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NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

March 11, 1993

Docket No. 50-336
B14399

Re: 10CFR2 Part 2

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Reply to Request for Additional Information
Inspection Report 50-336/92-22

In a letter dated January 11, 1993,(1) the NRC Staff transmitted its Notice of Violation relating to NRC Inspection Report No. 50-336/92-22. The report discussed the results of several NRC Staff inspections pertaining to the July 6, 1992, partial loss of normal power event at Millstone Unit No. 2. Based on results of the Staff's inspections, two apparent violations were identified. The first concerned 10CFR50 Appendix B requirements regarding translation of plant design change record implementation into the work order package. In a letter dated February 10, 1993,(2) Northeast Nuclear Energy Company (NNECO) provided a response to the first apparent violation on behalf of Millstone Unit No. 2, pursuant to the provisions of 10CFR2.201.

The second apparent violation, failure to promptly correct conditions adverse to quality, has been considered for escalated enforcement. Due to the complexity of the issue and the time span over which the events occurred, a significant amount of dialogue between the NRC Staff and NNECO has occurred. In a telephone conversation on February 17, 1993, between NRC Staff and NNECO, the Staff and NNECO agreed that NNECO would submit a written response to clarify two areas of the issue. The purpose of this letter is to provide additional information pertaining to: (1) power-operated relief valve design and operation and NNECO's historical knowledge thereof, and (2) any other technical information contained in the inspection report (50-336/92-22) dated

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(1) M. W. Hodges letter to J. F. Opeka, "Nuclear Regulatory Commission Inspection Report No. 50-336/92-22 Millstone Unit 2," dated January 11, 1993.

(2) J. F. Opeka letter to T. T. Martin, "Millstone Nuclear Power Station, Unit No. 2 Reply to Notice of Violation Inspection Report 50-336/92-22," dated February 10, 1993.

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January 11, 1993, which NNECO believes to be contrary to our understanding or in need of clarification. This information is provided in Attachments 1 and 2, respectively.

The license amendment request, originally discussed in License Event Report 91-002[3] and later discussed on page 16 of the inspection report, has been held pending resolution of this issue and will be submitted to the Staff in the near future.

NNECO appreciates the opportunity to provide our perspective and understanding of the issues in question. We recognize the complexity of both the technical issues and the history of their various aspects. Given the number of Staff inspections related to this event and the large number of NNECO personnel contacted, it is our view that the mutually agreed upon course of action is the best one. We believe that the information provided in Attachments 1 and 2 is sufficient to allow the Staff to take final action on this matter without further consideration of escalated enforcement. Our primary reason for this perspective is our belief that while it is possible that we could have found and, therefore, remedied certain deficiencies in the Millstone Unit No. 2 design earlier than the 1992 outage, our failure to do so does not raise to the level of escalated enforcement.

If you have further questions on the issues addressed, please contact Michael Wilson at (203) 665-3684.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

J. F. Opeka
Executive Vice President

cc: T. T. Martin, Region I Administrator
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2
P. D. Swetland, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

(3) S. E. Scace letter U.S. Nuclear Regulatory Commission, "Licensee Event Report 91-002-00," dated February 11, 1991.

Docket No. 50-336
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Attachment 1

Millstone Nuclear Power Station, Unit No. 2
Reply to Request for Additional Information
Inspection Report No. 50-336/92-22

Chronology of Knowledge Regarding Pressurizer PORV
Operating Characteristics

March 1993

CHRONOLOGY OF KNOWLEDGE
REGARDING PRESSURIZER PORV OPERATING CHARACTERISTICS

The following chronology details the activities associated with the Probabilistic Safety Study (PSS) as they relate to the operation of the Millstone Unit No. 2 Power-Operated Relief Valves (PORV), the Reactor Protection System (RPS), and the 120 V vital AC distribution panels. Much of this chronology was reconstructed with the benefit of a log maintained by the Probabilistic Risk Assessment (PRA) group supervisor.

NNECO believes that the details provided in this attachment show that NNECO identified PORV operating characteristics during the PSS and responsibly dispositioned PORV-related issues as they were identified, on a schedule consistent with their perceived safety and regulatory significance.

January 1987:

The Millstone Unit No. 2 PSS began.

This is an effort that would ultimately require over 4 calendar-years and 14 man-years of effort to complete the initial quantification. As a measure of the depth and rigor of this review, the resource expenditure is significantly higher than industry averages.

January 26 and 29, 1987:

The PRA staff began a general review of the Millstone Unit No. 2 design and noted that there are 4 vital 120 V AC buses with separate inverters and 2 batteries. Each vital panel was noted to have a backup power source, although two of the four rely on the corresponding nonvital AC distribution panel of that facility. The latter point was irrelevant to the PRA effort at this point.

January 30 through Spring of 1987:

Two NRC contractor reports, which document a PRA performed for the Calvert Cliffs plant, were reviewed in depth for possible relevance to Millstone Unit No. 2. They are:

(1) NUREG/CR-1659/3 of 4, "Reactor Safety Study Methodology Applications Program: Calvert Cliffs #2 PWR Power Plant," Sandia National Laboratories, May 1982.

(2) NUREG/CR-3511/1 of 2, "Interim Reliability Evaluation Program: Analysis of the Calvert Cliffs Unit 1 Nuclear Power Plant," Sandia National Laboratories, March 1984.

It was noted that, unlike Millstone Unit No. 2, the Calvert Cliffs design has four, rather than two, vital DC buses.

While the first report does not describe the detailed design of the pressurizer PORV logic and circuitry, the second report (p. 6-17) discusses the PORV actuation logic. It states, in pertinent part: ". . . the PORVs are actuated whenever the RPS's high primary pressure trip is actuated by two or more of the four channel logic system. The PORVs are actuated by the same bistable trip units which actuate reactor trip on high RCS pressure . . ." and, ". . . the 'feed-and-bleed' method of core cooling can be initiated, the PORVs are blocked open by removing a bistable . . . ".

Also, "Instead of constructing a fault tree for failure of the PORVs to open on demand and to reclose when required, operating experience was used to quantify these events. A Boolean equation was written for the PORVs failing to open and included their AC and DC support system dependencies... The failure probability for a PORV to reclose was found to be 2E-2 per demand per valve."

In short, neither report:

- clearly highlights the consequences of the loss of two vital 120 V AC buses resulting in PORV opening,
- explicitly models this design feature, or
- considers the loss of two vital 120 V AC buses as an initiating event.

In light of the fact that the first report lists 14 contributors, and the second 21 authors from eight organizations, these omissions are noteworthy in retrospect, and serve to provide some perspective on NNECO's overall performance on this issue.

Spring 1987:

Work was begun on two major tasks for the PSS:

- initiating events analysis, and
- support systems dependency analysis

June 1987:

All Licensee Event Reports (LERs) at Maine Yankee, Calvert Cliffs Units 1 and 2, and Millstone Unit No. 2 were reviewed for relevance to the PSS effort. The following LERs were considered significant:

1) Millstone Unit No. 2, LER 75-17: deenergized ESAS channels, generation of all ESAS signals

2) Millstone Unit No. 2, LER 79-01: failure of inverter, prevented switch to alternate source

3) Millstone Unit No. 2, LER 82-24: loss of inverter due to short, lost VA-10

4) Millstone Unit No. 2, LER 82-48: loss of 120 vital AC, lost VA-20

5) Calvert Cliffs Unit 2, LER 83-07: 2 RPS channels deenergized, PORVs opened, SIAS (operator overrode 30 seconds later)

Item 1 alerted NNECO to the potential consequences of loss of Engineered Safeguards Actuation System (ESAS) cabinets. Items 2, 3, and 4 identified that the static switches did not always function properly and that there is "dependency" between inverter failure and static switch failure. Certain failure modes (e.g. short of inverter) were likely to lead to 120 V vital AC bus failure. This information, together with plant-specific failure rate data collected on the inverters, led the PRA staff to later conclude that inverter/static switch failures were the dominant means of losing two 120V vital AC buses, rather than a loss of DC bus combined with failure of the non-vital inverter/turbine battery.

Item 5 alerted NNECO to some unusual dependency between the reactor protection system and PORV opening at Calvert Cliffs. Because of similar NSSS vendors (Combustion Engineering (CE)) and Architect/Engineer (Bechtel), it was suspected that this design may have implications for Millstone Unit No. 2 as well. It must be noted that at this point in the study, the PRA staff involved with the PSS were not intimately familiar with the design details of the RPS and 120 V vital AC power supplies at Millstone Unit No. 2. Therefore, the relationship between the loss of 120 V vital AC power and PORV opening was not yet known.

The fact that the Calvert Cliffs' operators rather quickly identified the PORV opening and isolated the break was encouraging, and implied that the event was readily recoverable.

Summer 1987:

Work progressed well on the support systems interdependence analysis. A PRA staff member identified that both PORVs would open upon loss of two (or more) vital 120 V AC buses. The common dependency of both PORVs on DC bus 201B was identified.

An initiating events analysis was performed in parallel. The following "what if" scenarios were posed for the loss of various electrical buses or combination of buses (regardless of probability at this time):

- 6.9 kV bus 25A or 25B
- 4.16 kV bus 24A or 24B
- 4.16 kv vital bus 24C
- 4.16 kV vital bus 24D
- 4.16 kV vital buses 24C and 24D
- 125 V DC bus 201A
- 125 V DC buses 201A and 201B
- 120 V vital AC VA-10 or VA-20
- 120 V vital AC VA-30 or VA-40
- 120 V vital AC VA-10 and VA-20
- 120 V vital AC VA-10 and VA-30
- 120 V AC VR-21 and VR-11

The NNECO analysis went beyond the Calvert Cliffs PRAs which only included the loss of one DC bus as a special initiator. Many scenarios in the above list would later be dropped because of low consequence.

August 25, 1987:

The PRA staff was provided time on the Millstone Unit No. 2 control room simulator to exercise several postulated scenarios. The purpose of the exercises was to provide some additional validation of system dependencies as well as to assess overall plant response, timing, and difficulty of diagnosing the events. The following were simulated at that time:

1) Loss of all feedwater, feed-and-bleed at 15 minutes with only one PORV.

2) Loss of all feedwater, feed-and-bleed at 20 minutes with only 1 PORV and only 1 High Pressure Safety Injection (HPSI) pump.

3) Station Blackout, with use of the Millstone Unit No. 1 electrical backfeed.

4) Simultaneous loss of both 125 V DC buses 201A and 201B.

5) Loss of bus 201A followed 30 seconds later by loss of 201B.

6) Simultaneous loss of 120 V vital AC buses VA-10 and VA-20.

7) Simultaneous loss of VA-10 and VA-30.

8) Simultaneous loss of VR-11 and VR-21.

We believe that this was the first time that scenarios 6 and 7 had been exercised on the simulator.

Item 6 confirmed that both PORVs would open. No safety injection actuation occurred. The plant response substantially validated the PRA analysis, and

further identified the difficulty of diagnosis because of the loss of substantial amounts of instrumentation.

Item 7 also confirmed that both PORVs would open. A partial loss of normal power occurred and the "A" diesel generator did not automatically start. One train of emergency safeguards equipment started automatically but the LPSI pump tripped because of the sump recirculation actuation signal which was prematurely initiated upon loss of two 120 V vital AC buses.

From these exercises, it became clear that the loss of VA-10 and VA-20 scenario was of relatively high consequence. However, because the buses are from different electrical facilities in different vital areas, the event probability was assessed to be very low. Moreover, it should be possible to isolate the open PORVs, or manually start safety injection pumps.

For the loss of VA-10 and VA-30, it was believed that the event could still be mitigated by HPSI, PORV reclosure, or PORV block valve closure.

No discussions were held regarding design basis or beyond design basis events. Up to this point, no thought was given as to how two 120-V vital AC buses were postulated to fail; only consequences were considered. Either case, namely, loss of VA-10 and VA-20 or loss of VA-10 and VA-30, required at least two equipment failures for the initiation of the scenario, and one or more additional failures were needed before leading to core melt.

September 2, 1987:

A discussion was held between the PRA staff and the Millstone Unit No. 2 operator training staff. No credible scenario was identified whereby VA-10 and 20 could be lost. The loss of one vital bus would result in entry into a technical specification action statement.

September 4, 1987:

The Millstone Unit No. 2 PSS progress report was issued; distribution of the report included Millstone Unit No. 2 and station management. The following statement is included in the report:

> "In general, the findings of the study thus far have been mostly positive. The potential to feed-and-bleed, low frequency of LOCA outside containment, and capability to obtain AC power from Unit 1 are encouraging. Two unexpected findings include 1) both pressurizer PORV's are dependent on 125 V DC bus 201 B in the control circuit to open the valves, 2) both PORV's will open on the loss of any two 120 V vital AC buses (an unlikely event). The risk significance of these are being addressed but should not be major."

September - October 1987:

The initiating events analysis and support systems analysis were completed and reviewed. The plant-specific equipment failure rate data analysis effort was begun. These data were needed to begin the systems reliability analyses.

January 7, 1988:

The Millstone Unit No. 2 PSS year-end progress report was distributed. Under "major findings" it was noted:

> "Other than the critical dependency of pressurizer PORVs on DC bus 201 B, and the fact that both PORVs will open on the loss of any two 120 V vital AC buses, no unusual system dependencies have been found."
>
> "Inverter failure rates are four times higher than generic data. Battery charger failure rates are 13 times higher."

January 19, 1988:

The loss of VA-10 and VA-30 during a refueling outage caused a partial loss of normal power. A PRA staff member was in the control room at the time. The plant response was as expected. This event prompted the PRA staff to reexamine the consequences of a loss of VA-10 and VA-30 as well as VA-20 and VA-40 events. The PRA staff was satisfied with the projected risk significance for power operation.

Winter 1988:

Work on the ESAS and 120 V vital AC system reliability analyses, begun in late 1987, came to a halt when the assigned engineer left the company. A change in priorities and turnover within the PRA staff caused the Millstone Unit No. 2 PSS effort to be reduced in half from the 1987 level. ESAS/120 V vital AC analyses were delayed until late spring. However, ESAS/120 V vital AC reliability analyses remained high priority systems analyses, along with DC power analysis and other support systems.

April 4, 1988:

The PRA staff continued to pursue potential failure modes for loss of two 120 V vital AC buses. Recent Plant Incident Reports were reviewed.

April 5, 1988:

Operating Procedure OP2345B, 120 V Vital Instrument AC System, as it relates to the loss of 120 V vital AC, was reviewed for the first time. A log book entry has the following highlighted:

> "*Step 6.3 only one alternate inverter may be in service at a time (INV 5 to VS-1 to VIAC-1 or INV 6 to VS-2 to VIAC-2)."

The PRA staff vigorously pursued this issue. A PRA consultant (a retired Millstone Unit No. 2 shift supervisor) was contacted and questioned on a previous ESAS cabinet failure. Millstone Unit No. 2 Operator Training and Northeast Utilities Service Company (NUSCO) Production Test were contacted regarding design details. The following log book entry was made:

> "*INV 5 & 6 physically together; note that losses of static switch have usually been caused by voltage spikes on inverters; question, some mechanism to lose INV 5 & 6 => lose static switches to VA 10 & 20?"

This was the first postulation by the PRA staff of a potential failure mechanism of VA-10 and VA-20 simultaneously.

Additional PIRs (88-8, 82-140, 82-3) and LERs (82-24, 79-1, 82-2) were reviewed in detail.

April 7, 1988:

The PRA staff contacted the Electrical Engineering staff and "what if" scenarios were posed. The Electrical Engineering staff member agreed to look into Appendix R concerns.

April 8, 1988:

Millstone Unit No. 2 120 V vital AC system was walked down by a PRA staff member and NUSCO Production Test management. They discovered that INV 6 was currently supplying VA-20. It is noted that INV 5 and 6 are not Category 1 and have no qualified isolator. The following log book entry was made:

> "possible loss of 2 vital AC: INV 1 & 2 fail due to common cause [this is PRA language - all identical components are postulated to fail by common cause even if no explicit failure mechanism is identified], 36 hr LCO, backup inverters 5 & 6 fail due to turbine battery bus fault or failure of DO 303 (spurious trip)."

April 12, 1988:

A PRA staff member contacted the Millstone Unit No. 2 Operations Supervisor and posed "what if" questions regarding inverter 1 and 2 failures. This conversation determined that if inverters 1 and 2 failed, there would be no alternative but to power VA-10 and VA-20 via inverters 5 and 6 from the turbine battery until repairs were made.

April 13, 1988:

The Millstone Unit No. 2 PSS consultant and Operator Training staff members were contacted. Both agreed that the scenario for loss of VA-10 and VA-20 is plausible. The log book entry states:

> "operators really have no choice if INV 1 & 2 are lost but to provide power from turbine battery; otherwise, must have VA-10 or 20 deenergized and enter 8 hour LCO. Also, concerns that on LNP, turbine battery has limited capacity and big draw by inverters (e.g. Hurricane Gloria)."

From this point on, the PRA staff concentrated on this failure mechanism for the simultaneous loss of VA-10 and 20.

Late Spring/Early Summer, 1988:

Work on the ESAS/120 V vital AC fault tree analyses was begun.

August 19, 1988:

The Millstone Unit No. 2 PSS progress report was distributed to NUSCO, Millstone Unit No. 2, and station staff and management. The following statement was included:

> "A low probability failure mode for the simultaneous loss of 120V vital AC buses VA-10 and VA-20 has been found. The transient is beyond the design basis (requires double/triple failures). However, the transient would result in a LOCA (PORV opening) coincident with failure of both ESAS actuation cabinets, loss of all automatic actuation of emergency core cooling systems and auxiliary feedwater, possible degradation of water flow from service water and RBCCW to critical equipment used for LOCA mitigation, and loss of important instrumentation. The high failure rate of inverters coupled with the high consequences could make this transient a dominant contributor to overall core melt frequency. Evaluation of the probability is nearly completed."

September 30, and November 23, 1988:

The PRA staff discussed PIR 88-65 with NUSCO Production Test and Millstone Unit No. 2 staff. The associated incident resulted in the loss of VA-20 on September 7, 1988, and provided significant insights regarding 120 V vital AC failure modes.

September - December 1988:

The ESAS and 120 V vital AC fault tree analyses underwent several rounds of preparation, review, comment, and reanalysis to incorporate failure modes such

as evidenced in PIR 88-65. The initiating event frequency for the simultaneous loss of 120 V vital AC panels VA-10 and VA-20 was estimated at 1.68 E-5/yr, while the simultaneous loss of VA-10 and 30 (or VA-20 and 40) was estimated at 1.25 E-2/yr.

The above results were encouraging and indicated that these events probably would not be "outlier" risk contributors. The reasoning is as follows:

- For the simultaneous loss of VA-10 and 20, the event, while of relatively high consequence, would not necessarily lead to core damage. Depending on operator response, the frequency of core melt from this event could be expected to be one to two orders of magnitude lower than 1.68 E-5/yr, or in the 1E-6 to 1E-7/yr range.

- For the simultaneous loss of VA-10 and 30 (or 20 and 40), the expected core melt frequency would be three orders of magnitude or more lower because of the multiple success paths for isolating the open PORVs or mitigating the LOCA. This would place the core melt frequency for this event in the 1E-5/yr range, or about 10 percent of the CMF goal of 1E-4/yr.[1] It was judged that this issue at Millstone Unit No. 2 did not warrant immediate corrective action or undo concern.

Completion of the remaining systems reliability analyses, event tree analysis, and human reliability analysis including observation of operator response on the control room simulator was necessary before these issues could be fully assessed.

<u>February 1989</u>:

The PRA staff discovered through conversations with Yankee Atomic personnel that the Maine Yankee nuclear power plant has similar design features to Millstone Unit No. 2. Certain dual losses of 120 V vital AC instrument buses result in one PORV inadvertently opening.

This discovery led the PRA staff to conclude that the issue of PORV opening may be more generic than just CE/Bechtel plants, and may be a fundamental design feature of the Reactor Protection System or pressurizer PORV opening logic, for all CE plants.

<u>October 4, 1989</u>:

The CE Owners Group Severe Accident Working Group meeting was held. The NUSCO PRA staff informed attendees of the consequences of the loss of two 120 V vital AC buses.

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(1) For perspective, certain risk outliers at the Haddam Neck Plant were in the 1E-4 to 1E-3/yr range when first discovered.

October 1989 - August 1990:

The Millstone Unit No. 2 PSS proceeds at a relatively high level of effort.

August 30, 1990:

During the PRA review of the project description for the Millstone Unit No. 2 DC/AC Inverter Replacement (PA 89-031) and as the result of discussions with NUSCO Electrical Engineering, the PRA staff first became aware of an area of concern regarding a technical specification interpretation. The PRA staff learned that when a 120 V vital AC bus is powered by the nonsafety-related alternate power supply, NNECO considered the vital AC bus operable.

September 4, 1990:

Discussions were held with NUSCO management concerning the technical specification interpretation and potential reportability based on past events.

October 26, 1990:

The PRA staff first became aware of the October 9, 1981, NNECO letter to the NRC[2] stating that no credit is taken for the balance of plant (turbine) battery to meet technical specification requirements.

December 4, 1990:

A telephone conversation was held between the PRA staff, Generation Facilities Licensing, Electrical Engineering, and Millstone Unit No. 2 plant staff regarding acceptability of powering VA-10 and/or -20 from the turbine battery. As a result of this meeting and subsequent evaluation, NNECO's interpretation of Technical Specification 3.8.2.1 was changed on January 11, 1991. It was agreed that the technical specification action statement would be entered if a 120 V vital AC bus were powered by the nonsafety-related alternate power supply.

A formal reportability evaluation was initiated to assess for reportability of past known occasions where the technical specification action statement was not entered and one of the 120 V vital AC buses was powered from its alternate source.

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(2) W. G. Counsil letter to R. A. Clark, "Millstone Nuclear Power Station, Unit No. 2 Loss of D.C. Power Event, Additional Information," dated October 9, 1981.

December 1990:

The PRA staff observed several operating crews on the Millstone Unit No. 2 simulator for loss of VA-10 and -20, and VA-20 and -30, scenarios. Operator performance was assessed as very good.

December 12, 1990:

A reportability evaluation regarding the design inadequacy of DC switchgear room cooling during loss of instrument air was initiated. The potential for inverter failure on high room temperature was postulated.

January 11, 1991:

A Millstone Unit No. 2 operations night order was issued which required that the 120 V vital AC buses required pursuant to Technical Specification 3.8.2.1 be declared inoperable, and the associated action statement be entered, whenever they were powered from their alternate source.

February 11, 1991:

Licensee Event Report (LER) 91-002, Revised Interpretation of Electrical Distribution Technical Specification Requirements,[3] was submitted to the NRC.

March 13, 1991:

LER 91-003, Design Inadequacy - Potential Loss of DC Switchgear Cooling During Loss of Instrument Air,[4] was submitted to NRC.

April 1991:

The Millstone Unit No. 2 PSS quantification was completed. The CMF from the loss of VA-10 and -30 (as well as VA-20 and -40) was estimated to be 6E-6/yr, or about 4 percent of the total CMF. Loss of VA-10 and -20 resulted in less than 1 E-7/yr CMF. Therefore, these postulated scenarios were not deemed to be "risk outliers." This quantification confirmed the judgments and estimates made in September 1987 and the fall of 1988 regarding the risk of scenarios resulting in inadvertent PORV operation.

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(3) S. E. Scace letter to U.S. Nuclear Regulatory Commission, "Licensee Event Report 91-002-00," dated February 11, 1991.

(4) S. E. Scace letter to U.S. Nuclear Regulatory Commission, "Licensee Event Report 91-003-00," dated March 13, 1991.

April 12, 1991:

The Millstone Unit No. 2 PSS results were presented to Millstone Unit No. 2 plant management. Five recommendations were made. The most credible failure mode for the simultaneous loss of two 120 V vital AC buses was identified as the potential common mode failure due to loss of DC switchgear room cooling. A recommendation was made to provide DC switchgear room temperature indication and/or alarm.

April 26, 1991:

The Millstone Unit No. 2 PSS results were presented to NU senior management.

April 29, 1991:

A Nuclear Operations Assignment (NOA) was issued to follow up on PRA recommendations (normal priority assigned).

July 6, 1992:

The Millstone Unit No. 2 partial LNP event occurred during shutdown.

August 1992:

"What if" questions were postulated by members of NUSCO PRA and Project Services Department staff. Postulation of a design basis LOCA coincident with a single DC bus failure and no credit taken for the nonsafety alternate power supply is first made. A Project Services Department staff member first suggested reversing the logic on the PORV actuation so that the loss of two 120 V vital AC buses would not open a PORV. The PRA staff had assumed up to this point that such a modification would be a complex undertaking and agreed that it would be a beneficial modification with no apparent negative consequences.

Fall 1992:

Design changes to the PORV actuation logic were implemented.

January 1993:

Temperature indicators/alarms for the DC switchgear rooms were implemented in response to the NOA.

CONCLUSION

Throughout the PSS project, action was taken to identify risk-significant design attributes of Millstone Unit No. 2. The level of investigation of various discoveries was consistent with the perceived safety significance. At no time did NNECO fail to take corrective action for issues identified or fully explore within reasonable limits the existence of additional design or operational deficiencies.

Docket No. 50-336
B14399

Attachment 2

Millstone Nuclear Power Station, Unit No. 2
Reply to Request for Additional Information
Inspection Report No. 50-336/92-22

Additional Inspection Report Clarification

March 1993

ADDITIONAL INSPECTION REPORT CLARIFICATION

The following information is provided to clarify or correct statements made in the Staff's inspection report[1] regarding the July 6, 1992, partial loss of normal power event at Millstone Unit No. 2. We have limited our comments to those portions of the inspection report which are relevant to the Staff's contemplated enforcement action, and have chosen not to address minor errors.

INSPECTION REPORT STATEMENTS:

"The apparent violation concerns the possible failure to correct single failure design discrepancies identified by your staff," (cover letter, page 2, first paragraph) and "The failure to more fully address and correct the identified single failure design discrepancies resulted in the continued operation of the facility in this vulnerable state." (page 17, section 5.6)

NNECO RESPONSE:

NNECO acknowledges that we were fully aware of the design characteristics of the PORVs. We have known for some time that the PORV's would open upon deenergizing two Reactor Protection System (RPS) cabinets, and that the loss of two 120 V vital AC panels would cause such deenergization. However, we would not characterize this as a "single failure design discrepancy." Rather, it is a design characteristic which, although not optimum, did not result in a condition that would call into question the safe operation of the unit. It is a condition that is common among various Combustion Engineering (CE) designed units.

The other discrepancy identified by NNECO, and reported to the Staff,[2] was one associated with technical specification interpretation and compliance. This discrepancy, relying on nonsafety-related power sources to demonstrate operability of safety-related 120 V AC buses, was corrected administratively.

A Millstone Unit No. 2 night order dated January 11, 1991, required that the 120 V vital AC buses required pursuant to Technical Specification 3.8.2.1 be declared inoperable whenever they were powered from their alternate source.

NNECO is unaware of any discrepancies known by us stemming from the 1990 investigation of this issue, or from the Probabilistic Safety Study, which remained uncorrected. It is true that the PORV logic was changed only following the July 6, 1992, partial loss of normal power (LNP) event. This

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(1) M. W. Hodges letter to J. F. Opeka, "NRC Inspection Report No. 50-336/92-22 Millstone Unit 2," dated January 11, 1993.

(2) S. E. Scace letter to U.S. Nuclear Regulatory Commission, "Licensee Event Report No. 91-002-00," dated February 11, 1991.

change is viewed as an enhancement, and not one which corrects any identified discrepancy, vulnerability, or violation of a regulatory requirement.

NNECO knows of no time prior to the July 6, 1992, LNP whereby a loss of vital DC bus, coincident with a loss-of-coolant-accident (LOCA), assuming that inverter number 5 or 6 was unavailable, was postulated. This is a scenario which NNECO now believes should have been postulated during plant design and licensing and one for which design basis vulnerabilities did exist regarding the operation of the Engineered Safeguards Actuation System (ESAS).

INSPECTION REPORT STATEMENTS

"The PRA engineering group characterized this practice as a violation of the single failure criteria of 10CFR50, Appendix A, and IEEE Standards 308-1971 and 279-1971." (page 16, third paragraph), and "During the conference, the PRA group asserted that the current TS interpretation did not meet the intent of the applicable IEEE Standards or 10CFR50, Appendix A." (page 17, first paragraph)

NNECO RESPONSE

Members of the PRA staff clearly questioned the practice described. However, they characterized the practice as one which was not in compliance with the technical specifications; not one that violated the single failure criterion. In documenting this issue for the purpose of assessing its reportability under 10CFR50.72 and 10CFR50.73, a PRA engineer did postulate various scenarios which included additional "single" failures beyond the two failures necessary to result in VA-10 and VA-20 being powered simultaneously by the turbine battery. This was done to help describe the potential safety implications of the historical technical specification interpretation. However, the change in technical specification interpretation appropriately dispositioned these concerns. NNECO has been unable to find any PRA staff member who recalls using the terminology of the inspection report.

INSPECTION REPORT STATEMENT:

"In early September [1990] when the PRA engineering group realized that the turbine building battery was not safety-related, . . ." (page 16, third paragraph)

NNECO RESPONSE:

The PRA staff cannot recall the exact point they became aware that the turbine building battery was not safety-related. Whether it is safety related or not would not have been factored into the Probabilistic Safety Study. The PRA staff may have known as early as 1987, and certainly knew by April 1988. However, as noted in Attachment 1, it was not known until late August or early September 1990 that there was an area of concern regarding technical specification interpretation.

INSPECTION REPORT STATEMENT:

"While conceding that the postulated scenario (loss of ESFAS during an accident) was a low probability event, the fact that it was not realistic was considered unacceptable from a design basis standpoint." (page 16, third paragraph)

NNECO RESPONSE:

What the PRA group believed to be unacceptable from a risk perspective was simultaneously supplying VA-10 and VA-20 from the turbine battery via inverters 5 and 6. Regarding the relationship of this practice to design basis, the PRA group stated, in its Millstone Unit No. 2 PSS progress report, dated August 19, 1988: "A low probability failure mode for the simultaneous loss of 120 V vital AC buses VA-10 and VA-20 has been found. The transient is beyond the design basis (requires double/triple failures)."

INSPECTION REPORT STATEMENT:

"It was the position of the PRA group, and others, that VIAC-1 and VIAC-2 could fail during a main steam line break in the turbine building . . ." (page 17, first paragraph)

NNECO RESPONSE:

To be complete, the phrase "if on their alternate supplies" should be inserted before "VIAC-1 and VIAC-2." If on their normal supplies, a main steam line break in the turbine building would not affect VIAC-1 or VIAC-2. It should be noted that the simultaneous operation of both VIAC-1 and VIAC-2 on their alternate source has been prevented by procedure for many years.

INSPECTION REPORT STATEMENT:

"In its analysis of safety significance, the licensee postulated a design basis accident involving loss of normal offsite power with VIAC-1 and VIAC-2 supplied by the turbine battery simultaneously." (page 15, section 5.5)

NNECO RESPONSE:

It is not accurate to characterize this scenario as either a design basis accident or as one which "the licensee postulated." This scenario was one used as an example by a member of the PRA group to help describe the importance of operating with VIAC-1 and VIAC-2 on their normal power source. Operating with both simultaneously supplied by their alternate supply has been disallowed by procedure for many years, and would only result from two safety-related failures (inverters 1 and 2), which is beyond the plant's design basis.