March 19, 2001

Mr. R. G. Lizotte, Master Process Owner - Assessment
c/o Mr. D. A. Smith, Process Owner - Regulatory Affairs
Northeast Nuclear Energy Company (NNECO)
P. O. Box 128
Waterford, Connecticut 06385

SUBJECT: MILLSTONE UNITS 2 & 3 - NRC INSPECTION REPORTS 50-336/2000-017, 50-423/2000-017, AND 50-336/2001-003

Dear Mr. Lizotte:

On February 2, 2001, the NRC completed two inspections at the Millstone Nuclear Generating Station. The enclosed reports present the results of these inspections. The results were discussed with Mr. Leon Olivier, Chief Nuclear Officer, and other members of his staff, on February 2, 2001.

NRC inspection reports 50-336/2000-017 and 50-423/2000-017 document the annual baseline inspection of your activities related to the identification and resolution of problems, your compliance with the Commission's rules and regulations, and the conditions of your license. NRC inspection report 50-336/2001-003 documents the supplemental inspection concerning the corrective actions in response to the degraded cornerstone for mitigating systems at Unit 2 during the third quarter of 2000. Within these areas, both inspections consisted of examinations of selected procedures and records, observation of activities, and interviews with personnel.

In general, the corrective action program was adequately implemented. The team noted multiple findings over the past year concerning the cross-cutting area of problem identification and resolution. The majority of these findings were associated with activities related to Unit 2. They involved issues with how problems were prioritized and evaluated, and the effectiveness of the corrective actions. Most notable was the failure to promptly address the anomalous operation of the governor for the Unit 2 turbine-driven auxiliary feedwater (TDAFW) pump in August 2000. Other examples included the failure to implement timely corrective actions to ensure correct voltage regulator settings for a Unit 2 emergency diesel generator, which resulted in a second occurrence of the identical issue one year later. Another example was the failure to implement adequate corrective actions for the failure of the Unit 2 high pressure safety injection (HPSI) pump. The accumulation of these findings represents a substantive cross-cutting issue with respect to the effectiveness of your corrective action program. This issue was determined to be a No Color finding.

Regarding the supplemental inspection, your staff adequately evaluated and took corrective actions in response to the failure of the Unit 2 HPSI pump. Also, the staff adequately addressed the corrective action aspects concerning the failure to promptly address the anomalous operation of the TDAFW governor. However, the technical evaluation and extent of condition review for the TDAFW pump failure was weak and did not thoroughly address other

contributors to the failure. While the supplemental inspection is considered complete, the NRC plans to conduct a Regulatory Performance Meeting with you in accordance with the Action Matrix contained in Inspection Manual Chapter 0305, Operating Reactor Assessment Program. The purpose of the meeting is to discuss your self-assessment of progress in correcting the corrective action program deficiencies that contributed to the performance issues associated with the turbine-driven auxiliary feedwater pump (White finding) and the safety injection system unavailability (White Performance Indicator). This meeting will be scheduled at a mutually convenient time to be held at the site within the next two months. Also, this meeting will be open for public observation.

Based on the results of the two inspections, the No Color finding discussed above and four Green findings were identified. The four Green findings involved (1) the failure to properly evaluate and correct adverse conditions in four previously identified non-cited violations, (2) the failure to maintain current certain drawings located in the Unit 2 control room, (3) inaccurate vendor information associated with the Unit 2 TDAFW governor and turbine designs, and the applicable procedures, and (4) the failure to implement adequate maintenance procedures associated with the Unit 2 “C” HPSI pump. The four Green findings were violations of NRC requirements that were treated as non-cited violations because of their very low safety significance and because they were entered into the corrective actions program.

In accordance with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368), the violations were not cited due to the very low safety significance and because the findings were entered into your corrective action program. If you contest these Non-Cited Violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Millstone Units 2 and 3 facilities.

In accordance with 10CFR2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC’s document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Wayne D. Lanning, Director
Division of Reactor Safety

Docket Nos. 50-336, 50-423
License Nos. DPR-65, NPF-49

Enclosures:
1. NRC Inspection Report 50-336/2000-017, 50-423/2000-017
   Annual Baseline Inspection for the Identification and Resolution of Problems
2. NRC Inspection Report 50-336/2001-003
   Supplemental Inspection due to a Degraded Cornerstone in Mitigating Systems

cc w/encls:
B. D. Kenyon, President and Chief Executive Officer - NNECO
R. P. Necci, Vice President - Nuclear Technical Services
L. J. Olivier, Senior Vice President and Chief Nuclear Officer - Millstone
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REGION I

Docket No:	50-336, 50-423
License No:	DPR-65, NPF-49
Report No:	50-336/2000-017, 50-423/2000-017
Licensee:	Northeast Nuclear Energy Company (NNECO)
Facility:	Millstone Nuclear Power Station, Units 2 & 3
Dates:	January 15 - February 2, 2001
Inspectors:	Barry S. Norris, Senior Reactor Inspector Thomas F. Burns, Reactor Inspector Todd H. Fish, Operations Engineer Steve R. Jones, Senior Resident Inspector Alfred Lohmeier, Reactor Inspector Kathleen D. Modes, Health Physicist
Approved By:	David C. Lew, Chief Performance Evaluation Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000336-00-17, 05000423-00-17; on 01/15-02/02/01; Northeast Nuclear Energy Company, Millstone Units 2 and 3; annual baseline inspection of the identification and resolution of problems; three findings were identified concerning corrective actions and design control.

The inspection was conducted by five regional inspectors and one resident inspector. Three findings were identified. Two of the findings were determined to be of very low safety significance (Green) and were categorized as Non-Cited Violations; the third finding was a cross-cutting issue and was determined to be No Color. The significance of the issues is indicated by their color (green, white, yellow, red) and was determined by the Significance Determination Process (SDP). Findings for which the SDP does not apply are indicated by "No Color." (Refer to Attachment 1)

Identification and Resolution of Problems

The licensee's performance in the area of problem identification and resolution at Millstone Units 2 and 3 was generally adequate. The licensee's staff usually identified risk significant problems at an appropriate threshold, and the problems were classified at an appropriate significance level. The engineering and maintenance backlogs, as well as the corrective action backlog, appeared to be adequately managed.

In general, the majority of the issues reviewed were dealt with adequately when entered into the corrective action program; however, the team noted that a number of NRC findings identified over the past year concerned the cross-cutting area of problem identification and resolution. The majority of these findings related to Unit 2, with respect to the prioritization and evaluation of problems, and the effectiveness of corrective actions. The team also noted that many of the corrective actions were extended considerably beyond the original scheduled completion date. Additionally, while procedures allowed waiving of a root cause analyses for significant conditions adverse to quality, about half of the root cause analyses were waived without providing adequate documented justification.

- No-Color. The weaknesses with respect to the prioritization and evaluation of problems and corrective action effectiveness, as reflected in NRC findings identified over the past year, represent a substantive cross-cutting issue. Most notable was the failure to promptly address anomalous indications in the governor for the Unit 2 turbine-driven auxiliary feedwater (TDAFW) pump in August 2000. Further, after the failure of the TDAFW pump, the evaluation of the problems with the governor was not thorough and did not address other contributors to the failure. Other examples included the failure to implement timely corrective actions to ensure correct voltage regulator settings for a Unit 2 emergency diesel generator, which resulted in a second identical occurrence one year later; and the failure to incorporate a corrective action to prevent recurrence of the inoperability of the Unit 2 "C" high pressure safety injection pump.

Cornerstone: Mitigating Systems

- Green. The team identified a Non-Cited Violation of 10 CFR 50, Appendix B, Criterion XVI, due to a failure to properly evaluate and correct conditions adverse to quality. Specifically, four Non-Cited Violations issued in the last year were not fully addressed in the licensee's

corrective action program. Although the associated equipment or plant condition was corrected, the subject of the violation (e.g., failure to revise or use appropriate procedures) was not resolved. The safety significance was determined to be very low because the physical deficiencies were corrected. **(NCV 50-336,423/2000-017-01)**

Cornerstones: Barrier Integrity/Mitigating Systems

- Green. The team identified a Non-Cited Violation of 10 CFR 50, Appendix B, Criterion III, due to a failure to maintain design documents accurate. Specifically, six drawings classified as "operationally-critical" and located in the Unit 2 control room, for safety-related equipment, were not maintained current. The safety significance was determined to be very low because there has been no actual degradation of plant equipment due to this problem. **(NCV 50-336/2000-017-02)**

REPORT DETAILS

4. OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution (71152)

a. Effectiveness of Problem Identification

(1) Inspection Scope

The team evaluated the documents listed in Attachment 2. The review included condition reports (CRs), maintenance trouble reports, operator workarounds, temporary modifications, maintenance and engineering backlogs, security and contamination event logs, and the disposition of selected operating experience events and notifications. The team also interviewed the plant staff and management.

The team reviewed Nuclear Oversight audit and surveillance reports, departmental self-assessments, and third-party reviews of licensee performance. This review was to determine whether the assessment results were consistent with NRC findings, assessment results were entered into the licensee's corrective action program, and corrective actions were completed to resolve identified program deficiencies.

(2) Issues and Findings

The team determined that the Millstone staff had generally identified problems and entered them into the CR system. However, the team noted an instance where problem identification was weak. In July 2000, a modification was implemented to upgrade the security radio system at the Millstone station. At the completion of the modification, security personnel recognized that the modification was inadequate, in that the security radios did not work in all of the required areas of the power block; nonetheless, the system was declared operable. Station management was not informed of the inadequate modification nor did the security department initiate a CR for a condition adverse to quality, until questioned by the NRC during this inspection. The team determined this was not a violation of NRC requirements or the Millstone Security Plan.

The team noted that the results of the licensee's last two audits and the periodic self-assessments were consistent with the overall findings of the inspection team.

b. Prioritization and Evaluation of Issues

(1) Inspection Scope

The inspectors reviewed the CRs listed in Attachment 2 to assess the appropriateness of the licensee's classification of the significance level, cause determination, and the extent of condition review. The inspectors assessed NNECO's review of the CRs for operability, reportability, and Maintenance Rule reliability and unavailability. The review also included an assessment of the backlog of corrective actions, and the maintenance and engineering backlogs, to determine if any actions, individually or collectively, represented an increased risk due to the delay of implementation. The team also

observed the onsite and offsite review committees to evaluate the adequacy of their reviews with respect to the root cause evaluation and the proposed corrective actions.

The corrective action program at Millstone provided for three significance levels of CRs; the level usually corresponded to the risk associated with the issue. Significance Level 1 (SL1) CRs were normally considered a significant condition adverse to quality and were expected to receive a formal in-depth root cause analysis; SL2 CRs were a condition adverse to quality and received an apparent cause determination; and SL3 CRs were minor issues with no cause determination anticipated.

(2) Issues and Findings

The team determined that CRs were generally classified at the correct significance level. When an apparent cause determination or root cause analysis was performed, the depth of the analysis was normally thorough and adequate. The Millstone staff considered operability and reportability requirements, as necessary. Although significant issues were classified as SL1, many did not receive a root cause analysis. The corrective action program allowed for waiving the root cause analysis; however, the team noted that root cause analyses were waived for about half of the SL1 CRs with inadequate or no documented justification.

The team reviewed the backlog of maintenance and engineering issues, and determined that the backlogs were properly prioritized and appeared to be declining with respect to total numbers. The team observed portions of the onsite and offsite review committees, and verified that both committees have a questioning attitude with respect to risk and safety.

However, several of the Non-Cited Violations (NCVs) issued in the last year were written to address the apparent causes of a problem and not the problem itself. As a result, although the Millstone CR program ensured that the equipment or plant condition was corrected, the problems identified in the NCVs were not always assessed to ensure that the corrective actions addressed the violation. The specific instances were:

- The violation (NCV 50-336/2000-06-01) was a failure to establish adequate procedural controls for draining of the Unit 2 safety injection header. The plant was in a cold shutdown condition and the reactor coolant system (RCS) was partially drained. Specifically, operators used the equipment clearance process, rather than an approved operating procedure for the evolution; this resulted in a loss of approximately 50 gallons of RCS inventory. The system alignment was returned to normal and the RCS inventory was restored to the proper level. However, corrective actions did not address the violation; i.e., failure to use an approved operating procedure. In the current NRC inspection program, the unintentional draining of RCS inventory would be determined to be of very low risk significance (Green) using Phase I of the Significance Determination Program, because the issue could affect the integrity of the RCS.

- The violation (NCV 50-423/2000-07-02) was a failure to promptly correct a nonconforming condition associated with a Unit 3 emergency diesel generator (EDG) or to evaluate acceptability of the degraded condition for an extended period

of time. Although the EDG was repaired, no actions were taken to address the failure to correct the problem in a timely manner or evaluate the condition as acceptable. The issue was determined to be No-Color at the time of the inspection report.

- The violation (NCV 50-336/2000-08-02) was a failure to adequately implement procedures for the filling and venting of the Unit 2 chilled water system after maintenance. Specifically, the licensee neither developed a new procedure for filling the chilled water heat exchanger nor used an approved existing procedure to vent portions of the system following the maintenance, which resulted in air-binding of both chilled water pumps. The chilled water system was restored to service; however, corrective actions did not address the failure to use an approved procedure for filling and venting of the chilled water system. The issue was determined to be Green at the time of the inspection report.

- The violation (NCV 336/2000-09-03) was a failure to implement timely corrective actions for a July 1999 failure to implement a surveillance procedure for a Unit 2 EDG, resulting in a repetition of the identical problem in July 2000. The licensee revised the associated surveillance test, but did not address the reasons for the failure to correct the procedure in 1999. The issue was determined to be Green at the time of the inspection report.

The above issues affected initiating events and mitigating systems, and each was assessed using the Significance Determination Process. Overall, this was considered to be more than minor, based on: (1) the failure to ensure that proper procedures were used, (2) the failure to promptly correct a nonconforming condition or evaluate the acceptability of the condition for extended periods, (3) the failure to develop a procedure, and (4) the failure to promptly revise a surveillance procedure. The inspectors did not identify any examples where the failure to address the above violations actually resulted in any plant equipment being inoperable or unavailable. Therefore, this finding was determined to be of very low safety significance (Green) using Phase I of the Significance Determination Process. The failure to properly evaluate and correct NRC identified deficiencies (i.e., NCVs) was entered into the Millstone corrective action program as CR-01-0845. Nevertheless, the failure to evaluate and correct conditions adverse to quality is a violation of 10CFR50, Appendix B, Criterion XVI. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the NRC Enforcement Policy, issued May 1, 2000 (65FR25368). **(NCV 50-336,423/2000-017-01)**

c. Effectiveness of Corrective Actions

(1) Inspection Scope

The inspectors reviewed the corrective actions associated with the NNECO cause evaluations to determine the prioritization and status of the actions, and the effectiveness of the actions to preclude recurrence.

(2) Issues and Findings

The team determined that the actions identified on the CRs were generally adequate to correct the identified problem and, as appropriate, to prevent recurrence; although, there were examples where problems were not promptly or effectively corrected. Also, the team also observed weaknesses related to implementation of the corrective action program. These observations included the following.

- Many of the corrective action requests had been extended numerous times; some as high as 15 extensions, with some as old as 36 months. Although not a violation of NRC requirements, the number of extensions and the age of the items appears to be high.

- The corrective action procedure requires an effectiveness review for all CRs classified as SL1. The team inspectors noted that the effectiveness review was frequently not done. Examples included CR M3-00-0349 involving an individual who operated a system with blue tags attached without receiving permission, and CR M3-00-1860 that involved the failure of a radiation monitor, which resulted in an inoperable train of the hydrogen recombiner. Although not a violation of NRC requirements, this was another example of weak implementation of the corrective action procedure.

- The team noted that NNECO had identified on CRs at least 38 drawing discrepancies which were not corrected, even though the drawings were considered "operationally-critical" and were used in the Unit 2 control room. The inspectors determined that six of the discrepancies could impact safety related equipment during emergent maintenance activities or operational events, which required reliance on the drawings. For example, these drawings included the charging pumps seal water system, and the electrical fuse blocks associated with the power supplies for the isolation valves for the containment air radiation monitor.

  The inspectors did not identify any examples where the drawing discrepancies actually resulted in any plant equipment being inoperable or unavailable. Therefore, this finding was determined to be of very low safety significance (Green) using Phase I of the Significance Determination Process; because the seal water could affect the operability of the charging pumps (mitigating system) and the electrical fuse blocks could affect the operability of containment isolation valves (barrier integrity). This was considered more than minor since the failure to update operationally critical drawings could have a credible impact on plant safety; however, the safety significance was determined to be very low since no actual degradation of plant equipment due to this problem was identified. The failure to correct the drawings was entered into the corrective action program as CR-01-0847. Nevertheless, the failure to maintain design documents accurate is a violation of 10CFR50, Appendix B, Criterion III. This violation is being treated as a NCV, consistent with Section VI.A of the NRC Enforcement Policy, issued May 1, 2000 (65FR25368). **(NCV 50-336/2000-017-02)**

d. Assessment of Safety-Conscious Work Environment

(1) Inspection Scope

The inspectors interviewed plant personnel to determine if people were hesitant to use the CR system to identify safety problems.

(2) Issues and Findings

No findings were identified.

4OA4 Cross-Cutting Issues

While the majority of the corrective action program issues reviewed were dealt with adequately at Millstone, the team noted a number of findings in the cross-cutting area of problem identification and resolution during this inspection and in previous NRC inspections conducted over the past year. The majority of these findings related to Unit 2 with respect to the prioritization and evaluation of problems, and the effectiveness of corrective actions. Examples include the following:

- The licensee failed to adequately evaluate the anomalous operation of the governor for the Unit 2 turbine-driven auxiliary feedwater (TDAFW) pump during a surveillance test in August 2000. The pump failed to perform its function during the next scheduled surveillance test in September 2000. Further, the subsequent evaluation for the failure was not thorough. The details of the licensee's evaluation for the failure of the TDAFW are documented in NRC IR 50-336/2001-003.

- During a review of the corrective actions associated with an unexpected cooldown Unit 2 had experienced following a reactor scram, the NRC identified that the licensee had failed to determine the cause of the cooldown. The licensee subsequently determined that the cooldown was caused by valves for the reheat steam supply to the moisture separator remaining open because the controllers were not in the required automatic mode of operation. The details of the issue are documented in NRC IR 50-336/2000-01.

- In 1999, Unit 2 operators failed to reset the voltage regulator on the EDG, rendering the EDG inoperable. A year later in 2000, operators again failed to reset the voltage regulator. The details of the issue are documented in NRC IR 50-336/2000-009.

- Due to inadequate maintenance, the Unit 2 high pressure injection system was declared inoperable. One of the causes identified by the licensee was an inadequate evaluation of an industry operating experience; the corrective action for incorporating that knowledge into the maintenance procedure was inadequate to prevent recurrence. The details of the issue are documented in NRC IR 50-336/2001-003.

The weaknesses with respect to the prioritization and evaluation of problems and corrective action effectiveness represent a substantive cross-cutting issue. This issue

was assessed using Manual Chapter 0610*, “Power Reactor Inspection Reports,” (Group 3 questions), and determined to be a No Color finding.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The inspectors presented the inspection results to Mr. L. Olivier, and other members of licensee management, at the conclusion of the inspections on February 2, 2001. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

Attachments:

Attachment 1: NRC’s Revised Reactor Oversight Process
Attachment 2: Partial List of Personnel Contacted
Items Opened, Closed, and Discussed
List of Acronyms
List of Documents Reviewed

Attachment 1

NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas): reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

Reactor Safety	**Radiation Safety**	**Safeguards**
● Initiating Events	● Occupational	● Physical Protection
● Mitigating Systems	● Public	
● Barrier Integrity		
● Emergency Preparedness		

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.

The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: http://www.nrc.gov/NRR/OVERSIGHT/index.html.

Attachment 2

PARTIAL LIST OF PERSONNEL CONTACTED

Millstone

S. Baker	Operations Work Control Manager, Unit 2
J. Campbell	Process Owner, Protective Services
R. Decensi	Manager, Radiation Protection
P. Dillon	Team Lead, Secondary Systems, Unit 2
D. Godinez	Operations Engineer, Units 2&3
R. Griffin	Process Owner, Chemistry
S. Heard	Process Owner, Corrective Action Program
J. Langan	Assistant Operations Supervisor, Unit 3
R. Lizotte	Master Process Owner, Assessment
S. Scace	Master Process Owner, Manage the Asset
S. Thickman	Licensing Engineer
A. Vomastek	Process Owner, Employee Concerns Program

NRC

P. Cataldo	Resident Inspector, Unit 2
A. Cerne	Senior Resident Inspector, Unit 3
B. Sienel	Resident Inspector, Unit 3
W. Lanning	Director, Division of Reactor Safety

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened & Closed

50-336,423/2000-017-01	NCV	Failure to correct conditions adverse to quality; i.e., NCVs were not properly addressed (Green) (IR Section 4OA2.b)
50-336/2000-017-02	NCV	Failure to resolve maintain operationally-critical drawings in the control current (Green) (IR Section 4OA2.c)

LIST OF ACRONYMS

CFR	Code of Federal Regulations
CR	Condition Report
EDG	Emergency Diesel Generator
HPSI	High Pressure Safety Injection
IR	Inspection Report
NCV	Non-Cited Violation
NNECO	Northeast Nuclear Energy Company
NRC	Nuclear Regulatory Commission
SL	Significance Level
TDAFW	Turbine-Driven Auxiliary Feedwater

LIST OF DOCUMENTS REVIEWED

PROCEDURES

AP-702	Welding Administrative Procedure, Rev. 18
CMP-715A1	Work Control Practices for Threaded Fasteners, Rev. 003
MP 2712B2	Overhead Crane Operating Information, Rev. 1-01
MP 2712B1	Control of Heavy Loads, Rev. 8-01
MP 2721W	Spent Fuel Pool Gate Maintenance and Movement, Rev. 6-02
MP-08-MP-GDL02	AWO Preparation Guideline, Rev. 0-01
MP-16-CAP-SAP-01	Condition Report Initiation, Rev. 00-01
MP-16-MMM	Corrective Action, Rev. 02
MP-16-SDP-GDL01.01	Millstone Station Significance Determination Process, Rev. 00
MP-20-OM-FAP02.1	Shutdown Risk Management, Rev. 0-02
MP-20-WM-FAP02.1	Conduct of On-Line Maintenance, Rev. 2-02
OP 2303B	SFP Fuel Handling Operations, Rev. 1-05
OP 2303B	SFP Fuel Handling Operations, Rev. 1-05
RP-17	Event Review Team, Rev. 01
RP-6	Root Cause Analysis, Rev. 02-01
RPM-1.1.2	Radiation Protection Program and ALARA Program, Rev. 0
RPM-1.5.2	High Radiation Area Key Control, Rev. 4
SDI-221A	Training Department Qualification and Responsibilities, Rev. 2
SDI-612	Security Reports, Rev. 10
SP 2614C	SFP Cask Crane Interlock Testing, Rev. 7-01
SP 3621.1	Main Feedwater Valve Operability Test, Rev. 8
SP 3712NC	Vital Battery Charger Surveillance Load Testing, Rev. 5
U2 WC 1	Unit 2 Work Control Process, Rev. 2
U3 WC 1	Unit 3 Work Management, Rev. 2
WC2	Tagging, Rev. 6-02

CONDITION REPORTS

CR-01-0239	M2-00-0461	M2-00-1054	M2-00-1543	M2-00-1994	M2-00-2600	M2-97-2436
CR-01-0280	M2-00-0465	M2-00-1074	M2-00-1579	M2-00-1995	M2-00-2666	M2-98-1118
CR-01-0324	M2-00-0497	M2-00-1123	M2-00-1609	M2-00-2021	M2-00-2716	M2-98-1275
CR-01-0691	M2-00-0514	M2-00-1135	M2-00-1651	M2-00-2105	M2-00-2718	M2-98-2601
CR-01-0747	M2-00-0525	M2-00-1169	M2-00-1669	M2-00-2173	M2-00-2743	M2-98-2894
CR-01-0801	M2-00-0583	M2-00-1193	M2-00-1697	M2-00-2177	M2-00-2776	M2-98-3396
M2-00-0052	M2-00-0599	M2-00-1235	M2-00-1704	M2-00-2179	M2-00-2781	M2-99-0656
M2-00-0099	M2-00-0661	M2-00-1263	M2-00-1735	M2-00-2195	M2-00-2782	M2-99-0772
M2-00-0144	M2-00-0694	M2-00-1350	M2-00-1736	M2-00-2207	M2-00-2857	M2-99-0993
M2-00-0192	M2-00-0710	M2-00-1418	M2-00-1741	M2-00-2249	M2-00-2927	M2-99-1730
M2-00-0236	M2-00-0712	M2-00-1439	M2-00-1796	M2-00-2256	M2-00-2927	M2-99-2176
M2-00-0276	M2-00-0802	M2-00-1449	M2-00-1820	M2-00-2270	M2-00-2931	M2-99-2179
M2-00-0324	M2-00-0808	M2-00-1454	M2-00-1829	M2-00-2318	M2-00-2935	M2-99-2295
M2-00-0342	M2-00-0881	M2-00-1472	M2-00-1830	M2-00-2347	M2-00-2945	M2-99-2380
M2-00-0350	M2-00-0939	M2-00-1487	M2-00-1850	M2-00-2377	M2-00-3200	M2-99-2615
M2-00-0373	M2-00-0987	M2-00-1513	M2-00-1851	M2-00-2381	M2-01-0046	M2-99-2962
M2-00-0387	M2-00-1020	M2-00-1520	M2-00-1933	M2-00-2425	M2-97-0768	M2-99-3025
M2-00-0398	M2-00-1034	M2-00-1526	M2-00-1934	M2-00-2474	M2-97-0986	M2-99-3061
M2-00-0422	M2-00-1035	M2-00-1536	M2-00-1956	M2-00-2556	M2-97-2021	M2-99-3186

M3-00-0054	M3-00-0548	M3-00-1241	M3-00-1860	M3-00-2632	M3-00-3104	M3-00-3574
M3-00-0092	M3-00-0549	M3-00-1245	M3-00-1936	M3-00-2652	M3-00-3141	M3-00-3578
M3-00-0098	M3-00-0562	M3-00-1366	M3-00-1999	M3-00-2659	M3-00-3193	M3-01-0146
M3-00-0113	M3-00-0573	M3-00-1389	M3-00-2054	M3-00-2723	M3-00-3225	M3-98-0994
M3-00-0121	M3-00-0578	M3-00-1418	M3-00-2102	M3-00-2749	M3-00-3248	M3-98-1155
M3-00-0247	M3-00-0626	M3-00-1430	M3-00-2107	M3-00-2865	M3-00-3299	M3-98-2545
M3-00-0275	M3-00-0628	M3-00-1479	M3-00-2112	M3-00-2896	M3-00-3306	M3-98-3777
M3-00-0277	M3-00-0634	M3-00-1565	M3-00-2163	M3-00-2918	M3-00-3314	M3-99-0646
M3-00-0284	M3-00-0654	M3-00-1615	M3-00-2183	M3-00-2930	M3-00-3348	M3-99-1254
M3-00-0308	M3-00-0935	M3-00-1676	M3-00-2244	M3-00-2942	M3-00-3355	M3-99-1480
M3-00-0349	M3-00-1008	M3-00-1699	M3-00-2259	M3-00-2972	M3-00-3358	M3-99-2430
M3-00-0362	M3-00-1011	M3-00-1711	M3-00-2292	M3-00-2982	M3-00-3363	M3-99-2472
M3-00-0367	M3-00-1066	M3-00-1757	M3-00-2474	M3-00-2990	M3-00-3371	M3-99-2575
M3-00-0392	M3-00-1068	M3-00-1769	M3-00-2570	M3-00-3020	M3-00-3375	M3-99-3305
M3-00-0439	M3-00-1087	M3-00-1781	M3-00-2616	M3-00-3102	M3-00-3527	M3-99-4032
M3-00-0473	M3-00-1165	M3-00-1795	M3-00-2627			M3-99-4034

ACTION REQUESTS RELATED TO OPERATING EXPERIENCE

AR99008511	Information Notice 99-14, Unanticipated Reactor Water Draindown at BWR's
AR00002494	Information Notice 00-01, Operational Issues Identified in BWR Trip and Transient
AR00007873	Information Notice 00-09, Steam Generator Tube Failure at IP2
AR00010377	Information Notice 00-17, Cracked Weld in RCS Hot Leg Piping at VC Summer
AR00010398	10CFR21, Possible ITT Industries Transducer Failures
AR99000724	10CFR21, GE Terminal Block Cracking in GE Type DC2800
AR99016104	10CFR21, Damaged Safety Grade Electrical Cabling Found in Supply

NON-CITED VIOLATIONS

1999-14-01	Failure to place RPS into a Maintenance Rule (a)(1) status
1999-14-02	Failure to establish and implement adequate testing of the SI recirculation header
1999-14-03	Failure to establish and implement adequate CAR fan testing
1999-14-04	Failure to establish and implement adequate testing of certain check valves
1999-14-05	Failure to establish and implement design controls for cable tray placement
1999-14-06	Failure to establish and implement design controls for containment instrumentation
1999-14-07	Failure to establish and implement design controls for the pressurizer spray line
1999-14-08	Failure to document instructions for seismic interactions of scaffolding and equipment
2000-01-01	Failure to implement surveillances for ESF and meteorological instrumentation
2000-01-02	Failure to establish a surveillance procedure for testing the enclosure building
2000-01-03	Design control deficiency involving isolation of main feedwater
2000-01-04	Design control deficiency involving potential to exceed SDC system design pressure
2000-01-05	Design control deficiency for blocking open doors in control room ventilation boundary
2000-01-06	Design control deficiency results in contamination of containment sump
2000-06-01	Failure to establish procedural controls for draining of the SI safety injection header
2000-06-02	Failure to adequately implement the procedure for filling of the safety injection header

2000-06-03 Failure to perform TS required surveillance activities on the battery banks
2000-06-04 Failure to adequately perform TS required surveillance activities on the RCPs
2000-06-05 Failure to adequately conduct TS required surveillance activities on the AOV
2000-06-06 Failure to establish design controls for the containment spray system
2000-06-07 Failure to perform surveillance on RCS pressurizer heater penetration breakers
2000-06-08 Failure to adequately perform discharge testing on vital battery chargers
2000-06-09 Failure to follow EPAP 1.15 for notifying EP of ERO changes
2000-07-01 Failure to identify that the "A" HPSI train injection valves were inoperable
2000-07-02 Failure to identify and correct nonconforming conditions on the "B" EDG
2000-07-03 Failure to control a high radiation area in accordance with TS 6.12.2
2000-08-01 Fire fighting strategy was not maintained
2000-08-02 Failure to implement a procedure covering the filling of the chilled water system
2000-08-03 Failure to establish and implement a procedure covering control of maintenance work
2000-08-04 Failure to take corrective actions to address RBCCW relief valves lifting
2000-08-05 Failure to implement post-maintenance test to verify RBCCW train independence
2000-08-06 Failure to establish adequate surveillance test criteria
2000-09-01 Failure to initiate performance monitoring of the CRD system
2000-09-02 Failure to identify the inoperable switchgear cooling systems
2000-09-03 Failure to implement timely corrective actions
2000-11-02 Failure to verify pump bearing oil flow following maintenance
2000-11-05 Failure to translate design changes into appropriate procedures
2000-15-01 Failure to use correct design inputs for assumptions in battery design calculations
2000-15-02 Failure to implement adequate test control

SELF-ASSESSMENTS & THIRD PARTY EVALUATIONS

3OPS-SA-2000-2: Operation and Monitoring of Systems, Structures, and Components
ECP-2000-03: Self-Assessment on Effectiveness of Corrective Actions Program Implementation in the Employee Concerns Department
ES-SA-00-001: Engineering Department Use of Operating Experience
ES-SA-00-002: Configuration Control of Design Documents
ES-SA-00-005: Delivery of Design Products for 3R07
ES-SA-00-013: Unit 2 I&C Set points
INPO Evaluation of Millstone Nuclear Power Station (9/19/00)
Little Harbor Consultants Assessments of the Safety Conscious Work Environment (9/2000)
MP-SA-00-004: Use of Industry Operating Experience
MP-SA-00-007: Radiation Protection and Waste Services
MP-SA-00-010: Maintenance's Use of Operating Experience
MP-SA-00-011: Millstone Steam Generator Integrity Program
MP-SA-00-031: 2R13 Pre-Outage Scope Development and Control
MP-SA-00-041: Radiological Surveys and the Control of Radioactive Material at Millstone
MP-SA-00-107: Millstone Surveillance Scheduling and Tracking Program
NTD-SA-00-01: Station Emergency Response Organization Qualification Program Documentation
SA-00-ECOP-01: ECOP Activities and Charter/Guideline Applicability
SA-20-NO-03: Impact of Nuclear Oversight on Station Performance

Attachment 2 - (cont.)

QUALITY ASSURANCE AUDITS & SURVEILLANCES

JUMA-00-01	Adequacy of the Quality Assurance Program for the Millstone Station
MP-00-A01	Conduct of Operations
MP-00-A14	Audit: RETS/REMP/ODCM
MP-00-A17	Emergency Preparedness Program
MP-99-A20	Audit: Security Plan, Training and Qualification and Safeguards
MP-99-A06	Corrective Action Program
MP-00-A04	Corrective Action (CREDS)

OTHER DOCUMENTS

Backlog Management - Total Recovery 2000 Backlog - Millstone 2
Backlog Management - Total Backlog 2000 - Millstone 3
Deferrable Recovery Backlog Items 2000 - Millstone 2 Technical Services
Deferrable Recovery Backlog Items 2000 - Millstone 3 Technical Services
Engineering Backlog/New Work Management 2000 - Millstone 2 Technical Services
Engineering Backlog/New Work Management 2000 - Millstone 3 Technical Services
Millstone Site Fire Protection - Active Impairment List (MP2), 01/16/01
Millstone Operational Focus Meeting (01/17/01)
Morning Meeting Briefing Sheet (01/23/01) - Status of Fire Protection Impairments
November 2000 ECP Monthly Report (12/19/00)
Nuclear Oversight Performance Summary Report (11/27/00)
Nuclear Oversight Performance Summary Report (12/29/00)

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No:	50-336
License No:	DPR-65
Report No:	50-336/2001-003 Supplemental Inspection due to a Degraded Cornerstone in Mitigating Systems
Licensee:	Northeast Nuclear Energy Company (NNECO)
Facility:	Millstone Nuclear Power Station, Unit 2
Dates:	January 15 - February 2, 2001
Inspectors:	Barry S. Norris, Senior Reactor Inspector Kenneth S. Kolaczyk, Reactor Inspector Leonard M. Cline, Reactor Inspector
Approved by:	David C. Lew, Chief Performance Evaluation Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000336/2001-003; on 01/15-02/02/2001; Northeast Nuclear Energy Company, Millstone Unit 2; supplemental inspection concerning a degraded cornerstone in mitigating systems; two findings were identified regarding the cause determinations and the corrective actions.

The inspection was conducted by three regional inspectors. Two findings were identified and determined to be Non-Cited Violations. The findings were determined to be of very low safety significance (Green). The significance of the issues is indicated by their color (green, white, yellow, red) and was determined by the Significance Determination Process (SDP). Findings for which the SDP does not apply are indicated by "no-color." (Refer to Attachment 1)

Cornerstone: Mitigating Systems

Regarding the August 2000 failure of the Unit 2 "C" high pressure safety injection (HPSI) pump, the team determined that Millstone performed an adequate root cause evaluation and extent of condition review. The root cause was determined to be blockage of oil to the bearing oil reservoir due to an impinged mechanical interface. This blockage was caused by inadequate work practices and poor vendor support. There were missed opportunities that may have prevented the pump from becoming inoperable, including a 1993 industry operating experience and a similar event at Unit 3 on a non-safety related pump. The corrective actions were generally appropriate to preclude recurrence, with one exception, as described below.

Regarding the September 2000 failure of the Unit 2 turbine-driven auxiliary feedwater (TDAFW) pump, the team determined that the licensee addressed key corrective action aspects of the event including the failure to implement timely corrective actions in response to degraded conditions. However, the team determined that the licensee did not thoroughly evaluate and identify other contributing causes. Specifically, the licensee did not fully evaluate the issues associated with a loose locking nut that was important to the operation of the governor, nor did they evaluate issues associated with inaccurate vendor technical information. Further, the licensee's evaluation of past operability was weak because observed anomalies were not considered in the determination. While the team considers the supplemental inspection for the failure of the TDAFW completed, an unresolved item was identified to review the licensee's evaluation of past operability and reportability of the governor failure.

- Green. The team identified a Non-Cited Violation of 10CFR50, Appendix B, Criterion III, due to a failure to ensure that design information was accurate and correctly translated into the applicable procedures. Specifically, the vendor technical manuals and drawings for the TDAFW pump governor and turbine were not consistent, and did not reflect the installed configuration. The safety significance was determined to be very low because similar vendor technical information deficiencies had not affected other safety-related equipment. **(NCV 50-336/2001-003-02)**

- Green. The team identified a Non-Cited Violation of 10CFR50, Appendix B, Criterion XVI, due to a failure to implement corrective actions to preclude repetition. Specifically, relative to the HPSI pump event, the revision to the associated maintenance procedure did not include guidance to address the specific contributing causal factor and would not have prevented the same event from happening. The safety significance was determined to be very low because the swing pump would normally be available and can be aligned to the affected HPSI train. **(NCV 50-336/2001-003-03)**

REPORT DETAILS

01 Inspection Scope

This supplemental inspection was performed by the NRC to assess Millstone's evaluation of the root causes, extent of condition, and corrective actions associated with a degraded cornerstone for Mitigating Systems. Specifically, the system unavailability performance indicator for high-pressure safety injection (HPSI) became White due to a low oil level in the outboard bearing of the "C" HPSI pump; and the failure of the governor for the turbine-driven auxiliary feedwater (TDAFW) pump was determined in a White inspection finding. Two white issues in the same cornerstone constitute a Degraded Cornerstone. Both issues were discussed in NRC IR 50-336/2000-011.

The inspection was conducted in accordance with NRC Inspection Procedure 95002. The team review of the issues consisted of examining the condition reports and corrective actions that were initiated as a result of the events, which included applicable Licensee Event Reports, station procedures, and drawings associated with the HPSI and TDAFW systems. Personnel from the engineering, maintenance and operations departments were interviewed.

02 Evaluation of Inspection Requirements

02.01 Problem Identification

a. Determine that the evaluations identify who (i.e., licensee, self revealing, or NRC), and under what conditions the issues were identified.

a.1 HPSI

On August 3, 2000, with Unit 2 at 100% power, a licensee Plant Equipment Operator (PEO) identified a low oil level for the outboard bearing on the rotating shaft collar of the "C" HPSI pump. The operations department had completed a surveillance test (SP2604B-1, "HPSI Pump Operability and Inservice Testing, Facility 2") of the HPSI pump, and the PEO noted a slightly higher temperature on the outboard bearing as compared to the inboard bearing. The PEO noted that there was oil in the outboard bearing oil reservoir (a clear glass bulb, commonly referred to as the bubbler), but there was no oil on the flinger ring (i.e., an integral attachment to the shaft which applies oil to the bearing). The lack of oil on the flinger ring indicated that there was insufficient oil in the bearing housing. The PEO verified the low level in the bearing housing using a dipstick. The licensee declared the pump inoperable and initiated Condition Report (CR) M2-00-2207.

a.2 TDAFW

On September 20, 2000, with Unit 2 at 100% power, plant operators were unable to increase the speed of the TDAFW pump to the normal operating speed during a monthly surveillance test (i.e., self-revealing). The licensee subsequently declared the TDAFW pump inoperable. Licensee investigation revealed a broken spring in a clutch assembly that transmitted torque from the electric servo-motor to the turbine governor. The licensee documented the event in CR M2-00-2595.

b. Determine that the evaluations document how long the issues existed, and prior opportunities for identification.

b.1 HPSI

Prior to the discovery on August 3 of the low oil level in the HPSI pump, work was performed on July 6, 2000, to repair a leak on the bubbler, and to perform the annual pump inspection/lubrication. The work was controlled by an automated work order (AWO M2-99-08720). For the annual inspection and lubrication, the mechanic drained and refilled the bearing housing. The licensee's investigation determined that the mechanic filled the bubbler twice (approximately 8 ounces) to refill the housing. The empty bearing housing needed approximately 16 ounces of oil to fill it to the proper level.

The licensee determined that the most likely cause for the low level condition was the insufficient oil replenishment following the maintenance on July 6, 2000. The total fault-exposure hours attributed to the low oil condition was 654 hours, from July 6 until August 3, 2000. The 654 hours resulted in the HPSI Performance Indicator exceeding the Green/White threshold for the 3rd Quarter 2000.

In June 2000, a similar event with a bubbler occurred on a non-safety related pump at Unit 3. The mechanic who discovered the low oil level in the pump at Unit 3 did not document the problem by initiating a CR. As a result, the Unit 2 management was not aware of the problem and missed the opportunity to determine if a widespread potential problem with the Trico bubblers existed.

In December 1993, an industry operating experience (OE) discussed problems related to pump oil levels and lubrication events. One of the issues in the OE specifically addressed anticipating the amount of oil to be added, and that the differences should be investigated. (see Section 02.02.c.1 for additional details)

b.2 TDAFW

Problems with the TDAFW pump were noted during the previous surveillance test, on August 23, 2000. During that test, operators at the turbine noted that the speed did not change when the operators adjusted the switch in the control room. When the turbine did respond, the speed change was not smooth as expected. Despite the unusual performance, the licensee did not conduct pump troubleshooting or declare the TDAFW pump degraded. In a letter to Millstone, dated December 6, 2000, the NRC determined the issue to be of low to moderate safety significance (White finding), and a Notice of Violation of 10CFR50, Appendix B, Criterion XVI, was issued for failure to correct a significant condition adverse to quality.

The licensee's evaluation concluded that the TDAFW problem could have been detected earlier if the anomalous pump performance during the August 2000 surveillance had been fully investigated. During the August surveillance, operators noted that the TDAFW pump governor performed sluggishly when it was operated from the control room. Specifically, when control room operators attempted to change turbine speed, the turbine did not initially respond, and any speed changes that did occur were

not smooth. Operators at the TDAFW pump noted that the servo-motor was turning without a corresponding movement of the governor speed control.

Although the anomalous pump performance was documented in CR M2-00-2347, the licensee did not conduct any troubleshooting. The lack of investigation was based, in part, on the fact that the acceptance criteria for the surveillance test was met. In addition, an existing trouble report from April 2000, documented an instance where the TDAFW pump control switch did not spring return to the normal position. This led the licensee's engineering organization to believe the sluggish operation observed in August was due to a defective switch. Accordingly, the resultant corrective action was to have the system engineering monitor pump performance during the next two surveillance tests.

c. Determine that the evaluations document the plant specific risk consequences and compliance concerns associated with the issues, both individually and collectively.

c.1 HPSI

When the low oil level was discovered in the "C" HPSI pump, the licensee declared the pump inoperable and entered Technical Specification (TS) Section 3.5.2, "Emergency Core Cooling Systems [ECCS]." TS 3.5.2 requires two ECCS subsystems to be operable when the average reactor coolant system temperature is greater than or equal to 300°F with each subsystem having one operable HPSI pump. The "B" HPSI pump, able to be aligned to either subsystem, was placed in service, thereby satisfying the requirements of the TS.

The licensee classified CR M2-00-2207, which documented the HPSI event, as a Significance Level 1 (SL1) issue. Information provided by the pump vendor indicated that the as-found oil level would have allowed the pump to operate for an estimated 30 hours before failure. The worst case design basis accident (DBA) analysis assumed pump operation for 30 days. Accordingly, the licensee concluded the pump would not have been able to perform its safety function during a DBA. If the "C" HPSI pump failed during a DBA, the licensee determined that the other train would have been capable of performing the required safety function. In addition, the control room operators would have been able to align the "B" HPSI pump to replace the "C" pump. Therefore, the plant would have two HPSI subsystems available in a relatively short period of time following the failure of the "C" pump. As such, this event was classified as very low safety significance. The licensee considered the pump to be inoperable from July 6 until August 3, 2000 (a period of 28 days); the TS allowed outage time is 48 hours. Since the plant exceeded the allowed outage time, the licensee reported this condition to the NRC as a "... condition prohibited by the plant's Technical Specifications," per 10CFR50.73, "Licensee Event Reporting System."

c.2 TDAFW

The licensee assumed 336 hours of unavailability for their risk evaluation of the TDAFW pump failure; half of the period from August 23 to September 20. Using this assumption, the event was determined to be of low to moderate safety significance (White). The licensee's determination was consistent with the NRC's risk assessment of

the event. A plant specific evaluation of the risk consequence of the pump failure was not performed by the licensee.

When the TDAFW pump failed the September 2000 surveillance test, licensee personnel appropriately entered TS 3.7.1 2, "Auxiliary Feedwater Pumps." The TDAFW pump was repaired and returned to service before the 72-hour allowed outage time was exceeded. Regarding reportability in accordance with 10CFR50.73(a)(2)(i)(B), the licensee determined that the event was not reportable, based on the assumption that the September surveillance test failure was "the time of discovery" for establishing when the pump became inoperable. However, the team determined that the licensee's evaluation of past operability was weak. This is further discussed in section 02.02.b.2 of this report.

c.3 HPSI and TDAFW Collectively

The inspectors evaluated the HPSI and TDAFW failures collectively and determined that the risk was not increased and there was no additional compliance concern based on the fact that the two failures did not occur at the same time.

02.02 Root Cause and Extent of Condition Evaluation

a. Determine that the problems were evaluated using a systematic method to identify the root causes and contributing causes.

a.1 HPSI

Millstone CR M2-00-2207, which documented the low oil level in the "C" HPSI pump, was classified as SL1. In accordance with the licensee's corrective action procedure, a SL1 CR required a root cause analysis. The licensee used the barrier analysis method to identify the root and contributing causes for the HPSI issue.

a.2 TDAFW

Millstone CRs M2-00-2347 and M2-00-2595, which documented the problems identified during the August and September surveillance tests, were classified as SL2. As a result, as allowed by the licensee's corrective action procedure, a systematic method such as barrier and change analysis was not performed. Based on the SL2 classification, the licensee performed an apparent cause evaluation that identified possible causes for the failure.

b. Determine that the root cause evaluations were conducted to a level of detail commensurate with the significance of the problem.

b.1 HPSI

The inspectors determined that the licensee's analysis for the HPSI issue was acceptable to identify the root cause and contributing causes. The analysis identified the root cause as an inadequate design for the bottom-feeding use of the bubbler; specifically, the Trico Opti-Matic oiler assembly. In this case, the bubbler was tightened to the threaded pipe such that the pipe protruded into the bubbler base and impinged on

the internal height adjustment mechanism (spider assembly). This blocked the normal flow of oil from the bubbler to the bearing housing, and showed oil in the reservoir, which gave a false indication of an adequate oil supply to the outboard bearing of the "C" HPSI pump.

The licensee identified several contributing causes:

- Inadequate vendor support: The licensee did not have the vendor information from Trico that described the upgrade of the spider assembly from a flat to a concave configuration. The licensee believed this information may have prevented the low oil level condition in the "C" HPSI pump. In fact, the concave spider assemblies were in the site warehouse on August 3, 2000, and some pumps on site had the concave spider assemblies installed.

- Inadequate work practices: There was a common practice at Millstone to allow the staff to tighten the fittings to stop leaks on bubblers. This ultimately caused the oil supply pipe to protrude into the base of the bubbler and impinge on the flat spider assembly, which blocked the flow of oil from the bubbler to the bearing housing, and gave a false indication of oil in the reservoir.

- Lack of communication between units: A similar event occurred at Unit 3 on June 1, 2000, on a non-safety related pump. The issue was not documented on a CR. Unit 3 personnel failed to recognize other potential applications of the same bubbler.

- Inadequate procedural guidance: The licensee determined that the procedures for filling/refilling the HPSI pump bearing housings was inadequate. The procedures did not require verification of flow from the oiler to the bearing housing, or expectation of the amount of oil required to fill the bearing housing to an acceptable level.

b.2 TDAFW

As discussed in Section 02.02.a.1 of this report, the licensee classified the CRs for the TDAFW pump issues as SL2, and consequently did not perform a root cause evaluation for the failure of the TDAFW pump. In accordance with the licensee's corrective action program for SL2 CRs, an investigation was conducted to identify an apparent cause for the event. The apparent cause investigation concluded that the pump failure was due to an age-related failure of a spring in the coupling that joined the servo-motor, which provided remote operation of the governor, to the turbine governor. The spring was actually located inside the speed control knob on the governor assembly that was operated by the servo-motor and coupling. The spring was part of the original equipment, since the plant went in service in 1975. No other causes were identified.

Due to the safety significance associated with the failure of the TDAFW pump, the team determined that the licensee, in accordance with their procedures, should have classified the TDAFW CRs as SL1, which required a more rigorous root cause analysis. While the licensee addressed the key corrective action aspects of the event (i.e., failure to implement timely corrective actions in response to degraded conditions), the team determined that the licensee did not fully evaluate and identify important contributing

causes. As a result, the team identified instances in which issues and contributing causes were not fully evaluated.

During it's investigation, the licensee noted that the locking nut for the speed control knob that was operated by the servo-motor and coupling was loose. The licensee determined, based on discussions with Woodward, that the locking nut on the speed control knob, when tight, added tension to the spring inside the knob. This helped to transmit torque from the servo-motor to the governor, and ensured proper operation of the servo-motor to governor coupling. However, the licensee did not evaluate the cause of the loose locking nut or evaluate the impact of the loose locking nut on the operation and operability of the TDAFW governor. Subsequent to the start of the NRC supplemental inspection, the licensee obtained a torque value for the locking nut from the vendor.

Regarding the licensee's evaluation of past operability of the TDAFW, the licensee concluded that there was no firm evidence of when the failure occurred, and therefore, assumed that the September surveillance test failure was "the time of discovery" to be used for determining how long the pump was inoperable. However, the team concluded that there were observations that may have provided indications of past operability that the licensee did not fully address. The proper operation of the linkage between the servo-motor and the governor relies on the positive connection between the governor speed change spindle and the governor speed control knob. The licensee identified two components that contributed to this positive connection, i.e., the spring and the locking nut. During the August surveillance, the licensee noted that the servo-motor was rotating, but the governor-valve linkage was not moving. This could have indicated that the spring was broken and the friction of the locking nut was providing connection, albeit degraded, between the spindle and the knob, or that the locking nut was loose and there was intermittent connection between the spring and the knob. Further, during every shutdown of the pump, a reverse action was applied to the speed control knob, which applied a loosening torque to the locking nut. No other torque was subsequently applied to the locking nut until the September surveillance, when the locking nut was found loose. These two observations may have indicated that the TDAFW pump was inoperable following the surveillance test in August 2000. However, the licensee did not fully consider these issues in its determination. Pending the NRC review of additional licensee evaluation regarding past operability, and therefore potential reportability, this issue was identified as an unresolved item. **(URI 50-336/2001-003-01)**

The licensee's investigation also noted that the vendor technical information for the TDAFW governor and turbine did not accurately reflect the installed configuration. Specifically, the Woodward governor manual and Terry turbine design documents did not reflect how the governor was installed and operated in the plant. For example, the Woodward manual indicated that speed was controlled by an air-operated piston vice the installed electrical servo-motor. Further, the Terry turbine documents indicated that the failed spring was not required for pump operation, and should have been removed during coupling installation. Millstone did not evaluate how the inaccuracies in the vendor technical manuals would have contributed to the spring failure. Additionally, although the licensee's corrective action plan included updating the TDAFW manuals, it did not evaluate why the manuals were inaccurate, although there had been a

comprehensive review of the vendor manual program during the extended site outage in the late 1990s. Finally, the licensee's corrective action plan did not consider reviewing other manuals to determine if similar deficiencies existed.

The inspectors did not find any examples where inaccurate vendor information resulted in the inoperability or unavailability of plant equipment. Therefore, this issue is of very low safety significance (Green) in accordance with Phase I of the Significance Determination Process, in that incomplete design information could credibly affect the operability, availability, reliability, or function of a mitigating system. This issue was entered into the license's corrective action program as CR-01-0848. The failure to ensure that the supporting vendor information for the TDAFW governor and turbine was accurate and correctly translated into the applicable procedures is a violation of 10CFR50, Appendix B, Criterion III. This violation is being treated as a Non-Cited Violation consistent with Section VI.A of the NRC Enforcement Policy, issued on May 1, 2000 (65FR25368). **(NCV 50-336/2001-003-02)**

c. Determine that the root cause evaluations included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

c.1 HPSI

The licensee identified two instances that may have prevented the low oil level issue:

- In December 1993, there was an industry operating experience report that discussed pump bearing oil level and lubrication events at three other nuclear facilities. The report identified maintenance practices for avoiding this exact type of event, including anticipating the amount of oil to be replaced for a given bearing, and verifying the proper operation of the bubblers following maintenance.

- In June 2000, Millstone Unit 2 experienced the exact same issue on a non-safety related pump. The Unit 3 personnel did not initiate a CR; as such, Unit 2 was unaware of the Unit 3 problem until after the HPSI event occurred.

c.2 TDAFW

As part of their investigation, the licensee reviewed NRC and industry operating experience; no similar occurrences were identified by the licensee.

d. Determine that the root cause evaluations included consideration of potential common cause and extent of condition of the problem.

d.1 HPSI

The associated corrective actions for the root cause related to the HPSI event were applied to bubblers for all pumps at both Units 2 and 3. In addition, the contributing causes related to the procedures for oil sampling and maintenance activities, the problems identified with the work control practices, and the failure to initiate a CR were

treated as generic issues for the site. The inspectors considered the extent of condition for the HPSI issues to be appropriately addressed.

d.2 TDAFW

The CR for the TDAFW (M2-00-2595) did not discuss what actions the licensee took to ensure that the remaining Woodward governors at Units 2 and 3 where not susceptible to the same failure mechanism. When the inspectors questioned the potential for common cause failure, the licensee initiated CR-01-0594 to document that they had verified the remaining Woodward governors at Units 2 and 3 did not have the suspect spring. The inspectors noted that the licensee's actions included consideration of potential common cause and extent of condition for the one cause that they identified through its investigation.

02.03 Corrective Actions

a. Determine that appropriate corrective actions are specified for each root and contributing cause, or that there is an evaluation that no actions are necessary.

a.1 HPSI

The corrective actions for the HPSI event were adequate to correct the immediate problem and prevent recurrence with one exception. One of the proposed corrective actions to address the procedural inadequacies was a revision to Maintenance Form (MF) 2701F-P41, the procedure used by the mechanic on July 6, 2000. The originally proposed corrective action indicated that statements should be added to MF 2701F-P41 to read "Verify that the flow to housing is unrestricted with spider assembly installed." and "Housing refill should require from 16 to 18 oz. of oil to fill pump." This change would have been consistent with the recommended guidance in the 1993 industry operating experience. However, on October 6, 2000, the licensee canceled the original procedure change and replaced it with a note that read "Filling bearing reservoir with adjuster mechanism (spider) installed will ensure unrestricted flow." This procedure change was subsequently approved and incorporated into MF 2701F-P41.

The inspectors determined that this procedure change would not ensure unrestricted flow from the bubbler to the bearing housing. Specifically, the spider assembly was installed before the mechanic refilled the bearing housing on July 6, 2000, in accordance with the procedure (MF 2701F-P41). The blockage caused by the supply pipe impinging on the spider prevented oil flow from the bubbler to the bearing housing. Implementing the procedure, as revised, would not prevent the same event from happening again.

The failure to implement adequate corrective action to prevent recurrence was assessed as a Green finding using the Significance Determination Process, based on the fact that the operability of a mitigating system could be adversely affected. This issue was entered into the licensee's corrective action program as CR-01-0727. The revised procedure step was never used and therefore had no actual impact on the availability or operability of the HPSI pump. In addition, the inadequate step was a verification that a maintenance activity had been adequately performed. Therefore, the failure to properly

implement this step would not necessarily result in pump performance. This finding was determined to be of very low safety significance (Green) in accordance with Phase I of the Significance Determination Process, because the finding had no actual affect on the HPSI pump.

The finding was considered more than minor in that a similar condition could credibly go undetected and challenge the operability of the affected system. 10CFR50, Appendix B, Criterion XVI, "Corrective Action," states that, in the case of significant conditions adverse to quality, measures shall assure corrective actions preclude repetition. The failure to implement adequate corrective actions is a violation of 10CFR50, Appendix B, Criterion XVI. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the NRC Enforcement Policy, issued on May 1, 2000 (65FR25368). **(NCV 50-336/2001-003-03)**

a.2 TDAFW

Immediate corrective actions included replacing the defective spring and retesting the TDAFW pump. At the time of the inspection, the licensee had not determined the long term corrective actions to assure the spring would remain functional. Proposed remedies being considered included establishing a preventive maintenance program that would replace the spring periodically, and/or to procure a new governor that would not require the suspect spring.

However, as discussed in Section 02.02.b.2, the inspectors concluded the licensee did not fully evaluate and identify important contributing causes. As a result, the team identified instances in which issues and contributing causes were not fully evaluated.

b. Determine that the corrective actions have been prioritized with consideration of the risk significance and regulatory compliance.

b.1 HPSI

The licensee prioritized its corrective actions appropriately, in accordance with the risk significance.

b.2 TDAFW

The licensee prioritized appropriately, in accordance with the risk significance, the corrective actions for the cause identified in the apparent cause analysis.

c. Determine that a schedule has been established for implementing and completing the corrective actions.

c.1 HPSI

All proposed corrective actions were completed except for installation of concave spider assemblies on the affected non-safety related pumps.

c.2 TDAFW

A schedule was established for completion of the corrective actions. In accordance with the Millstone corrective action program, the schedule was reviewed and approved by licensee management.

d. Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

d.1 HPSI

The associated condition report (CR M2-00-2207) included a requirement to perform an effectiveness review and established a date to complete that review. At the time of the inspection, the method of measuring the effectiveness for the specific corrective actions had not been determined.

d.2 TDAFW

No quantitative or qualitative measures of success were established to measure the effectiveness of the corrective actions for the failure of the TDAFW pump. As defined by the Millstone corrective action program, an effectiveness review was not required for a SL2 CR (CR M2-00-2595).

03 Management Meetings

Exit Meeting Summary

The inspectors presented the inspection results to Mr. L. Olivier, and other members of licensee management, at the conclusion of the inspections on February 2, 2001. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

Attachments:
Attachment 1: NRC's Revised Reactor Oversight Process
Attachment 2: Partial List of Personnel Contacted
Items Opened, Closed, and Discussed
List of Acronyms
List of Documents Reviewed

Attachment 1

NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas): reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

Reactor Safety	**Radiation Safety**	**Safeguards**
● Initiating Events	● Occupational	● Physical Protection
● Mitigating Systems	● Public	
● Barrier Integrity		
● Emergency Preparedness		

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.

The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: http://www.nrc.gov/NRR/OVERSIGHT/index.html.

Attachment 2

PARTIAL LIST OF PERSONNEL CONTACTED

Millstone
W. Bartron - Team Lead, Nuclear Safety Evaluations
J. Bemis - System Engineer
J. Chadbourne - System Engineer
T. Cleary - Senior Engineer, Compliance
M. Goldblatt - Corrective Action Engineer
S. Heard - Process owner, Corrective Action Program
A. House - Corrective Action Engineer
D. Knopf - Plant Reliability Engineer
T. Lyons - Team Leader, NSSS
R. Sholler - Process Owner, Plant Reliability
R. Tomer - Root Cause Analysis Team Leader

NRC
P. Cataldo - Resident Inspector, Unit 2
S. Jones - Senior Resident Inspector, Unit 2
W. Lanning - Director, Division of Reactor Safety

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED

50-336/2001-003-01	URI	Weak evaluation of past operability for the TDAFW pump following the September 2000 pump failure. (IR Section 02.02.b.2)

OPENED & CLOSED

50-336/2001-003-02	NCV	Failure to maintain vendor design information accurate for the TDAFW pump (Green) (IR Section 02.02.b.2)
50-336/2001-003-03	NCV	Failure to implement corrective action to preclude recurrence of the HPSI low oil event of August 2000 (Green) (IR Section 02.03.a.1)

LIST OF ACRONYMS

CFR	Code of Federal Regulations
COLR	Core Operating Limits Report
CR	Condition Report
ESF	Engineered Safety Function
LER	Licensee Event Report
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
QA	Quality Assurance
RCA	Root Cause Analysis
ST	Surveillance Test
TS	Technical Specification

Attachment 2 (cont.)

LIST OF DOCUMENTS REVIEWED

PROCEDURES

CBM-103	Oil Sampling
MF-2701F-P41	Maintenance Form, Rev. 5, 6, 6-01
MP-16-CAP-SAP-01	Condition Report Initiation, Rev.00-01
MP-16-MMM	Corrective Action, Rev.02
MP-16-SDP-GDL01.01	Millstone Station Significance Determination Process, Rev.00
OP-2308	High Pressure Safety Injection System
RP-6	Root Cause Analysis, Rev.02-01
SP-2604B	HPSI Pump Operability and Inservice Testing, Facility 2
SP-2610B	TDAFW Tests

CONDITION REPORTS

CR-01-0727 M2-00-2207 M2-00-2419 M2-01-0594 M3-00-2192 M3-00-3148 M3-00-3348
M2-00-2207 M2-00-2347 M2-00-2595 M2-98-1488 M3-00-2701

WORK REQUESTS

M2-00-07893	"C" High Pressure Safety Injection Pump Add Oil to Proper Level in Outboard Bearing Oiler
M2-00-10138	"C" High Pressure Safety Injection Pump Quarterly Oil Analysis PM
M2-00-10139	"C" High Pressure Safety Injection Pump Quarterly Oil Analysis PM
M2-00-14990	"C" High Pressure Safety Injection Pump Oil Bubble Spider Configuration Inspection and Change-out
M2-00-14991	"A" High Pressure Safety Injection Pump Oil Bubble Spider Configuration Inspection and Change-out
M2-00-14992	"B" High Pressure Safety Injection Pump Oil Bubble Spider Configuration Inspection and Change-out
M2-00-14993	"A" Reactor Building Closed Cooling Water Pump Oil Bubble Spider Configuration Inspection and Change-out
M2-00-15039	"B" Stator Liquid Cooling Pump Oil Bubble Spider Configuration Inspection and Change-out
M2-99-08720	"C" High Pressure Safety Injection Pump Annual PM

OTHER DOCUMENTS

Document Action Request 001002-143321 Lubrication Information Sheet HPSI Pumps P41A,B, & C Rev. 006 Minor Rev. 01, Approval Date June 27, 2000
HPSI Pump Operability Test Mode 1,2,3, and 4 Results (7/6/00, 8/3/00, 8/31/00, 9/28/00, 10/26/00, 11/22/00, 12/21/00)
Licensee Event Repot (LER) 50-336-014-00, "Low Oil Level in "C" HPSI Outboard Bearing
Memo MP-USE-00-068 Trico Oil Bubblers with Bottom Feed Connections (8/8/00)
Millstone Unit 2 Maintenance Rule Action Plan for HPSI System (2308)
VTM No. 25203-365-011 High Pressure Safety Injection Pumps, Unit 2