April 7, 2005

Mr. David A. Christian
Sr. Vice President and Chief Nuclear Officer
Dominion Resources
5000 Dominion Boulevard
Glenn Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION UNIT 2 AND UNIT 3 - NRC INSPECTION REPORT 05000336/2005008 AND 05000423/2005008

Dear Mr. Christian:

On February 23, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed inspections at your Millstone Power Station Unit 2 & Unit 3. The enclosed inspection report documents the inspection findings, which were ultimately discussed on February 24, 2005, with Mr. Michael Wilson and other members of your staff.

The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license, specifically in the area of the licensed operator requalification program. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents an inspection which began in October 2004, but continued through February 2005, as the inspectors worked with your staff to resolve several potentially generic issues related to site-specific simulator fidelity and testing. The report closes two simulator-related unresolved items (URIs), one from a previous Unit 3 licensed operator initial examination report and one from a previous Unit 2 engineering team inspection report. Additionally, the report opens two URIs related to simulator scenario-based testing.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Richard J. Conte, Chief
Operational Safety Branch
Division of Reactor Safety

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

Enclosure: Inspection Report 05000336/2005008 and 05000423/2005008

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Enclosure

REGION I

Docket No.:	05000336, 05000423
License No.:	DPR-65, NPF-49
Report No.:	05000336/2005008 and 05000423/2005008
Licensee:	Dominion Nuclear Connecticut, Inc.
Facility:	Millstone Power Station, Unit 2 and Unit 3
Location:	P. O. Box 128 Waterford, CT 06385
Dates:	October 4, 2004 - February 23, 2005
Inspectors:	S. Barr, Senior Operations Engineer H. Balian, Operations Engineer P. Presby, Operations Engineer C. Zoia, Operations Engineer (Region III)
Accompanied by:	L. Vick, Reactor Engineer, Operator Licensing Branch, Office of Nuclear Reactor Regulation
Approved by:	Richard J. Conte, Chief Operational Safety Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000336/2005008 and 05000423/2005008; 10/04/2004 - 02/23/2005; Millstone Power Station, Unit 2 and Unit 3; Licensed Operator Requalification Program, Other Activities.

This inspection was conducted by three Region I inspectors and one Region III inspector, who were accompanied by one NRR reactor engineer. No findings of significance were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 3 dated July 2000.

A. NRC-Identified and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems

1R11 Licensed Operator Requalification Program (71111.11B)

a. Inspection Scope

The following inspection activities were performed using NUREG-1021, Rev. 8, "Operator Licensing Examination Standards for Power Reactors," Inspection Procedure Attachment 71111.11, "Licensed Operator Requalification Program," and NRC Manual Chapter 0609, Appendix I, "Operator Requalification Human Performance Significance Determination Process (SDP)," as acceptance criteria, 10 CFR 55.46 Simulator Rule (sampling basis). These inspection activities were performed for both units.

The inspectors reviewed documentation of operating history at both units since the last requalification program inspection. The inspectors also discussed facility operating events with the resident staff. The inspectors performed a general review of documented performance related to operator performance, including NRC inspection reports and licensee Condition Reports that involved human performance and Technical Specification compliance issues.

The Unit 2 and Unit 3 examinations consisted of both the biennial written exam and the annual operating exam. The inspectors reviewed three licensed operator comprehensive biennial written exams and two cyclical quizzes administered at each unit in 2004. The inspectors reviewed five sets of simulator scenarios and 10 job performance measures (JPMs) administered at both units during this current exam cycle to ensure the quality of these exams met or exceeded the criteria established in the Examination Standards and 10 CFR 55.59.

The inspectors observed the administration of operating examinations to the Unit 2 "A" and the Unit 3 "C" shift operating and staff crews. The operating examination consisted of two simulator scenarios for the operating crew and for the staff crew, and one set of in-plant and control room job performance measures administered to each individual. As part of the examination observation, the inspectors assessed the adequacy of licensee examination security measures.

The inspectors interviewed four evaluators, two training supervisors, three ROs, and three SROs, at each unit, for feedback regarding the implementation of their respective licensed operator requalification program. The inspectors also reviewed Operations Training Condition Reports, QA audits, Operations Training self-assessments, and recent plant and industry events to ensure that the training staff modified the program, when appropriate, to recommended changes.

The effectiveness of remedial training was assessed through the review of evaluation records for the past year, including four instances of evaluation failures at each Unit 2 and eight instances at Unit 3.

Conformance with operator license conditions was verified by reviewing the following records:

- Attendance records for both units for the most recent year training cycle.
- 11 medical records at Unit 2, and 10 at Unit 3, to confirm all records were complete that restrictions noted by the doctor were reflected on the individual's license and that the exams were given within 24 months.
- Proficiency watch-standing and reactivation records. A sample of licensed operator watch-standing documentation, three operators for Unit 2 and seven for Unit 3, was reviewed for the current and prior quarter to verify currency and conformance with the requirements of 10 CFR 55.

The inspectors observed simulator performance during the conduct of the examinations at both units, and reviewed simulator performance tests and discrepancy reports to verify compliance with the requirements of 10 CFR 55.46. Millstone is committed to the ANSI/ANS-3.5-1998 standard. The inspectors reviewed simulator configuration control and performance testing through interviews and the review of: facility simulator procedures; open and closed simulator condition reports and discrepancy reports; and the review of test results. Specifically, the following scenario-based tests were reviewed:

- MP2 LORT Annual Operating Exam AOT 02
- MP2 LORT Annual Operating Exam AOE 09
- MP2 LORT Annual Operating Exam AOE 10
- MP2 LORT Annual Operating Exam AOE 18
- MP3 LORT Annual Operating Exam SE 09
- MP3 LORT Annual Operating Exam SE 20
- MP3 LORT Annual Operating Exam SE 50
- MP3 LORT Annual Operating Exam SE 53

On November 16, 2004, the inspectors conducted an in-office review of licensee requalification exam results. For both Unit 2 and Unit 3, these results included both the biennial written and annual operating examinations. The inspection assessed whether pass rates were consistent with the guidance of NRC Manual Chapter 0609, Appendix I, "Operator Requalification Human Performance Significance Determination Process (SDP)." The inspectors verified that:

- Crew failure rate on the dynamic simulator was less than 20% at both units (failure rate at both units was 0%).

- Individual failure rate on the dynamic simulator test was less than or equal to 20% at both units (failure rate was 0% at Unit 2 and 2% at Unit 3).

- Individual failure rate on the walkthrough test (JPMs) was less than or equal to 20% at both units (failure rate was 2% at Unit 2 and 2% at Unit 3).

- Individual failure rate on the comprehensive biennial written exam was less than or equal to 20% at both units (failure rate was 5% at Unit 2 and 2% at Unit 3).

- More than 75% of the individuals passed all portions of their exam at both units (93% of the individuals passed all portions of the exam at Unit 2 and 96% at Unit 3).

b. Findings

1. Acceptability or Suitability of Millstone Unit 2 and Unit 3 Simulator Scenario-Based-Tests (SBTs) For Meeting ANSI/ANS-3.5-1998 Performance Testing Criteria

Introduction. The inspectors reviewed several SBTs. As described below, those reviews indicated that those tests did not adequately compare and confirm the performance of simulator key parameters, automatic actions, and alarms against actual or predicted plant performance. In the absence of such comparisons, these tests did not appear to meet ANSI/ANS-3.5-1998 requirements for performance tests. Because ANSI/ANS-3.5-1998 does not provide details regarding the extent of the comparison between the simulator and actual or predicted plant performance that is required during SBT, some confusion has developed within the industry regarding proper interpretation of the standard in this area. Regulatory Guide (RG) 1.149 Revision 3-October 2001, which endorses ANSI/ANS 3.5-1998 with some exceptions, does not address this issue. Currently, NRC staff believes that the comparison, to be meaningful, must include key parameters / automatic actions/alarms as referenced by Section 4.1.4, Malfunctions, of the standard.

Description. The inspectors reviewed samples of Millstone Unit 2 and Unit 3 SBTs presented as ANSI/ANS-3.5-1998 performance tests. The simulation facility licensee used exclusively NRC and/or facility developed operating tests (e.g., examination scenarios developed in accordance with guidance from NUREG-1021, “Operator Licensing Examination Standards For Power Reactors,” for the purpose of evaluating the performance of applicants for a license or licensed operators’ requalifcation) as simulator SBT performance tests. As simulator performance tests, the scenario-based-tests did not sufficiently demonstrate that meaningful and adequate testing and documentation was conducted to verify the simulator’s performance as compared to actual or predicted reference plant performance. ANSI/ANS-3.5-1998 Section 4.4.3.2, Simulator Performance Testing, requires, among other things, that a record of the conduct of these tests, and a data comparison that the results meet reference unit data, shall be maintained (e.g., include a data comparison that the simulator results meet reference unit data). The simulator SBTs lacked required data comparisons, recording of tests results, and meaningful evaluations of tests results. The sampled SBTs included a scenario validation data sheet used by the licensee to ensure that the scenario can be used on the simulator for evaluating the performance of operators. However, the data sheets relied heavily upon inferred or implied simulator performance

from observations, for the most part, rather than a comparison to expected or predicted reference plant performance. The simulator SBT performance tests reviewed did not adequately identify specific key parameters, automatic actions, and/or alarms for comparison and evaluation to the reference unit expected or predicted response.

As an example, Millstone 3, Simulator "Operational Exam 50" ID Number # LORTSE50, used as a simulator performance SBT, did not adequately demonstrate that performance testing was conducted to verify the simulator's performance as compared to actual or predicted reference plant performance. Event 1, "RCS Loop D Flow Xmitter Failure," a variable malfunction that is ramped (i.e., fails from current value to 0% severity over 60 seconds) identified only expected operator actions as described in AOP 3571, Instrument Failure Response. The SBT did not adequately demonstrate nor sufficiently document test results that simulator response during the conduct of the malfunction meets ANSI/ANS-3.5 acceptance criteria of 4.1.4 with regard to: (a) observable change in simulated parameter(s) corresponds in direction to those expected from actual or best estimate response; (b) fail to cause an alarm or automatic action under identical reference plant circumstances; and (c) not cause an alarm or automatic action under identical reference plant circumstances. For the given event/malfunction, no simulator performance or test results can be assessed due to there being no performance acceptance criteria in the SBT. The SBT simply defers to use of the reference plant's AOP 3571 procedure and does not identify key parameters, alarms, and automatic actions expected to occur as consequence of the failed instrument. Also, Event 3, "Generator trip resulting in reactor trip and four faulted SGs," several malfunctions are activated at the same time with no simulator performance acceptance criteria identified. The SBT simply defers to E-0, "Reactor Trip or Safety Injection," emergency operating procedure. The simulator's performance with respect to generator trip, turbine trip, reactor failure to trip, steam generator safety valves opening, "A" steam generator faulting, main steam isolation valves A and B failure to close, and C and D safety valves sticking open, is not addressed. Attachment 1, Validation Checklist, asserts that the scenario (e.g., SBT) has been tested on the simulator and that the simulator response is reasonable and as expected. Absent specific simulator performance acceptance criteria and an evaluation of the test results, one cannot conclude that the simulator's response had been compared favorably with the reference plant's expected performance.

Analysis. Insufficient and inadequate SBT performance testing and documentation raised questions as to the adequacy or suitability of the license’s operating test scenarios as simulator performance tests. The licensee’s use of operating test scenario documentation for performance testing raised questions as to its adequacy and sufficiency as a basis for demonstrating continued assurance of simulator fidelity. These questions are raised because of a clarity problem with the specific implementing guidance for this facility and the applicable regulations (RG 1.149 and ANSI/ANS 3.5-1998). It should be noted that Revision 2 of RG 1.149, which endorses ANSI/ANS 3.5 1993, Section 1.5 states in part: “Performance and malfunction testing may be integrated with a facility licensee’s approved or accelerated training program that uses a systems approach to training if performance data are obtained during either scenario dry-runs or the training session and analyzed for compliance with the performance criteria listed in ANSI/ANS-3.5-1993.” In essence, this portion of the RG1.149 Rev. 2

endorses the SBT process, but also notes that the SBT must include simulator capability criteria. These revisions/versions of the RG/ANSI/ANS are not applicable to the facility, however.

Enforcement. The inspectors reviewed the licensee's practice of using operating test scenarios for the required performance testing of their plant specific simulators. 10 CFR 55.4 states that the definition of "performance testing" means testing conducted to verify a simulation facility's performance as compared to actual or predicted reference plant performance. 10 CFR 55.46 (c)(1) states that a plant reference simulator must demonstrate expected plant response to operator input and to normal, transient, and accident conditions to which the simulator has been designed to respond. 10 CFR 55.46 (d)(1) requires performance testing to provide continued assurance of simulator fidelity. To be consistent with the definition of "performance testing" in ANSI/ANS-3.5-1998 and the Commission's regulation, such testing must include a comparison of the results of integrated operation of the simulation facility to actual or predicted reference plant data.

In addition to the above, per Section 4.4.3.2, "Simulator Scenario-Based Testing," of the ANSI/ANS-3.5-1998 standard, simulator scenario-based tests (SBTs) need to demonstrate that the simulator is capable of being used to satisfy predetermined learning or examination objectives without exceptions, significant performance discrepancies, or deviation from the approved scenario sequence. Since simulator fidelity deficiencies can adversely affect the ability to meet training / learning objectives, SBTs must necessarily compare simulator performance to the actual or predicted performance of the plant.

Dominion is committed to the 1998 version of ANSI/ANS-3.5 and uses the testing specified by that standard to demonstrate the satisfaction of 10 CFR Part 55 requirements for simulator fidelity. Pending the clarification of ANSI standard and regulatory requirements by NRR and the subsequent acceptance of that position or an acceptable alternative by the facility, the adequacy of the licensee's current use of SBTs as performance tests is unresolved. **URI 05000336&423/2005008-01**, **Acceptability or Suitability of Millstone Unit 2 and Unit 3 Simulator Scenario-Based-Tests (SBTs) For Meeting ANSI/ANS-3.5-1998 Performance Testing Criteria**

2. Millstone Unit 3 Simulator Demonstration of Expected Reactor and Plant Response to Operator Input and to Normal Evolutions (Reactor Vessel Heat-up) Using Only Operator Actions Normal to the Reference Unit

Introduction. An NRC issue was identified for the potential failure of the Millstone Unit 3 simulator to correctly demonstrate the expected reactor and plant response to operator input and to normal conditions when conducting reactor heat-up evolutions from cold shutdown condition to hot standby (e.g., rated reactor vessel temperature and pressure) during reactor startup using the reference plant procedures as applicable to normal evolutions.

Description. The inspectors interviewed licensee simulator staff regarding their initial condition(s) development used on the Millstone Unit 3 plant-referenced simulator. The inspectors found that, potentially contrary to the requirements of the ANSI/ANS-3.5-1998 standard, Section 3.1.3, Normal Evolutions, the simulation facility licensee uses mathematical modeling changes rather than using only operator actions normal to the reference unit procedures when conducting normal evolutions for heat-up of the reactor and vessel from cold shutdown to hot standby.

Millstone Nuclear Station Unit 3 reference plant does not have any means for changing a reactor coolant pump's frictional heat output characteristics; it is established by design based, in part, on the amount of work being required and performed by pump operation. The reference plant reactor coolant pump frictional heat output is predetermined by design and cannot be adjusted during reactor operations under any conditions. Other factors such as time and rate of heat addition on the temperature of vessel head, flanges, and nozzles and well as thermal-hydraulic operating characteristics that influence reactor heat-up cannot be artificially changed during the heat-up from cold shutdown conditions in the reference reactor plant.

Analysis. The inspectors found that the simulation facility licensee had conducted required normal evolution performance testing with regard to the Unit 3 plant-referenced simulator using mathematical model changes instead of using only operator actions normal to the reference unit to artificially manipulate the effect and response of reactor coolant pump frictional heat output (e.g., allowing unrealistic reactor vessel temperature and pressure responses during reactor coolant pump operations when this simulator feature is not in the reference plant and is not part of the design data for the reactor coolant system).

Incorrect generation of simulator initial condition sets, and the use of artificial means to effect reactor coolant pump frictional heat changes, could impact operator actions on the reference plant as a result of licensed operators and senior operators being negatively trained on initial condition sets that were derived from an incorrect representation of the reactor core and reactor coolant system used to inappropriately demonstrate nuclear and thermal hydraulic characteristics and subsequent leading to misunderstandings of the expected reference plant response.

Enforcement. Section 3.1.3, Normal Evolutions, of the ANSI/ANS-3.5-1998 standard requires, among other things, that the simulator shall support the conduct of the reference unit evolutions using only operator action normal to the reference unit, including reactor startups and shutdowns, in a continuous manner without any mathematical model or initial condition changes. Additionally, the standard requires that the response of the simulator resulting from operator action, no operator action, improper operator action, automatic reference unit controls, and inherent operating characteristics shall be realistic and shall not violate the physical laws of nature within the limits of the verification, validation, and performance testing criteria of Section 4, Testing Requirements. This criteria is designed to ensure that no noticeable differences exist between the simulated systems when evaluated against the systems of the reference unit. Use of "mathematical model changes" instead of "only operator actions

normal to the reference unit," to ensure the adequacy and accuracy of the mathematical models, fails to ensure that the simulator can correctly demonstrate repeatability with respect to time base relationships, sequences, durations, rates, and accelerations as require by Section 4.1, Simulator Capabilities Criteria of the standard. The equivalency of these model changes has apparently not been demonstrated at least once.

10 CFR 55.46 (c)(1) states that a plant reference simulator must demonstrate expected plant response to operator input and to normal, transient, and accident conditions to which the simulator has been designed to respond. This item is unresolved pending the facility licensee's ability to demonstrate that the artificial reactor coolant pump heat programming used by the licensee does not produce conditions in the simulator that vary from conditions the operator would see at the reference unit. **URI 05000423/2005008-02, Millstone Unit 3 Simulator Demonstration of Expected Plant Response to Operator Input and to Normal Conditions (Reactor Heat-up Operations) Using Only Operator Actions Normal to the Reference Unit**.

3. Review of Previously-Opened Items

Introduction. The inspectors reviewed two URIs concerning simulator fidelity issues that had been documented in two previous NRC reports: Initial Examination Report 05000423/2004301 (August 2004) and Inspection Report 05000336/2004017.

Description. URI 05000423/2004301-01 described three examples of potentially inaccurate fidelity between the Unit 3 simulator and the reference plant:

- Modeling of Safety Injection Pump Cavitation - During the loss of cold leg recirculation JPM, after the containment recirculation spray system (RSS) pumps were secured, the safety injection (SI) and charging (CHS) pumps continued to cavitate. However, when the CHS pumps were subsequently secured, indications of SI pump cavitation went away even though the SI pump had no suction source.

  The licensee entered this issue into their corrective action process (Discrepancy Report (DR) 2004-3-0078) and determined that the simulator modeling did not accurately reflect actual pump elevations which created an artificial SI pump suction flow path when only the CHS pumps were secured. The modeling discrepancy appeared to be beyond the scope of current simulator operational testing. The modeling discrepancy had apparently not been identified during verification and validation testing performed several years ago. The sequence of actions taken by the license applicant that identified the discrepancy were not in accordance with station procedures; i.e., both the SI and CHS pumps are expected to be secured if the RSS suction source is lost. When procedure steps were followed correctly, the simulator performed as expected.

- Fouled Reactor Plant Component Cooling Water (RPCCW) Heat Exchanger - During the fouled RPCCW heat exchanger JPM, one license applicant indicated he recognized a potential heat exchanger problem, but he ruled out fouling on

the service water side because service water flow rate was unchanged between heat exchanger “B” and “C.”

The licensee entered this issue into their corrective action process (DR 2004-3-0079) and determined that the entered simulator malfunction resulted in the predicted (based on reference plant comparisons) 10% reduction in service water flow. This indicated reduction in service water flow, along with other simulator control room indications, provided evidence of heat exchanger fouling. The licensee determined that, for the mode of heat exchanger fouling modeled by the malfunction, all simulator indications were appropriate; the license applicant’s expectation for a larger decrease in service water flow needed to indicate fouling was inaccurate.

- Volume Control Tank (VCT) Temperature Following Loss of RPCCW Train “A” - During exam validation week, the exam team noted a rapid rise of VCT temperature following a loss of RPCCW Train “A” cooling to the letdown non-regenerative heat exchanger, and this response was believed to be inaccurate.

  This issue was also evaluated by DR 2004-3-0079, and the licensee performed an engineering analysis to validate the simulator’s demonstrated rate of VCT temperature rise. The engineering analysis determined the observed temperature rate to be correct, and no corrective actions were required.

Also, URI 05000336/2004017-01 described one example of potentially inaccurate fidelity between the Unit 2 simulator and the reference plant:

- The NRC inspection team identified the facility Emergency Operating Procedure (EOP) setpoint calculation for the Sump Recirculation Actuation Signal (SRAS) setpoint was based on switching the suction path for the containment spray (CS) and high pressure spray injection (HPSI) pumps to the containment sump prior to emptying the refueling water storage tank (RWST). In order to facilitate this action, Dominion engineering calculations indicated that due to the containment sump being at a lower level than the RWST, approximately 13.5 psig containment pressure was necessary to hold the RWST suction check valves shut to prevent continued RWST draw down until the RWST suction isolation valves were shut by the operator.

  To determine if the simulator modeled this effect, the team observed Dominion training personnel initiate a large break loss of coolant accident (LOCA) in the simulator to pump down the RWST, and vent the containment to reduce pressure. The simulator did properly draw down the RWST with pressure below approximately 14 psig. Simulator personnel then closed one containment sump suction valve to simulate a failure of the valve to open. As expected, the RWST continued to pump down to a level of 5%, then remained steady. However, the running HPSI and CS pumps continued to indicate design flow, with no indications of cavitation despite no suction source. Dominion training personnel then ran a subsequent scenario in which they shut both a containment sump

suction valve and the associated RWST suction valve; this yielded proper indications of cavitation.

The licensee entered this issue into their corrective action process and determined that a simulator modeling error existed where both containment sump suction valves (in series arrangement) needed to be closed to demonstrate a loss of flow from the containment sump. The licensee subsequently corrected the modeling error. Similar to the Unit 3 SI pump cavitation example above, this modeling discrepancy was beyond the capability of current simulator operational testing. The modeling discrepancy had apparently not been identified during verification and validation testing performed several years ago. The sequence of actions taken during the licensee investigation of required containment over-pressure was not in accordance with station procedures; i.e., only one of the in-series containment sump suction valves was closed instead of the procedure requirement to close both. When procedure steps were followed correctly, the simulator performed as expected.

Analysis. NRC discussions with the licensee, and review of their actions taken, resulted in the NRC concluding that for two apparent simulator fidelity issues (Unit 3 fouled RPCCW heat exchanger and VCT temperature), no actual lack of simulator fidelity existed and no corrective actions were required.

The NRC further concluded that for the other two apparent simulator fidelity issues (Unit 3 SI pump cavitation and Unit 2 HPSI and CS pump cavitation), simulator modeling was incorrect and simulator fidelity had not been maintained. However, in order for the fidelity discrepancies to be cited as findings, a licensee performance deficiency needs to be evident. NRC Manual Chapter 0612 defines a performance deficiency as "an issue that is the result of a licensee not meeting a requirement or standard where the cause was reasonably within the licensee's ability to foresee and correct, and which should have been prevented." While these two fidelity issues were the result of the licensee not meeting the simulator fidelity requirements of 10 CFR Part 55.46, the NRC concluded that neither of the issues' cause was reasonably within the licensee's ability to foresee and correct within the current simulator operational testing program, and therefore, no performance deficiency was cited. This conclusion was based on the fact that both issues were only evidenced by improper operator actions or equipment misalignment.

Enforcement. NRC review of the four issues described in these two URIs resulted in the conclusion that, in two cases, no actual simulator fidelity problem existed, and in the other two, simulator fidelity was inaccurate but no licensee performance deficiency existed. In the cases where fidelity was inaccurate, timely licensee corrective actions were taken. For the above cited reasons, the NRC determined no findings related to simulator fidelity existed, and therefore, URIs 05000423/2004301-01 and 05000336/2004017-01 are closed.

4. OTHER ACTIVITIES [OA]

4OA6 Meetings, Including Exit

On October 8 and October 29, 2004, the inspectors presented preliminary on-site inspection results to Mr. Michael Wilson and other members of the Millstone staff. Due to the potentially generic nature of some of the findings and the continuing submission of additional information by the licensee staff, NRC in-office inspection continued into February 2005. A final exit meeting was conducted via teleconference on February 24, 2005, again with Mr. Wilson and other members of the Millstone staff.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

M. Wilson, Nuclear Training Manager
T. Horner, Operations Training Supervisor
M. Coty, Unit 2 Licensed Operator Requalification Supervisor
T. Kulterman, Unit 3 Licensed Operator Requalification Supervisor

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000336&423/2005008-01	URI	Acceptability or Suitability of Millstone Unit 2 and Unit 3 Simulator Scenario-Based-Tests (SBTs) For Meeting ANSI/ANS-3.5-1998 Performance Testing Criteria (Section 1R11)
05000423/2005008-02	URI	Millstone Unit 3 Simulator Demonstration of Expected Plant Response to Operator Input and to Normal Conditions (Reactor Heat-up Operations) Using Only Operator Actions Normal to the Reference Unit (Section 1R11)

Closed

05000336/2004017-01	URI	Plant Simulator Does Not Correctly Model Failure of Containment Sump Valve
05000423/2004301-01	URI	Simulator Fidelity Issues

LIST OF DOCUMENTS REVIEWED

NSEM-5.01, "Simulator Modification Control Process," Revision 16

NSEM-4.09, "Simulator Operability Testing," Revision 5

NSEM-1.01, "Control of the Nuclear Simulator Engineering Manual," Revision 14

NTP-134, "Developing Simulator Training and Examinations," Revision 003-02

MP3, Form 7.3, Malfunction Cause and Effects, Malfunction #RH01, Residual Heat removal Pump A (B) Trip, Rev. 0, dated 10/31/00

MP2, Malfunction Cause and Effects, Malfunction #RH01A(B), LPSI Pump Breaker Trip, Rev. 2, dated 10/19/90

MP2 LORT Annual Operating Exam, AOT 02 (Simulator Exam Guide used as Simulator Performance Test - Scenario-Based Test) Rev 0, dated 11/20/2003

MP2 LORT Annual Operating Exam, AOT 10 (Simulator Exam Guide used as Simulator Performance Test - Scenario-Based Test) Rev 0, dated 10/30/2001

MP2 Simulator List of Open & Closed Discrepancies For Last 12 Months

MP3 Simulator Discrepancy Report Created Since 10/25/2003 (Last 12 Months)

MP3 Simulator Discrepancy Reports Closed After 10/25/2003 (Last 12 Months)

MP3 Simulator DR Summary report by DR Number as of 10/25/2004

MP3 Attachment 8.2, (Simulator) Normal Operations Test Cover Sheet, dated 10/30/2000

MP3 (Simulator) Normal Operations Test & Cover Sheet - Test Cycle Year 1, 2, 3, & 4

MP3 U3 Operations 3600 Procedures OSCAR Procedure List Report

MP3 (Simulator) Benchmark Data Analysis (For ANSI/ANS-3.5-1998, App B Transient Performance Test - “Reactor Trip Dated 12/23/2002 Main Generator Fault”

Millstone Unit 3 Startup Report, Docket No. 50-423, License No. NPF-49 (Table of Contents)

Millstone Nuclear Power Station Annunciator Response Procedure, Main Board 4C Annunciator Response, OP 3353.MB4C, Rev 005-05, dated 5/18/2004

Millstone Nuclear Power Station Lesson Plan: Reactor Protection and Safeguards Actuation System, RPS012C, Rev 2, dated 6/04/2002

MP3 (Simulator) Malfunction Test Procedure & Cover Sheet Figure 7.1 for Malfunction RD03, Dropped Control Rod, dated 1/4/2000

MP3 (Simulator) Malfunction Cause and Effects, Figure 7.3 for Malfunction RD17, Control Rod H-8 ejection Partial Head Failure, Rev 0, dated 10/31/2000

MP3, Simulator Reactor Core Test Cycle 10, Beginning of Life

MP3 DeltaT/Tavg Channel 1 Calibration Data Sheet, Rev 014-01, effective date 7/01/2004

MP3 Surveillance Procedure, DeltaT/Tavg Channel 1 Calibration SP3442A10, Rev 003-01, dated ½5/2001

MP3 LORT Annual Operating Exam, SE09 (Simulator Exam Guide used as Simulator Performance Test - Scenario-Based Test) Rev 6, dated 8/31/1998

MP3 LORT Annual Operating Exam, LORTSE20 (Simulator Exam Guide used as Simulator Performance Test - Scenario-Based Test) Rev 1, dated 4/11/1997

MP3 LORT Annual Operating Exam, LORTSE50 (Simulator Exam Guide used as Simulator Performance Test - Scenario-Based Test) Rev 0, dated 5/31/2000

MP3 LORT Annual Operating Exam, LORTSE53 (Simulator Exam Guide used as Simulator Performance Test - Scenario-Based Test) Rev 0, dated 10/25/2001

MP3 Simulator DR# 2004-3-0088, Rad Response with VCT Leak

MP3 Simulator DR# 2004-3-0089, Switch 3FWS-FS510C Intermittent Failure

MP3 NSSS Data Calculation Vol. 5, rev. 1, 10/2004

MP3 DCR Reload Core Design for Cycle 10

LIST OF ACRONYMS

CFR	Code of Federal Regulations
CHS	charging system
CS	containment spray
DR	discrepancy report
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
EOP	emergency operating procedure
HPSI	high pressure safety injection
JPM	job performance measure
LOCA	loss of coolant accident
NRC	Nuclear Regulatory Commission
QA	quality assurance
RO	reactor operator
RPCCW	reactor plant component cooling water
RSS	recirculation spray system
RWST	refueling water storage tank
SBT	scenario-based-test
SDP	Significance Determination Process
SI	safety injection
SRAS	sump recirculation actuation signal
SRO	senior reactor operator
URI	unresolved item
VCT	volume control tank