Northeast
Utilities System

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November 14, 1996

Docket No. 50-423
B15986

Re: 10CFR 50.73(a)(2)(v)
10CFR 50.73(a)(2)(vii)
10CFR 50.73(a)(2)(ii)(B)

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

This letter forwards Licensee Event Report 96-039-00, documenting a condition that was determined at Millstone Unit No. 3 on October 15, 1996. This LER is submitted pursuant to 10CFR 50.73(a)(2)(v), 10CFR 50.73(a)(2)(vii), and 10CFR 50.73(a)(2)(ii)(B).

NNECO's commitments in response to this event are contained within Attachment 1 to this letter

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

M. H. Brothers
Unit Director, Millstone Unit No. 3

Attachment: 1) NNECO's commitments in response to LER 96-039-00
2) LER 96-039-00

cc: H. J. Miller, Region I Administrator
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3
V. L. Rooney, NRC Project Manager, Millstone Unit No. 3
W. D. Travers, Dr., Director, Special Projects

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Docket No. 50-423
B15986

Attachment 1

Millstone Nuclear Power Station, Unit No. 3
NNECO's commitments
in response
Recirculation Spray and Emergency Core Cooling Systems Potentially Inoperable Following a Postulated LOCA - Due to Existing Debris in RSS Sump and Improper Configuration of Sump Cover Plates
(LER 96-039-00)

November 14, 1996

The following are NNECO's commitments made within this letter:

B15986-01: The foreign material in the RSS suction piping has been removed and the piping internals inspected.

B15986-02: An engineering assessment will be made of the Recirculation Spray System (RSS) sump to determine the need for modifications to the sump design to ensure that critical design attributes are met. The assessment will be completed, along with modifications deemed necessary, prior to entry into Mode 4.

B15986-03: Prior to entry into Mode 4, procedures for sump inspection, containment close-out and work on the sump will be revised or developed to ensure that ,during procedure performance, critical design attributes are understood and considered.

B15986-04: An evaluation of the Operating Experience Program will be performed prior to entry into mode 4. Improvements identified as a result of this evaluation will be implemented.

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)

Recirculation Spray & Emergency Core Cooling Systems Potentially Inoperable Following a Postulated LOCA - Due to Existing Debris in RSS Sump and Improper Configuration of Sump Cover Plates

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	15	96	96	039	00	11	14	96	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	000	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	[X] 50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	[X] 50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)	[X] 50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
J.M. Peschel, MP3 Nuclear Licensing Manager	(860)437-5840

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION	MONTH	DAY	YEAR
[ ] YES (If yes, complete EXPECTED SUBMISSION DATE).	[X] NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On October 15th, 1996 at 1330 hours, while at 0% power in Mode 5, what has been concluded to be construction debris was discovered in the Recirculation Spray System (RSS) containment sump and in RSS pump suction lines. This debris could have been drawn into, and damaged, pumps relied upon for containment heat removal and accident mitigation during LOCA conditions. On October 22nd, 1996, several gaps were found in the RSS sump cover plates. These gaps could have permitted the introduction of debris larger than analyzed into the RSS Pump suctions via the sump. Subsequent inspection on October 26th, 1996 and November 7, 1996 found additional debris and further examples of sump enclosure gaps. The RSS Pumps, during a postulated LOCA, provide containment heat removal and provide flow to ECCS pumps. The above discoveries create the possibility for a loss of recirculation spray and/or ECCS function train during a Design Basis Accident.

These conditions are being reported pursuant to 10CFR50.73(a)(2)(v)(B&D) and 50.73(a)(2)(vii)(B&D) as conditions that could have significantly impacted the plant's ability to remove residual heat or mitigate the consequences of an accident, and 10CFR50.73(a)(2)(ii)(B) as a condition outside the plant design basis.

Engineering assessment for, and implementation of, any required design change to the sump design, and procedural modifications to ensure critical design attributes are understood and considered during procedure performance will be completed prior to entry into Mode 4.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

I. Description of Event

On October 15th, 1996 at 1330 hours, while at 0% power in Mode 5, during a visual inspection of the containment sump, debris was observed in the C and D Recirculation Spray System (RSS) Pump suction lines. The inspection was deemed necessary by engineering due to several clips and bolts that were found missing from the vortex suppression grating inside the sump in an earlier observation.

On October 22nd, 1996, during a walkdown, several gaps were discovered in the plate decking covering the RSS sump enclosure. These gaps could have led to the introduction of foreign material larger than analyzed into the sump and thence, to the RSS pumps.

On October 26th, 1996, in a followup to the October 15th inspection, additional debris was found in all four RSS pump suction lines. The majority of the foreign material consisted of sand, mud, soft sludge, fibers, rubber, bird feathers, two tie wraps, and small segments of weld slag. Others items of significance were several pumice stones, pieces of cement (1 1/4 by 3/4 inch), two rocks (about 1 inch in diameter) and two pieces of sheet metal cuttings (one 1/2" square and the other 1" square). Foreign material with dimensions larger than that corresponding to a 3/32" screen mesh exceeds the sump design particle limit. This limit is related to reactor vessel minimum internal passage gaps and containment spray nozzle orifice size.

A preliminary engineering evaluation of the above findings was completed on October 28, 1996. Based on the results, which determined that the RSS system may not have been capable of performing its safety functions, an immediate notification pursuant to 10CFR50.72 (b)(2)(iii) was made at 1400 hours.

A subsequent November 7th, 1996 inspection revealed that train "A"/"B" separating screens, internal to the sump enclosure, also have gaps larger than the design limit dimension. Upon completion of an evaluation of this condition, an immediate notification pursuant to 10CFR50.72(b)(1)(ii)(B) was made at 1440 hours on November 7th, 1996.

This set of conditions is reportable pursuant to 10CFR50.73.(a)(2)(vii), as an event where a single condition could cause two independent trains to become inoperable in a single system designed to mitigate the consequences of an accident; pursuant to 10CFR50.73(a)(2)(v), as any event or condition which alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident, and pursuant to 10CFR50.73(a)(2)(ii)(B), as in a condition outside the design basis of the plant.

II. Cause of Event

The root causes of this event are:

A. Inadequate programs in:

- Ineffective inspections during plant construction and initial startup programs,
- Inadequate plant materiel condition inspection and design requirement compliance verification required following sump maintenance and during containment close-outs required for Mode change

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prior to each plant startup following refueling and other extended outages,

- Inadequate inspections of sump internals and sump cover plate configuration in response to NRC Information Notices dealing with sump debris and inadequate sump protection events at other plants.

B. There was a lack of instructions for maintenance work detailing the critical nature of maintaining sump cover plate gap size. Additionally, inspection plans did not address the sump enclosure cover plates and tests and inspections did not demonstrate RSS operability.

C. Lack of an aggressive Operating Experience Program, in that critical design attributes should have been inspected on the opportunities to do so in response to NRC Information Notices highlighting events at other plants and each time work was performed on the sump enclosure.

III. Analysis of Event

There were no adverse safety consequences from this condition, in that the unit has not experienced an event that required the actuation of the RSS. However, this condition is significant because the potential existed for permitting foreign material to be introduced into plant systems which could have prevented the performance of their safety functions.

In the event of a design basis Loss Of Coolant Accident (LOCA) the RSS system is designed to remove heat from containment during the injection phase of the accident. At approximately 30 to 35 minutes into the accident, during the cold leg recirculation phase of the accident, two of the RSS pumps (A and B) are realigned providing suction flow to the Charging and Safety Injection pumps from the containment sump so that these pumps may continue performing the Emergency Core Cooling System (ECCS) function, while RSS pumps C and D continue to remove heat from containment.

The containment sump is protected by an approximately five foot high rectangular enclosure. The front and side walls, and internal partitions of the enclosure are fabricated of screening nominally sized to prevent debris particles greater than 3/32" screen mesh size from entering the RSS. The containment, itself, forms the back wall of the sump enclosure and the top is closed by decking plates. The size of any gaps between the plates, between the plates and the containment wall, and between the plates and any appurtenances penetrating the top surface of the sump enclosure have a design limit corresponding to a 3/32" screen mesh. Internally, the sump enclosure is partitioned to separate the sump supply piping to the "A" and "B" trains of RSS.

A majority of the debris, including two 1" rocks was found in the suction of the "C" RSS pump. Pieces of cement rubble, along with other minor debris were discovered in the "A" RSS Pump suction line. The pieces of cement and the rocks found in the sump were large enough that the potential existed for the rocks or cement to be wedged between the pump 1st stage impeller and bowl assembly. This condition could have resulted in a pump failure - thereby preventing the "A" train of the RSS, comprised of the A and C pumps, from performing its containment heat removal or supporting the ECCS function. Additionally, debris was found in the B and D pump suctions but to a lesser extent. This could have resulted in the inability of this train to perform its containment heat removal or supporting the ECCS function.

The gaps discovered in the decking plate above the sump are larger than the 3/32" screen mesh criterion. The two largest gaps measured approximately 2 by 8 inches and 2 by 6 inches. These gaps are located at opposite

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ends of the sump. There are 4 gaps that measured approximately 1 inch square and a number of smaller gaps approximately 1/4 inch in size where the deck plates were not properly fitted. Additionally, several gaps in the sump enclosure internal dividing screening that exceed the 3/32" screen mesh criterion were identified.

The introduction of foreign material large enough to challenge the ability of the RSS system to perform its safety functions could have occurred at the gaps found on the deck plating above both the "A" and "B" train suctions in the sump. Introduction of debris into the RSS via this pathway could have resulted in a loss of recirculation spray and/or ECCS function.

IV. Corrective Action

- The foreign material in the RSS pump suction piping has been removed and the piping internals inspected.
- An engineering assessment will be made of the Recirculation Spray System (RSS) sump to determine the need for modifications to the sump design to ensure that critical design attributes are met. The assessment will be completed, along with the modifications deemed necessary, prior to entry into Mode 4.
- Prior to entry into Mode 4, procedures for sump inspection, containment close-out and work on the sump will be revised or developed to ensure that, during procedure performance, critical design attributes are incorporated and understood.
- An evaluation of the Operating Experience Program will be performed prior to entry into mode 4. Improvements identified as a result of this evaluation will be implemented.

V. Additional Information

None

Similar Events

LER 96-007-00 Containment Recirculation Spray and Quench Spray System Outside Design Basis due to Design Errors

On April 3, 1996, at 13:55, with the plant in Mode 5 at 0-percent power, it was determined that the Containment Recirculation System (RSS) spray piping and supports were not adequately designed for loads resulting from accident temperatures. It was initially determined that the higher RSS temperatures could result from a postulated loss of service water to one or more RSS heat exchangers. It was subsequently determined that: a) unacceptable stresses in the RSS and Quench Spray System (QSS) piping and supports could also result from the design basis accident temperatures inside containment, and b) the original design basis piping analyses utilized support anchor movements which were non-conservative.

LER 96-013-00 Residual Heat Removal System Design Deficiency Due to Non-conservative Original Design Assumption

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On June 12, 1996, with the plant in Mode 5 at 0-percent power, an engineering evaluation determined that a design deficiency in the Residual Heat Removal System (RHS) was a condition that was outside the design basis of the plant. A loss of control air could cause the RHS control valves to fail open. If this condition occurred during the initial phase of a plant cool down, the Reactor Plant Component Cooling Water System (CCP) temperatures could go above the 125°F used in the system stress analysis. The Safety Grade Cold Shutdown (SGCS) design requirements specify that the unit be capable of being brought to Cold Shutdown with limited operator action outside the control room. The original plant design did not consider that the RHS flow control valves failing open on a loss of air, could create unacceptably high RHS heat exchanger discharge temperatures.

LER 96-036-00 Safety Related Valves Controlled by Non-Safety Equipment

On September 29, 1996, with the plant in mode 5 of an extended outage, while performing an engineering evaluation, it was concluded that the High Pressure Safety Injection (SIH) and Low Pressure Safety Injection (SIL) systems were subject to degraded performance due to possible mis-positioning of normally closed safety related air operated valves (AOVs). Mis-positioning of these valves was postulated to occur as a result of failures related to non-qualified power and control circuits. Several components within the SIH and SIL systems were not properly analyzed for all potential failures in the original plant design.

LER 96-037-00 Spent Fuel Pool Cooling System Potentially Inoperable Following an SSE Due to Failure of Non-Seismic Connecting Piping.

At 12:40 on October 2, 1996 with the plant in mode 5 of an extended outage, an Engineering review determined that failure of the non-seismic purification lines connected to the Spent Fuel Pool (SFP) could result in a loss of SFP cooling. The purification lines are connected to the SFP at the same elevation as the SFP cooling system suction lines. Because of this, drain down of the SFP to the level of the purification line penetrations would result in the SFP cooling line being partially out of the water. There would be no damage to the spent fuel pool cooling system itself provided the SFP cooling pumps were secured on low level as required by Abnormal Operating Procedures (AOP) for "Loss of Spent Fuel Pool Cooling". However, pool cooling would be unavailable until repairs to, or isolation of, the purification lines could be accomplished and make up provided to restore SFP level.

Manufacturer Data

EIIS System Code:
Containment .....NH
Containment Spray System .....BE

EIIS Component Code: .....Pump