V/I card) output was 20.93 milliamps (ma) instead of 20 ma expected value. A conversion of milliamp V/I card signal to indicated pressure would yield an indicated pressure of 1693 psig. This indication may be slightly higher than the channel check acceptance of 64 psig if the redundant channel was indicating actual pressure. However, this does not consider other tolerances that may tend to compensate for the V/I card uncertainty. The technicians performing the work noted in the work order remarks section that they notified the supervisor of the problem with V/I card calibration. A work order to calibrate the V/I card was not written until September 1993. The I&C group completed recalibration of the V/I card on September 7, 1993. Following the completion of AWO M2-93-04917, in April 1993, the monthly calibration checks were all satisfactory, including a channel check conducted on August 8, 1993, when the pressurizer pressure was within the range of PI-103-1B (400 psig).

The inspector concluded that PI-103-1B was capable of performing its intended function of providing low range pressurizer pressure indication at the remote hot shutdown panel. This conclusion was based on the successful calibration check surveillances conducted between April and September 1993. These tests also included one test, in August 1993, that occurred with the actual pressure within the scale of the pressure indicators. The inspector noted one weakness in the work control process; the I&C supervisor did not initiate a work order to recalibrate the V/I card in April 1993, when it was identified by the technicians. However, this oversight did not result in the indicator not being capable of performing its function.

5.0 UNRESOLVED ITEMS

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or violations. Unresolved items are identified in the executive summary of this report.

6.0 EXIT MEETING

The licensee management was informed of the scope and purpose of the inspection at the entrance meeting on March 15, 1993. The findings of this inspection were discussed with the licensee representatives during the course of the inspection, mini-exit of Unit 2 on April 8, 1994, and presented to licensee management during the exit meeting on April 22, 1994. The licensee did not dispute the inspection findings during either of the exit meetings. A list of attendees is presented in Attachment 1.

ATTACHMENT 1

Persons Contacted

Northeast Utility Service Company (NUSCo)

J. Baker, Transmission and Distribution Department
* R. Bates, Supervisor
* P. Blumberg, Sr. Engineer, PSD
* W. Becker, Supervisor - Electrical Engineering (ED)
* L. Chiarizia, General Specialist (PSD)
** R. Ewing, Senior Engineering Technician (PSD)
* J. Fergon, Manager, Design Engineering Department
* R. Halleck, Senior Engineer (PSD)
D. Harris, Licensing Engineer, Nuclear Licensing
P. Hesler, Senior Engineer (ED)
* F. Libby, Jr., Supervisor, Assessment Services
* C. Maxson, MPI, Mechanical Supervisor (ED)
S. Ravin, Project Upgrade, Project Coordinator
** J. Regan, Supervisor - Nuclear Electrical Engineering
* H. Risley, Director, Millstone 1, Engineering Department
** K. Shipman, Senior Engineer (PSD)
* M. Smaga, Senior Engineer (ED)
** W. Temple, Nuclear Licensing Engineer
* D. Vail, Design Engineer (ED)

U.S. Nuclear Regulatory Commission

* P. Swetland, Sr. Resident Inspector

* Asterisk denotes personnel present at exit meeting of April 22, 1994.
** Denotes personnel present at mini-exit meeting on April 8, 1994.