



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PA 19406-1415

November 5, 2010

EA-10-175

Mr. David Heacock  
President and Chief Nuclear Officer  
Dominion Resources  
5000 Dominion Boulevard  
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION - NRC TRIENNIAL FIRE PROTECTION  
INSPECTION REPORT 05000336/2010008 AND 05000423/2010008 AND  
NOTICE OF VIOLATION AND TEMPORARY INSTRUCTION 2515/181  
INSPECTION REPORT 05000336/2010009

Dear Mr. Heacock:

On September 22, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Millstone Power Station Unit 2 and Unit 3. In addition to the triennial fire protection inspection results, these inspection reports also document the results of an inspection performed on Unit 2 in accordance with Temporary Instruction (TI) 2515/181, "Validate the Effectiveness of the Regulatory Infrastructure Related to Fire Induced Circuit Failures and Operator Manual Actions. The preliminary results of these inspections were discussed on August 5, 2010, with Mr. A. J. Jordan and other members of your staff. Following additional in-office and on-site reviews an exit meeting was conducted by telephone with Mr. A. J. Jordan and other members of your staff on September 22, 2010.

The inspection 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. In conducting the inspection, the team reviewed selected procedures, calculations and records, observed activities, and interviewed station personnel.

One violation is cited in the enclosed Notice of Violation and the circumstances surrounding it are described in detail in the subject inspection report. The violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at <http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>. The violation involved the use of unapproved manual operator actions to mitigate post-fire safe shutdown equipment malfunctions caused by a single spurious actuation on Millstone Unit 2, in lieu of protecting the equipment in accordance with 10 CFR Part 50 Appendix R, Section III.G.2 (EA-10-175). Although determined to be of very low safety significance (Green), this violation is being cited in the Notice because not all of the criteria specified in section 2.3.2.a of the NRC Enforcement Policy for a noncited violation were satisfied. Specifically, Dominion Nuclear Connecticut, Inc. failed to restore compliance within a reasonable amount of time after the violation was identified in condition report 119114 in November 2008. You are required to

respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

One additional finding of very low safety significance (Green) was also identified. This finding was also determined to be a violation of NRC requirements. However, because of the very low safety significance, and because the issue was entered into your corrective action program, the NRC is treating this finding as a non-cited violation (NCV) consistent with section 2.3.2.a of the NRC Enforcement Policy. If you contest the NCV in this report, you should provide a written response within 30 days of the date of this inspection report with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington D.C. 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Senior Resident Inspector at Millstone. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the Senior Resident Inspector at Millstone. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response 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/reading-rm/adams.html> (the Public Electronic Reading Room). To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,



John F. Rogge, Chief  
Engineering Branch 3  
Division of Reactor Safety

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

Enclosures: 1. Notice of Violation  
2. Inspection Report 05000336/2010008; 05000423/2010008; and,  
05000336/2010009  
w/Attachment: Supplemental Information

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/RA/

John F. Rogge, Chief  
Engineering Branch 3  
Division of Reactor Safety

Docket Nos: 50-336, 50-423  
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w/Attachment: Supplemental Information

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## NOTICE OF VIOLATION

Dominion Nuclear Connecticut, Inc.  
Millstone Nuclear Station, Unit 2

Docket No: 50-336  
License No: DPR-65  
EA-10-175

During an NRC inspection conducted July 19 through September 22, 2010, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

License Condition 2.C.(3) specifies, in part, Dominion shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report and as approved in the Safety Evaluation Report (SER) dated September 19, 1978, and a supplement dated July 17, 1990.

The Final Safety Analysis Report, Section 9.10.6 specifies that Dominion will meet the requirements of 10 CFR Part 50, Appendix R, Section III.G.2, which requires, in part, except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the means of ensuring that one of the redundant trains is free of fire damage shall be provided, per the requirements in G.2.a–G.2.f.

Contrary to the above, through September 22, 2010, Dominion failed to implement all provisions of the approved fire protection program as described in the Final Safety Analysis Report and as approved in the SER dated September 19, 1978, and a supplement dated July 17, 1990. Specifically, the safe shutdown strategy for Millstone Unit 2 relied upon unapproved manual operator actions to mitigate post-fire safe shutdown equipment malfunctions caused by a single spurious actuation, in lieu of protecting the equipment in accordance with 10 CFR Part 50 Appendix R, Section III.G.2, per the requirements in G.2.a–G.2.f. The use of manual actions in lieu of providing the required protection requires prior NRC approval. Dominion had not requested or received NRC approval for the use of manual actions affecting components that included the following: charging header containment isolation valve 2-CH-249, steam generator main steam isolation valves 2-MS-64A/B, steam generator blowdown control valves 2-MS-220A/B, charging system isolation valve 2-CH-192, auxiliary feedwater flow control valves 2-FW-43 A/B and turbine driven auxiliary feedwater pump 2-FW-P4.

This violation is associated with a Green Significance Determination Finding.

Pursuant to the provisions of 10 CFR 2.201, Dominion Nuclear Connecticut, Inc. is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region I, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation; EA 10-175" and should include for each violation: (1) the reason for the violation, or, if

Enclosure 1

contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 5<sup>th</sup> day of November, 2010

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos: 50-336, 50-423

License Nos: DPR-65, NPF-49

Report Nos: 05000336/2010008; 05000423/2010008; and  
05000336/2010009

Licensee: Dominion Nuclear Connecticut, Inc.

Facility: Millstone Power Station, Units 2 and 3

Location: P.O. Box 128  
Waterford, CT 06385

Dates: July 19 through September 22, 2010

Inspectors: L. Scholl, Senior Reactor Inspector (Team Leader)  
W. Schmidt, Senior Reactor Analyst  
G. Replogle, Region IV, Senior Reactor Analyst  
J. Richmond, Senior Reactor Inspector  
R. Fuhrmeister, Senior Reactor Inspector  
M. Patel, Reactor Inspector  
E. Huang, Reactor Inspector  
J. Rady, Reactor Inspector  
G. Pick, Region IV, Senior Reactor Inspector  
D. Frumkin, NRR (Observer)  
G. Cooper, NRR (Observer)

Approved by: John F. Rogge, Chief  
Engineering Branch 3  
Division of Reactor Safety

## SUMMARY OF FINDINGS

IR 05000336/2010008, 05000423/2010008, and 05000336/2010009; 07/19/2010 - 09/22/2010; Millstone Power Station, Units 2 and 3; Triennial Fire Protection and Millstone Power Station, Unit 2; Temporary Instruction 2515/181 Inspection.

These reports covered an initial two week on-site triennial fire protection team inspection and a one week on-site inspection of regulatory infrastructure related to fire-induced circuit failures and operator manual actions by NRC Regions I and IV specialist inspectors. Additional in-office and site inspections were performed following the initial inspection. One cited and one non-cited finding of very low significance (Green) was identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process (SDP)." The cross-cutting aspects were determined using IMC 0305, "Operating Reactor Assessment Program." Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### A. NRC-Identified and Self-Revealing Findings

#### **Cornerstone: Mitigating Systems**

- Green. The team identified a non-cited violation of Millstone Unit 2 Operating License Condition 2.C.(3), and Unit 3 Operating License Condition 2.H, for the failure to implement all provisions of the approved Fire Protection Programs. Specifically, Dominion did not implement adequate review, approval and distribution of fire fighting strategies to provide for the adequate development and maintenance of effective strategies. As a result, the team found that Dominion did not provide adequate guidance in the fire fighting strategies for several areas that included the Unit 2 "B" emergency diesel generator (EDG) room, and the Unit 3 west switchgear room. This issue was entered into Dominion's corrective action program as condition report (CR) 388786.

The team determined that the failure to administratively control fire fighting strategies as required by the fire protection program was a performance deficiency. This finding was more than minor because it adversely affected the availability and capability objectives of the protection against external events (i.e., fire) attribute under the Mitigating Systems Cornerstone. Specifically, the above examples would likely cause delays in manual fire fighting activities and, therefore, adversely affected the defense-in-depth aspect of the fire protection program to limit fire damage by quick suppression of those fires that occur. The team performed a Phase 1 SDP screening, in accordance with NRC IMC 0609, Appendix F, "Fire Protection Significance Determination Process." This finding affected fire prevention and administrative controls, and was screened to very low safety significance (Green) because this failure to control fire fighting strategies was determined to represent a low degradation rating. This finding had a cross-cutting aspect in the area of human performance because Dominion failed to ensure complete and accurate fire fighting strategies were available to the fire brigade to support timely extinguishment of fires. [H.2(c)] (Section 1R05.03)



- Green. The team identified a cited violation of 10 CFR Part 50, Appendix R, Section III.G.2 for the failure to protect required post-fire safe shutdown components and cabling to ensure one of the redundant trains of equipment remains free from fire damage. In lieu of providing the required separation, Dominion utilized unapproved operator manual actions to mitigate component malfunctions or spurious operations caused by a single fire induced circuit fault (hot short, open circuit or short to ground). Dominion has entered this issue into the corrective program for resolution. The team found the manual actions to be reasonable interim compensatory measures pending final resolution by Dominion.

Dominion's failure to protect components credited for post-fire safe shutdown from fire damage caused by single spurious actuation is considered a performance deficiency. The performance deficiency was more than minor because it affected the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to an external event to prevent undesirable consequences in the event of a fire. Specifically, the use of operator manual actions during post-fire shutdown is not as reliable as normal systems operation which could be utilized had the separation requirements of 10 CFR 50, Appendix R, Section III.G.2 been met and therefore prevented fire damage to credited components and/or cables. The team used IMC 0609, Appendix F, "Fire Protection Significance Determination Process (SDP)," Phase 1 and an SRA conducted Phase 3 evaluation, to determine that this finding was of very low safety significance (Green). The team determined the finding had a low degradation rating because the manual actions were reviewed by the team and were found to be acceptable interim compensatory measures (pending licensee actions to resolve the non-compliances or obtain exemptions) because they did not require complicated actions, adequate time was available to accomplish the actions and the actions were properly included in the appropriate abnormal operating procedures. This finding had a cross cutting aspect in the area of problem identification and resolution associated with the corrective action program because Dominion did not completely and accurately identify deficiencies related to single spurious actuations of credited post-fire safe shutdown components. [P.1.(a)] (Section 1R05.06)

B. Licensee-Identified Violations

None.

## REPORT DETAILS

### Background

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure (IP) 71111.05T, "Fire Protection." The objective of the inspection was to assess whether Dominion Nuclear Connecticut, Inc. (Dominion) had implemented an adequate fire protection program and whether post-fire safe shutdown capabilities had been established and were properly maintained at Millstone Power Station Unit 2 and Unit 3 (Millstone). The following fire areas and fire zones were selected for detailed review based on risk insights from the Millstone Individual Plant Examination of External Events, past inspection results, recent operational experience, and resident inspector input:

#### Unit 2 Fire Areas / Fire Zones

- R-1 / A-1B, Reactor Building Closed Cooling Water (RBCCW) Pump & Heat Exchanger Area
- R-2 / T-10, Upper 4 kV Switchgear (SWGR)
- R-8 / A-16, "B" EDG Room
- R-13 / T-6, West 480 Volt Load Center Room

#### Unit 3 Fire Areas / Fire Zones

- AB-5, East Motor Control Center and Rod Control Area
- CB-1, West SWGR Area
- CB-7, Battery Room 5
- CB-8, Cable Spreading Area

Inspection of these fire areas/zones fulfilled the inspection procedure requirement to inspect a minimum of three samples on each unit.

The team evaluated Dominion's fire protection program (FPP) against applicable requirements which included Unit 2 Operating License Conditions 2.C.(3) and 2.C.(13), Unit 3 Operating License Conditions 2.C.(10) and 2.H, NRC Safety Evaluation Reports (SERs), 10 CFR 50.48, 10 CFR 50 Appendix R, and the NRC Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1. The team also reviewed related documents that included the Updated Final Safety Analysis Report (UFSAR), Fire Protection Program, Fire Hazards Analyses (FHA), and post-fire Safe Shutdown Analyses Reports.

Section 4.0.A.5.2 presents the results of an inspection of Unit 2 conducted in accordance with Temporary Instruction (TI) 2515/181, "Validate the Effectiveness of the Regulatory Infrastructure Related to Fire Induced Circuit Failures and Operator Manual Actions."

Specific documents reviewed by the team are listed in the attachment to this report.

## 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

### 1R05 Fire Protection (IP 71111.05T)

#### .01 Protection of Safe Shutdown Capabilities

##### a. Inspection Scope

The team reviewed the FHA, safe shutdown analyses, and supporting drawings and documentation, to evaluate the fire protection of safe shutdown equipment and capabilities. The team compared the separation requirements described in the UFSAR and in 10 CFR 50, Appendix R, Section III.G to the designed and installed fire protection features for credited safe shutdown equipment, including their supporting power, control, and instrumentation cables to assess the protection adequacy of safe shutdown capabilities. The team's review included an assessment of the adequacy of the selected systems for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and associated support system functions.

The team reviewed procedures and programs for the control of ignition sources and transient combustibles to assess their effectiveness in preventing fires and in controlling combustible loading less than the analyzed limits established in the FHA. The team reviewed selected hot work permits, transient combustible control, and fire protection program evaluations to assess the adequacy of the fire protection program administrative controls. During plant walkdowns, the team observed permanent and transient combustible loading and potential ignition sources to independently verify whether the installed protective features were being properly maintained and administrative controls were being adequately implemented.

##### b. Findings

No findings were identified.

#### .02 Passive Fire Protection

##### a. Inspection Scope

The team walked down accessible portions of the selected fire areas to evaluate whether the observed material conditions of the fire area boundaries were adequate for the fire hazards in the area. The team compared the fire area boundaries, including walls, fire doors, fire dampers, penetration fire barrier seals, electrical raceway fire barriers, and redundant equipment fire barriers to design basis requirements, industry standards, and the Millstone FPP, as approved by the NRC, to identify any potential degradation or non-conformances.

The team reviewed selected engineering evaluations, installation work orders, and qualification records for a sample of penetration fire barrier seals to determine whether

the fill material was properly installed and whether the as-left configuration satisfied design requirements for the intended fire rating. For Unit 2, there were no credited fire protection wraps in the selected fire areas.

In addition, the team reviewed the most recent test results for fire damper functionality tests and inspection records of penetration fire barrier seals and fire separation barriers for the selected fire areas, to verify whether the inspection and testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

b. Findings

No findings were identified.

.03 Active Fire Protection

a. Inspection Scope

The team evaluated the fire detection and suppression systems in the selected fire areas to determine whether they were installed, tested, maintained, and operated in accordance with NRC requirements and approved exemptions, National Fire Protection Association (NFPA) codes of record, and the fire protection program, as approved by the NRC. The team also assessed whether the suppression systems capabilities were adequate to control and/or extinguish fires associated with the hazards in the selected areas. The team reviewed initial discharge testing, design specifications, modifications, and engineering evaluations for Unit 3 carbon dioxide (CO<sub>2</sub>) suppression systems for the west switchgear room, east motor control center and rod control area, and cable spreading room. The team also reviewed and walked down the associated fire fighting strategies and CO<sub>2</sub> system operating procedures.

The team reviewed the design capability of the fire water supply system to verify whether the design basis and NFPA code requirements for the hazards involved were adequately satisfied. The team reviewed the fire water system hydraulic analyses and assessed the adequacy of the underground fire loop flow tests to verify whether the tests adequately demonstrated that the flow distribution circuits were able to meet design basis requirements. The team evaluated the motor-driven and diesel-driven fire pump capacity tests to assess the adequacy of the test acceptance criteria. In addition, the team reviewed the most recent pump and loop flow test results to verify whether the testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

The team walked down accessible portions of the detection and suppression systems in the selected areas and major portions of the fire water supply system, including motor and diesel driven fire pumps, fire water storage tank, interviewed system and program engineers, and reviewed selected open condition reports (CRs) to assess the material condition of the systems and components. In addition, the team reviewed the most recent test results

for the Unit 2 "B" emergency diesel generator (EDG) room deluge system, and for the smoke and heat detectors for the selected fire areas, to verify whether the testing was adequately conducted, the acceptance criteria were met, and any potential performance degradation was identified.

The team assessed the fire brigade capabilities by reviewing training, qualification, and drill critique records. In addition, the team interviewed fire brigade members, fire brigade leaders, a fire brigade advisor, and the site Fire Marshall, to better assess the site fire fighting capabilities. The team reviewed Dominion's fire fighting strategies (i.e., pre-fire plans) and smoke removal plans for the selected fire areas to determine if appropriate information was provided to fire brigade members and plant operators to identify safe shutdown equipment and instrumentation, and to facilitate suppression of a fire that could impact post-fire safe shutdown capability. The team independently inspected the fire brigade equipment, including personnel protective gear (e.g., turnout gear) and smoke removal equipment, to determine operational readiness for fire fighting.

b. Findings

Introduction. The team identified a finding of very low safety significance (Green), involving a non-cited violation of Millstone Unit 2 Operating License Condition 2.C.(3), and Unit 3 Operating License Condition 2.H, to implement and maintain all aspects of the approved fire protection programs (FPPs), in that Dominion had not adequately controlled fire fighting strategies as required by the FPPs. Specifically, Dominion did not implement adequate review, approval and controlled distribution of fire fighting strategies to provide for the adequate development and maintenance of effective strategies. As a result, the team determined that the guidance in the fire fighting strategies for several Unit 2 and 3 fire areas would likely result in a delay in manual fire suppression activities.

Description. The team reviewed eight fire fighting strategies, and identified multiple issues with the strategies. The team determined that the fire fighting strategies were not controlled as required by CM-AA-FPA-100, "Fire Protection/Appendix R (Fire Safe Shutdown) Program," and CM-AA-FPA-102, "Fire Protection and Fire Safe Shutdown Review and Preparation Process and Design Change Process." Specifically, CM-AA-FPA-102, Attachment 12A, required Dominion to maintain effective fire fighting strategies, including review, approval, and controlled distribution of fire fighting strategies. The team identified that fire fighting strategies were being updated and informally distributed by the site Fire Marshall in lieu of the implementation of appropriate independent reviews, approvals, and controlled distribution.

Unit 2 Issues

The team reviewed the fire fighting strategy and the relevant fire zone design features for Unit 2 fire zone A-16, the "B" EDG room. The team noted that the "A" and "B" EDG rooms shared a common ventilation system that included fan F-27 to circulate air between the two rooms. The team also noted that the fire detection systems in the two rooms utilize heat detectors and that normal personnel access to the "B" room is via the "A" room. Based on the ventilation, fire detection (i.e., heat vs. smoke detection) and personnel access design features, the team concluded that the first indication of a fire, in

particular a small or slowly developing fire, in the "B" EDG room would likely be the observation of smoke in the "A" EDG room. The team identified that the fire fighting strategy did not alert the fire brigade to the possibility that smoke in the "A" EDG room could be due to a fire in the "B" EDG room, did not provide any guidance regarding operations of recirculation fan F-27, and did not provide any guidance for additional fire location diagnostics, such as early verification of conditions in adjacent areas. The team also noted that the fire fighting strategy for EDG rooms did not provide guidance for operators to consider securing of a running EDG prior to initiation of manual suppression activities.

The team also identified an inconsistency in the fire fighting strategy for the Unit 2 west 480V load center room, in that the strategy did not appropriately identify the fire suppression equipment. Specifically, the strategy's "Fire Suppression Capabilities" section specified one specific fire hose station that included a hose that was not long enough to reach the areas covered by the specific strategy, while the "Initial Actions" section listed a different hose station that did include a hose of sufficient length.

As a result, the team determined that manual suppression in these Unit 2 areas could reasonably be delayed as a result of the fire fighting strategy deficiencies.

### Unit 3 Issues

The team reviewed the fire fighting strategy for Unit 3 fire zone CB-1, west switchgear room, and determined that the strategy provided inadequate guidance for manual discharge of CO<sub>2</sub>. The strategy for the west switchgear room provided instructions for aligning fire dampers prior to initiating the CO<sub>2</sub> suppression system. However, the section of the strategy erroneously referred to the damper alignment as if the strategy was dealing with a fire in the east switchgear room. In addition, the team discussed this issue with a fire brigade leader and interviewed a fire brigade advisor. The team determined that the information provided in the strategy, which referenced both west and east switchgear rooms, was sufficiently inconsistent and misleading to result in the brigade members delaying the initiation of the CO<sub>2</sub> suppression system until they could verify the damper operation instructions were correct.

The team also identified an error in the fire fighting strategy for the Unit 3 main transformer area, in that the specified fire hydrant for manual fire fighting had been removed by a modification, and a new hydrant, installed in an adjacent area, was not listed.

As a result, the team determined that manual suppression in these Unit 3 areas could reasonably be delayed as a result of the fire fighting strategy deficiencies.

Analysis. The team determined that the failure to control fire fighting strategies as required by the fire protection program was a performance deficiency. Specifically, CM-AA-FPA-100 and CM-AA-FPA-102 required Dominion to maintain effective fire fighting strategies, and required review, approval, and controlled distribution of fire fighting strategies. As a result, Dominion had not provided fully effective guidance in the

fire fighting strategies for the Unit 2 "B" EDG room, and the Unit 3 west switchgear room, such that delays in manual fire fighting activities would likely occur.

This finding was more than minor because it adversely affected the availability and capability objectives of the protection against external events (i.e., fire) attribute under the Mitigating Systems Cornerstone. Specifically, the above examples would likely cause delays in manual fire fighting activities and, therefore, adversely affected the defense-in-depth aspect of the fire protection program to limit fire damage by quick suppression of those fires that occur. The team performed a Phase 1 SDP screening, in accordance with NRC IMC 0609, Appendix F, "Fire Protection Significance Determination Process." This finding affected fire prevention and administrative controls, and was screened to very low safety significance (Green) because this failure to control fire fighting strategies was determined to represent a low degradation rating. A low degradation rating was assigned because there was only a minimum impact to the performance of manual fire fighting activities, such that those activities were expected to display nearly the same level of effectiveness and reliability as they would have the degradation not been present. In addition, this issue did not affect the likelihood that a fire might occur. The team concluded that this performance deficiency was reasonably within Dominion's ability to foresee and prevent.

This finding had a cross-cutting aspect in the area of Human Performance, Resources component, because Dominion failed to ensure complete and accurate fire fighting strategies were available to the fire brigade to support timely extinguishment of fires. [H.2.(c)]

Enforcement. Unit 2 License Condition 2.C.(3), and Unit 3 License Condition 2.H, in part, require that Dominion implement and maintain in effect all provisions of the approved FPP as described in the Final Safety Analysis Report. Dominion's FPP as implemented by CM-AA-FPA-100 and CM-AA-FPA-102 require the maintenance of effective fire fighting strategies, through a program that includes appropriate review, approval, and controlled distribution of fire fighting strategies. Contrary to above, fire fighting strategies for Unit 2 and 3 were not controlled as required by Dominion's Fire Protection Program. Because this finding was of very low safety significance (Green) and was entered into Dominion's corrective action program (CR 388786), this violation is being treated as a non-cited violation (NCV), consistent with section 2.3.2.a. of the NRC Enforcement Policy. **NCV 05000336/2010008-01; 05000423/2010008-01, Failure to Properly Control Fire Fighting Strategies.**

.04 Protection from Damage from Fire Suppression Activities

a. Inspection Scope

The team walked down the selected fire areas and adjacent areas, and reviewed selected documents to determine whether redundant safe shutdown trains could be potentially damaged from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. Specifically, to determine whether a potential existed to damage redundant safe shutdown trains, the team evaluated whether:

- A fire in one of the selected fire areas would not release smoke, heat, or hot gases that could cause unintended activation of suppression systems in adjacent fire areas which could potentially damage all redundant safe shutdown trains;
- A fire suppression system rupture, inadvertent actuation, or actuation due to a fire, in one of the selected fire areas, could not directly damage all redundant trains (e.g., sprinkler caused flooding of other than the locally affected train); and,
- Adequate drainage was provided in areas protected by water suppression systems.

b. Findings

No findings were identified.

.05 Alternative Shutdown Capability

a. Inspection Scope

Methodology

The team reviewed the safe shutdown analysis, operating procedures, piping and instrumentations drawings (P&IDs), electrical drawings, the UFSAR, and other supporting documents to evaluate whether Dominion could achieve and maintain hot and cold shutdown from outside the control room, for fire scenarios that rely on a shutdown methodology from outside the control room. The team assessed Dominion's ability to shutdown the plant from outside the control room both with and without the availability of offsite power. Plant walkdowns were also performed to independently verify whether the plant configuration was consistent with that described in the FHA and safe shutdown analysis. The team's review focused on systems selected for reactivity control, reactor coolant make-up, reactor decay heat removal, process monitoring instrumentation, and support system functions to assess the adequacy of the selected systems. In addition, the team assessed the systems and components credited for use during the shutdown to determine whether they would remain free from fire damage. The team reviewed the transfer of control from the control room to the alternative shutdown locations to verify whether it would be affected by fire-induced circuit faults (e.g., by the provision of separate fuses and power supplies for alternative shutdown control circuits).



Similarly, for fire scenarios that relied on a shutdown from the control room, the team also evaluated the shutdown methodology to verify the adequacy of the selected components and systems to achieve and maintain safe shutdown conditions.

### Operational Implementation

The team reviewed the training program for licensed and non-licensed operators to assess training adequacy for alternative shutdown systems and procedures. In addition, the team evaluated operator minimum shift staffing requirements to verify whether an adequate number of operators were available on-site at all times, exclusive of those assigned as fire brigade members, to perform fire related safe shutdown activities using either the normal or alternative shutdown systems.

The team reviewed the procedures utilized for post-fire safe shutdown, walked down key equipment and control stations, and performed a tabletop walk through of selected procedure steps to independently assess human factor elements and procedure adequacy. The team also evaluated the available time to assess whether operators could reasonably perform the specific actions needed to maintain plant parameters within specified limits. Specifically, the team evaluated the time critical operator actions to restore alternating current (AC) electrical power, transfer operational command and control from the main control room to the remote shutdown panel, establish reactor coolant make-up, and establish decay heat removal.

The team reviewed selected operator manual actions to determine whether Dominion had adequately validated and verified that the actions could be implemented in accordance with approved procedures, and in the time necessary to support the safe shutdown method for each fire area. In addition, the team reviewed the most recent test results for alternative shutdown transfer capability, and instrumentation and control functions, to verify whether the testing was adequately conducted, the acceptance criteria were met, and any potential performance issues were identified, to ensure the alternative shutdown capability remained functional.

b. Findings

No findings were identified.

.06 Circuit Analysis

a. Inspection Scope

The team reviewed Dominion's post-fire safe shutdown analysis for the selected fire areas to determine whether the analysis appropriately identified the structures, systems, and components important to achieving and maintaining safe shutdown. In addition, the team evaluated the analysis to assess whether the necessary electrical circuits were properly protected and whether circuits that could adversely impact safe shutdown due to hot shorts, shorts to ground, or other failures were identified, evaluated, and properly dispositioned to ensure spurious actuations would not prevent safe shutdown.

The team's review considered fire and cable attributes, potential undesirable consequences, and common power supply or bus issues. Specific review aspects included fire threat credibility, cable insulation properties, cable failure modes, and potential spurious actuations which could result in flow diversion or loss of coolant events.

The team also reviewed cable routing data bases for a sample of components required for post-fire safe shutdown to determine whether the cables were routed as described in the safe shutdown analyses.

Cable failure modes were reviewed for the following components:

### Unit 2

- 3RCS\*LI459C, Pressurizer Level Indicator
- 3RCS\*PI455B, Pressurizer Pressure Indicator
- 3RCS\*MV8000A, Pressurizer Relief Isolation Valve
- 3RHS\*MV8701A, Residual Heat Removal Inlet Isolation Valve
- 3CHS\*MV8438C, Charging Header Isolation Valve

### Unit 3

- A-EDG, Emergency Diesel Generator
- LI-1123B, Steam Generator Level Indicator
- LI-110X, Pressurizer Level Indicator

In addition, the team reviewed circuit breaker coordination studies to assess whether equipment needed to support post-fire safe shutdown activities could be impacted due to inadequate over-current coordination. Additionally, the team reviewed a sample of circuit breaker maintenance records to verify whether the circuit breakers for components required for post-fire safe shutdown were properly maintained in accordance with approved procedures.

## b. Findings

Introduction. The team identified a finding of very low safety significance (Green), involving a cited violation of Millstone Unit 2 Operating License Condition 2.C.(3) to implement and maintain all aspects of the approved fire protection program. Specifically, Dominion failed to protect required post-fire safe shutdown components and cabling to ensure one of the redundant trains of equipment remained free from fire damage as required by 10 CFR Part 50, Appendix R, Section III.G.2. In lieu of providing the required separation, Dominion utilized unapproved operator manual actions to mitigate component malfunctions or spurious operations caused by potential single fire induced circuit faults (hot short, open circuit or short to ground).

Description. As a result of a self-assessment (Self-Assessment Report 000506), Dominion initiated condition report (CR) 119114 in November 2008 to identify the lack of

documentation concerning a review of their use of operator manual actions against the guidance contained in Regulatory Issue Summary (RIS) 2006-10, "Regulatory Expectations with Appendix R Paragraph III.G.2 Operator Manual Actions," dated June 30, 2006. The CR also identified that exemption requests may be needed to obtain NRC approval for the use of operator manual actions.

In addition to information provided to the licensees in RIS 2006-010, the NRC issued several enforcement guidance memoranda (EGM) to promulgate interim enforcement guidance to the staff while the issues of non-compliant manual actions and fire induced circuit faults were being resolved. Specifically, EGM 07-004 defined March 6, 2009, as the date by which corrective actions were to have been completed for non-compliances involving the use of unapproved post-fire manual actions. If corrective actions were completed by this date the licensees would be eligible to receive enforcement discretion for the associated violations of NRC requirements. The scope of this EGM included use of manual actions to mitigate component malfunctions that resulted from fire-induced single spurious actuations but did not include malfunctions due to multiple spurious actuations. The NRC subsequently issued EGM 09-002 to describe the conditions limiting enforcement during the resolution of fire protection concerns involving multiple spurious actuations. EGM 09-002 made enforcement discretion available provided licensees entered these non-compliances into their corrective action program and implemented interim compensatory measures within six months of the issuance of NRC Regulatory Guide (RG) 1.189, Rev. 2, and then implemented corrective actions within three years of the issuance of RG 1.189, Rev. 2. Accordingly, based on the issuance date of the RG, May 2, 2010, was established as the date by which non-compliances associated with multiple spurious actuations were to be entered into the corrective action program and November 2, 2012, is the date by which corrective actions must be completed for licensees to be eligible to receive enforcement discretion for the associated non-compliances. At the time of this inspection, a fleet wide Dominion project for identification and resolution of multiple spurious operation issues was in progress.

In June 2010, during the performance of a fire protection self-assessment (SAR001036), Dominion initiated CR 383734 which documented that CR 119114 had been improperly closed to the multiple spurious operations evaluation process. Further review by the team confirmed that issues opened in CR 119114 associated with the use of unapproved manual actions to address single spurious actuation had not yet been resolved. Additional licensee reviews during this inspection subsequently identified numerous components that did not meet the separation requirements of 10 CFR Part 50, Appendix R, Section III.G.2. This issue was entered into Dominion's corrective action program as CR 388775.

Specifically, the team reviewed information provided by Dominion concerning potential unapproved manual operator actions in seven fire areas (R-2, R-4, R-9, R-10, R-13, R-14, and R-17). The team focused on actions that needed to be completed in a relatively short period of time to ensure core cooling, specifically feeding of the steam generators (SG) using the available auxiliary feedwater system (AFW). The team reviewed the Fire Safe Shutdown Analysis and procedures to reach hot shutdown for each of these areas, identifying the credited path that would need to be free of fire

damage to be in compliance with Appendix R, Section III.G.2. This included identification of the required pump or pumps and flow path including the SG flow control valve (FCV) to one of the two SGs, referred to as the required path. The team then identified any flow path to the other SG using the other FCV, referred to as the redundant path.

The team identified the post-fire safe shutdown required paths and the associated components that were operated by procedures from outside the control room using manual actions to restore/maintain the required safe shutdown function because of potential fire damage. This review identified five general types of actions needed to maintain decay heat removal with the SGs that could be subject to exemption. These included: 1) operating the required flow path FCV locally or from the fire safe shutdown panel; 2) closure of the required SG blowdown valve; 3) restoration of instrument air, if offsite power is lost, to allow continued operation of the FCVs from the control room or fire safe shutdown panel; 4) operation of the turbine driven (TD) AFW pump from the fire safe shutdown panel including not over filling the SGs; and 5) actions to protect the required 4160 volt AC bus and DC power supplies. This resulted in 11 actual individual unapproved manual actions for which the licensee had not requested exemption.

Analysis. The team identified a performance deficiency in that Dominion failed to protect components credited for post-fire safe shutdown from fire induced damage that could result in a single spurious actuation. The performance deficiency was more than minor because it affected the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences in the event of a fire. Specifically, the use of operator manual actions during post-fire shutdown is not as reliable as normal systems operation which could be utilized had the separation requirements of 10 CFR 50, Appendix R, Section III.G.2 been met and therefore prevented fire damage to credited components and/or cables. The team used IMC 0609, Appendix F, "Fire Protection Significance Determination Process (SDP)," Phase 1 and an SRA conducted Phase 3 analyses, to determine that this finding was of very low safety significance (Green).

In six of the identified fire areas actions were needed to maintain AFW flow to the required SG within 30 to 45 minutes. The actions to restore charging flow were not needed until over three hours and were not reviewed. Actions needed to operate SG atmospheric dump valves to control the plant cooldown were not reviewed, because steam generator safety valves were the assumed path for decay heat removal. Simple actions to isolate components such as repositioning switches at the bottle-up panel to force isolations and prevent spurious actuations to isolate the SGs were not reviewed, because they were essentially equivalent to actions from the control room. Actions needed to restore instrument air to support control room operation of the AFW FCVs were not reviewed because of installed two-hour air bottles on each FCV. As such, fire areas R-4, R-9, R-10, and R-17 were screened as having low degradation in the Phase 1 of the Fire SDP, Inspection Manual Chapter 0609, Appendix F.

The SRA conducted Phase 3 risk evaluations for the unapproved manual action in fire areas R-2, R-13, and R-14. The individual analyses reviewed the increase in risk due to the unapproved manual actions. These evaluations allowed for use of the available flow

path to the redundant steam generator. The bases case assumed conformance with III.G.2 (i.e., operation from the required flow path components from the control room)

and the condition case assumed non-conforming manual actions taking place outside the control room. SPAR H was used to model both the conforming and non-conforming manual actions. Specifically:

- R-2 - the required path to the #1 steam generator with operation of the "A" MD AFW pump from the control room with local manual operation of the "A" FCV vice operation from the control room.
- R-13 - the required path to the #2 steam generator with operation of the TDAFW pump and the "B" FCV from the fire safe shutdown panel vice the control room.
- R-14 - the required path to the #2 steam generator with either the TDAFW pump or the "B" MDAFW pump operating from the control room, with:
  - local manual action to isolate the 24D safety bus, and align the "B" EDG, vice no action needed
  - local manual operation of the "B" FCV vice operation from the control room.

Based on the fire frequencies specified in the Individual Plant Evaluation of External Events (IPEEE) for these areas, the total conditional core damage probability increase given the local manual actions vice control room was estimated to be in the range of 1 core damage accident in 1.1 million years (high E-7 range).

The team found the unapproved manual actions in fire areas R-2, R-4, R-9, R-10, R-13, R-14, and R-17 to be reasonable interim compensatory measures (pending licensee actions to resolve the non-compliances or obtain exemptions) because they did not require complicated actions, adequate time was available to accomplish the actions and the actions were properly included in the appropriate abnormal operating procedures. This finding has a cross cutting aspect in the area of problem identification and resolution associated with the corrective action program because Dominion did not completely and accurately identify deficiencies related to single spurious actuations of credited post-fire safe shutdown components. As a result, appropriate actions were not taken to address the use of unapproved manual actions as described above. (P.1.a)

Enforcement. License Condition 2.C.(3) specifies, "The licensee shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report and as approved in the SER dated September 19, 1978, and supplements dated October 21, 1980, November 11, 1981, October 31, 1985, April 15, 1986, January 15, 1987, April 29, 1988, July 17, 1990, and November 3, 1995." Final Safety Analysis Report, Section 9.10.6 specifies that the licensee will meet the requirements of 10 CFR Part 50, Appendix R, Section III.G.2 that identifies three methods of protecting post-fire safe shutdown equipment from fire damage. Additionally, by letter B17399, dated March 17, 1999, Dominion informed the NRC staff of variances between the SER supplement (dated July 17, 1990) related to post-fire alternative shutdown capability, and their current (1999) safe shutdown strategy for Millstone Unit 2. Letter B17399, in part, clarified that only four fire areas (R-1, R-3, R-11, and R-16) relied on alternative shutdown capability. As a result, use of manual

operator actions in lieu of protecting the equipment in accordance with 10 CFR 50, Appendix R, III.G.2 would only be allowed if approved by the NRC.

Contrary to the above, through September 22, 2010, Dominion failed to implement their fire protection program by using one of the three methods described in Appendix R, Section III.G.2 to protect circuits required for post-fire safe shutdown from fire induced circuit damage. Specifically, Dominion continued to use unapproved manual actions to mitigate post-fire safe shutdown equipment malfunctions caused by a single spurious actuation without having obtained NRC approval. This finding is being cited because not all of the criteria specified in section 2.3.2.a of the NRC Enforcement Policy for a non-cited violation were satisfied. Specifically, Dominion failed to restore compliance within a reasonable amount of time after the violation was identified in CR 119114 in November 2008. Additionally, because the violations were not corrected by March 6, 2009, Dominion is not eligible to receive enforcement discretion previously available by EGM 07-004. **VIO 05000336/2010008-02, Failure to Protect Safe Shutdown Equipment From the Effects of Fire.**

.07 Communications

a. Inspection Scope

The team reviewed selected fire related safe shutdown procedures, the FHA, the safe shutdown analysis, and associated documents to assess whether the expected method of communications would be available during and following a fire. During this review, the team considered the effects of ambient noise levels, clarity of reception, reliability, and coverage patterns. The team inspected the designated emergency storage lockers to verify whether sufficient portable radios would be available for the fire brigade and operators. In addition, the team assessed whether communications equipment, such as sound powered phone system cables, repeaters, transmitters, and uninterruptable and back-up power supplies would be adversely affected by a fire.

b. Findings

No findings were identified.

08 Emergency Lighting

a. Inspection Scope

The team walked down the emergency lights in the selected fire areas to independently evaluate the placement and coverage areas of the lights. The team assessed whether the lights provided adequate illumination on local equipment and instrumentation, required for post-fire safe shutdown, to ensure local operations could be reliably performed under expected post-fire conditions. Emergency light placement was also evaluated to determine adequate illumination of local area access and egress pathways.

The team verified whether the emergency light batteries were rated for at least an eight-hour capacity. Preventive maintenance procedures, the vendor manual, completed surveillance tests, and battery replacement practices were also reviewed to evaluate whether the emergency lighting was being maintained in a manner that would ensure reliable operation.

b. Findings

No findings were identified.

.09 Cold Shutdown Repairs

a. Inspection Scope

The team reviewed dedicated repair procedures for selected components which might be damaged by the fire, to determine whether the a cold shutdown could be achieved within the time specified in the design and licensing bases. The team also reviewed the associated equipment, materials, and tools needed to perform the repairs (e.g., pre-cut cables with lugs attached), to determine whether they were available and accessible on-site.

b. Findings

No findings were identified.

.10 Compensatory Measures

a. Inspection Scope

The team reviewed selected fire protection and post-fire safe shutdown equipment, systems, or features that were out-of-service, degraded, or inoperable (e.g., detection and suppression systems, passive fire barriers, pumps or valves, or electrical devices providing safe shutdown functions or capabilities) to determine whether Dominion had implemented appropriate compensatory measures. The team also evaluated selected short term compensatory measures to assess whether the degraded function or feature was adequately compensated until appropriate corrective action could be taken to return the equipment to service. In addition, the team assessed Dominion's effectiveness to return equipment to service in a reasonable period of time.

b. Findings

No findings were identified.

.11 Large Fires and Explosions Mitigation Strategies

a. Inspection Scope

The team reviewed Dominion's preparedness to handle large fires or explosions by reviewing two mitigating strategies on each unit to verify they continue to meet the requirements of the Unit 2 and Unit 3 license conditions 2.C.(13) and 2.C.(10), respectively by determining that:

- Procedures are being maintained and adequate;
- Equipment is properly staged and is being maintained and tested; and,
- Station personnel are knowledgeable and can implement the procedures.

b. Findings

The results of this inspection are document in NRC Inspection Report 05000336/2010011 and 05000423/2010011.

**4. OTHER ACTIVITIES**

4OA2 Identification and Resolution of Problems (IP 71152)

a. Inspection Scope

The team reviewed a sample of CRs associated with the FPP and post-fire safe shutdown issues to determine whether Dominion was appropriately identifying, characterizing, and correcting problems associated with these areas and whether the planned or completed corrective actions were appropriate. The CRs reviewed are listed in the attachment.

The team determined that the licensee had identified several multiple spurious operation (MSO) scenarios for further review. Dominion placed the identified scenarios into their corrective action program and implemented alternate compensatory measures prior to May 2, 2010.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 (Closed) URI 50-423/2003-02-03, Generic Industry and NRC Resolution of Fire Safe Shutdown Issues

NRC Inspection Report 50-423/2003-002 closed Licensee Event Report 50-423/2002-00 Supplement 01, which was associated with inadequate validation of fire safe shutdown assumptions (fire-induced circuit fault). In addition, that inspection report also closed a previous NRC unresolved item (URI) 50-423/2002-05-07 which tracked the resolution of



an NRC and industry initiative to develop generic guidance to evaluate fire-induced circuit failures. That URI was closed because it was considered too narrow in scope, in that it only addressed the resolution of an issue related to power operated relief valves. That inspection report opened a new URI (50-423/2003-02-01) to track the broader resolution of the issue. (Note: The NRC tracking number was subsequently administratively changed to URI 50-423/2003-02-03.)

There were two specific aspects of fire-induced circuit faults that the NRC subsequently addressed. The first issue involved fire-induced single circuit cable faults and associated operator manual actions, not specifically approved by the NRC, which licensees relied upon as compensatory measures to mitigate potential adverse effects on equipment required for post-fire safe shutdown. NRC EGM 2007-004 authorized enforcement discretion for such issues, provided that licensees entered those issues into their corrective action programs, instituted appropriate compensatory measures until the issues were corrected, and either (a) corrected the conditions or (b) submitted an exemption request to the NRC, by March 6, 2009. The EGM also stated that non-compliances involving single fire-induced circuit faults identified after March 6, 2009 would be subject to enforcement actions.

The second issue involved fire-induced multiple circuit cable faults and associated operator manual actions. EGM 2009-002, dated May 14, 2009, authorized enforcement discretion for such issues, provided that licensees identified those issues, entered them into their corrective action programs, and instituted appropriate compensatory measures until the issues were corrected, within the six month period following a planned revision to RG 1.189, "Fire Protection for Nuclear Power Plants." RG 1.189, Rev. 2, issued in October 2009, provided a method acceptable to the NRC to evaluate and resolve multiple fire-induced circuit faults. After the 6 month period for identification of issues, the EGM further authorized enforcement discretion an additional 30 month period, for licensees to resolve the identified multiple fire-induced circuit fault issues.

The two EGMs and RG 1.189, discussed above, provide adequate technical guidance and an acceptable time table to evaluate and resolve the issues tracked by URI 50-423/2003-02-03, regarding fire-induced cable faults. The adequacy of licensee actions to address these issues will continue to be reviewed within the framework of the NRC's reactor oversight process which includes the triennial fire protection team inspections and problem identification and resolution inspections. Therefore, URI 50-423/2003-02-03 is no longer necessary to track these issues and is closed.

.2 Temporary Instruction (TI) 2515/181, "Validate the Effectiveness of the Regulatory Infrastructure Related to Fire-Induced Circuit Failures and Operator Manual Actions"

Background

This TI is intended to verify that the regulatory infrastructure is sufficient for licensees to achieve compliance in the areas of fire induced circuit failures and post-fire operator manual actions for spurious actuations due to fire-induced failures. 10 CFR Part 50, Appendix R, Section III.G.2, identifies three acceptable methods to meet the requirement for maintaining one of the redundant trains in the same fire area, outside of primary

containment, free of fire damage. The three methods include a combination of physical barriers, spatial separation, and fire detection and automatic suppression systems.

In October 2009, the NRC issued guidance in Regulatory Guide 1.189, "Fire Protection for Nuclear Power Plants," Revision 2, to identify acceptable methods for resolving issues related to circuits required for post-fire safe shutdown and circuits important to post-fire safe shutdown. Equipment required post-fire safe shutdown (credited train) must use one of the three methods identified in Section III.G.2 to protect the circuits located within the same fire area from fire damage, including single and multiple spurious operations. For important to post-fire safe shutdown circuits, the licensee may use operator manual actions if the licensee demonstrates they can be shown to be feasible and reliable or resolve issues using other analysis methods including fire modeling.

a. Inspection Scope

During this inspection, the team reviewed a representative sampling of single and multiple spurious issues for Unit 2 to:

- 1) Determine if the licensee used the guidance in Regulatory Guide 1.189, Revision 2 and Nuclear Energy Institute (NEI) 00-01, "Guidance for Post Fire Safe Shutdown Analysis," Revision 2, to successfully address single and multiple spurious issues in a manner that met the regulations. This included equipment required for safe shutdown and equipment important for safe shutdown.
- 2) Evaluate the adequacy of the licensee's method for determining that the required trains of safe shutdown equipment do not rely on operator manual actions.
- 3) Evaluate the adequacy of the licensee's method for determining if redundant trains of post fire safe shutdown equipment (required and important to post fire safe shutdown equipment) are made inoperable or nonfunctional due to single or multiple spurious actuations.
- 4) Evaluate the adequacy of the licensee's multiple spurious actuation evaluation in accordance with RG 1.189 and NEI 00-01 for alternative or dedicated shutdown areas.
- 5) Evaluate the licensee's understanding of the requirements related to allowed operator manual actions. (Note: The team added this question to assure sufficient information was available related to Task 4 of the fire protection stabilization plan.)

The team reviewed the Unit 2 post-fire safe shutdown analysis, Unit 2 licensing basis, project instructions, drawings, and corrective action documents. The team interviewed the multiple spurious operation project expert panel chairman, the fire protection safe shutdown engineer, the fire protection system engineer, and a reviewer who participated in the screening circuit analysis and disposition of the expert panel questions. Two NRC staff with expertise in circuit analysis and the requirements related to multiple spurious

operations from the Fire Protection Branch in the Office of Nuclear Reactor Regulation provided assistance to the team during this inspection.

b. Findings

No findings were identified.

Licensee Process

Dominion established a process that followed the guidelines established in NEI 00-01. This process included the following components:

- Establishment of an expert panel that reviewed the generic list of multiple spurious operations established in NEI 00-01, Appendix G, "Generic List of MSOs," for pressurized water reactors. The expert panel identified the multiple spurious operations that could be applicable based on the Unit 2 plant-specific design;
- Evaluation of the identified applicable multiple spurious operation scenarios to determine whether the existing post-fire safe shutdown analysis and safe shutdown strategy already included measures that adequately addressed any potential adverse impacts of the particular scenario;
- Identification of cables for the components within the scope of the multiple spurious operations scenario evaluation and identification of their physical routing by fire areas;
- Performance of an initial circuit analysis to determine which of the cables selected in the previous step could cause a component to actuate from their initial state to an undesired state due to fire induced circuit damage;
- Performance of fire area analyses to identify fire areas that contained the cables for each of the components whose combinations are necessary to result in a multiple spurious operation of concern;
- Documentation and evaluation of multiple spurious operation scenarios that require resolution in the corrective action program and implement compensatory measures;
- Performance of additional circuit and fire area analyses for those multiple spurious operation scenarios that have been entered into the corrective action program to confirm which scenarios could realistically occur and implement corrective for final resolution; and,
- Documentation of the multiple spurious operation project process, evaluations and results.

At the time of this inspection, the team determined that Dominion had not implemented this process for their alternative or dedicated shutdown areas. Dominion indicated that they had plans to evaluate their alternative or dedicated shutdown areas following the same process described above.

1) Determine if the licensee used the guidance contained in Regulatory Guide 1.189, Rev. 2, and NEI 00-01, Rev. 2, to successfully address single and multiple spurious operations in a manner that met regulations. This includes equipment required for safe shutdown and equipment important for safe shutdown.

The team found that Dominion established appropriate project instructions for conducting their expert panel and for conducting their circuit analysis. The project instructions utilized the guidance contained in NEI 00-01, Section 3 for evaluating the different circuit failure combinations and utilized the guidance contained in NEI 00-01, Appendix F for conducting the expert panel evaluations of potential MSO scenarios including the generic multiple spurious operations listed for pressurized water reactors in NEI 00-01, Appendix G. The team also found that Dominion programs were adequate to identify single spurious operations. However, the team found that unapproved operator manual actions were being used to mitigate previously identified equipment spurious actuations that could be caused by single fire induced circuit failures. Refer to section 1R05.06 above for details.

The team concluded Dominion used the guidance in RG 1.189 and NEI 00-01 to conduct their review for single and multiple spurious operations. The team concluded that these documents provided sufficient guidance for Dominion to establish an appropriate review process that evaluated spurious operations of both required and important post fire safe shutdown equipment.

2) Evaluate the adequacy of the licensee's method for determining that the redundant trains of safe shutdown equipment do not rely on operator manual actions.

The team found that Dominion's existing safe shutdown analysis program adequately determined where required trains of post-fire safe shutdown equipment relied upon operator manual actions. The use of manual operator actions to address single spurious actuation issues are identified and documented in 25203-SP-M2-SU-1046, MP 2, Appendix R Compliance Report, Rev. 01. However, the team also found that the licensee had not corrected conditions that resulted in reliance on operator manual actions, nor had Dominion obtained NRC approval for the use of operator manual actions that involved equipment required for safe shutdown. Refer to section 1R05.06 for details.

The team also noted that Dominion has not yet identified MSO scenarios whose resolution may require reliance on operator manual actions. At the time of this inspection Dominion's MSO program had progressed to the point where CRs have been initiated for multiple spurious operation scenarios for which their initial reviews determined to be potential viable concerns. As a result, additional licensee reviews and evaluations will be necessary to determine which MSO scenarios may require corrective

actions and whether operator manual actions would be considered as a viable corrective action.

Based on these reviews, the team concluded that Dominion's methods are adequate to identify where the redundant trains of safe shutdown equipment do not meet the separation requirements of 10 CFR 50, Appendix R and the safe shutdown methodology for single or multiple spurious operations may rely on operator manual actions.

3) Evaluate the adequacy of the licensee's method for determining if redundant trains of safe shutdown equipment are made inoperable or nonfunctional due to single or multiple spurious actuations.

Dominion does not consider safe shutdown equipment to be inoperable or nonfunctional due to a potential single spurious actuation if they have determined that an acceptable operator manual action has been established. However, Dominion did acknowledge the need to take actions to establish compliance with the requirements of 10 CFR 50, Appendix R, Section III.G.2. Refer to section 1R05.06 for details of the violation.

Dominion performed a functionality assessment for potential component failures as a result of multiple spurious operations on a fire area basis. Dominion considered these components as "operable but degraded and nonconforming." Consequently, Dominion evaluated the components using the guidance described in Regulatory Information Summary 2005-20, "Revision to NRC Inspection Manual Part 9900 Technical Guidance, Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," Rev. 1. Dominion determined that the types of issues identified by the multiple spurious operation review would not significantly affect the plant margin of safety and that these multiple spurious operations did not constitute a degraded fire protection feature within the scope of the Millstone Unit 2 Technical Requirements Manual (TRM).

Dominion has determined the impact of multiple spurious operations had low risk and safety consequences. Dominion based this conclusion, in part, on the following technical factors: (1) a large fire lasting longer than 20 minutes would likely be necessary to result in a multiple spurious operation; (2) the fire will likely have been detected prior to reaching a damaging level; (3) the suppression systems will actuate long before the temperatures reach the levels required to damage thermoset cables (500–700 °F); (4) the fire must continue in the area of the cables for long periods to result in maloperation; and, (5) multiple hot shorts would need to occur.

Based on the above assessment, Dominion implemented interim compensatory measures in the form of enhanced operator rounds as described in their functional assessment prior to May 2, 2010 to provide an additional level of awareness. Dominion enhanced the operator rounds by: (1) training operators on the fire hazards to increase their awareness, (2) adding statements to the rounds for the types of items to monitor (e.g., degraded fire features and increased combustibles), and (3) requiring the operators to routinely document that these items were reviewed. In addition to the changes to the operator rounds, additional monitoring of fire detection system operability

has been implemented. Upon final confirmation that specific multiple spurious operation scenarios are valid concerns that require corrective actions.

Dominion specified that they would initiate individual corrective action documents and implement compensatory measures specified in their TRM for the identified nonconformance.

The team concluded Dominion had an adequate method for evaluating the operability and functionality of components subject to multiple spurious operations. However, actions to ensure compliance with Appendix R for single spurious actuation issues were not timely (refer to section 1R05.06 above).

4) Evaluate the adequacy of the licensee's multiple spurious actuation evaluation in accordance with Regulatory Guide 1.189 and NEI 00-01 for alternative or dedicated shutdown areas.

The team determined that Dominion had established a process to evaluate their alternative or dedicated shutdown areas. Dominion planned to implement this review following the steps used for evaluating the 10 CFR Part 50, Appendix R, Section III.G.2 multiple spurious operation evaluations.

5) Evaluate the licensee's implementation of the requirements related to allowed operator manual actions.

The team reviewed Dominion's implementation of guidance and requirements involving the use of operator manual actions for post-fire safe shutdown. Aspects reviewed included the differences regarding the use of operator manual actions contained in 10 CFR Part 50, Appendix R, Sections III.G.2 and III.G.3, including the circumstances under which an NRC exemption would be required. The team confirmed that Dominion understood that when reviewing the acceptability of specific manual actions associated with a licensing action, the NRC would utilize the guidelines contained in NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire."

The team also reviewed Dominion's program for addressing the use of operator manual actions to resolve MSO issues. Specifically, the team confirmed that Dominion's program was consistent with the guidance specified in RG 1.189 and NEI 00-01, including differentiation between "required" and "important" to safe shutdown equipment.

4OA6 Meetings, including Exit

The team presented the preliminary inspection results to Mr. A. J. Jordan, Site Vice President, and other members of Dominion's staff on August 5, 2010. Following additional in-office and on-site reviews, an exit meeting was conducted by telephone with Mr. A. J. Jordan and other members of your staff on September 22, 2010. The team verified that this report does not contain proprietary information.

**ATTACHMENT**

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel

P. Anastas, Safe Shutdown Program Engineer  
J. Armstrong, Fire Protection Engineer  
R. Beal, Senior Reactor Operator  
R. Bonner, Supervisor, Electrical and I&C System Engineering  
C. Chatman, Senior Reactor Operator  
K. Cyr, Electrical Design Engineer  
P. Dillon, Diesel System Engineer  
P. Freeman, Electrical Design Engineer  
W. Harrelson, Senior Reactor Operator  
C. Karpinski, Fire Brigade Training  
L. LeBaron, System Engineer  
J. Lupa, Reactor Operator  
J. Mangeno, Fire Protection Engineer  
J. Martin, MSO Project Manger  
T. McNatt, System Engineer  
R. Patel, Electrical Design Engineer  
B. Pinkowitz, Simulator Instructor  
J. Powers, System Engineer  
J. Rigatti, Manager, Nuclear Engineering  
T. Ryan, System Engineer  
S. Wainio, Engineering Supervisor  
B. Wilkens, Site Fire Marshal

NRC Personnel

S. Shaffer, Senior Resident Inspector- Millstone  
B. Haagensen, Resident Inspector- Millstone  
J. Krafty, Resident Inspector- Millstone

**LIST OF ITEMS OPENED, CLOSED AND DISCUSSED**

Opened

05000336/2010008-02      NOV      Failure to Protect Safe Shutdown Equipment From the Effects of Fire. (Section 1R05.06)

Opened and Closed

05000336/2010008-01      NCV      Failure to Control Fire Fighting Strategies  
05000423/2010008-01      (Section 1R05.03)

Closed

05000423/2003002-03      URI      Generic Industry and NRC Resolution of Fire Safe Shutdown Issues (Section 4OA5.1)

**LIST OF DOCUMENTS REVIEWED**

Fire Protection Licensing Documents

25203-SP-M2-SU-1046, Unit 2 Appendix R Compliance Report, Rev. 1  
25212-BTP-9.5-1, Unit 3 Branch Technical Position 9.5-1 Compliance Report, Rev. 3  
Unit 3 FSAR Fire Protection Evaluation Report, Rev. 23  
Unit 2 Fire Hazards Analysis Report, Rev. 11  
Unit 2 FHA Boundary Dwg., Sh. 1, Auxiliary & Containment Bldg, Elev. minus 45 ft., Rev. 3  
Unit 2 FHA Boundary Dwg., Sh. 2, Auxiliary & Containment Bldg, Elev. minus 25 ft., Rev. 2  
Unit 2 FHA Boundary Dwg., Sh. 3, Auxiliary & Containment Bldg, Elev. minus 5 ft., Rev. 3  
Unit 2 FHA Boundary Dwg., Sh. 4, Auxiliary & Containment Bldg, Elev. 14 ft., Rev. 5  
Unit 2 FHA Boundary Dwg., Sh. 5, Auxiliary & Containment, Elev. 25 ft., Rev. 3  
Unit 2 FHA Boundary Dwg., Sh. 6, Auxiliary & Containment, Elev. 38 ft., Rev. 6  
Unit 2 FHA Boundary Dwg., Sh. 7, Turbine Bldg, Elev. 14 ft., Rev. 4  
Unit 2 FHA Boundary Dwg., Sh. 8, Turbine Bldg, Elev. 31 ft., Rev. 3  
Unit 2 FHA Boundary Dwg., Sh. 9, Turbine Bldg, Elev. 54 ft., Rev. 2  
Unit 2 FHA Boundary Dwg., Sh. 10, Outside Buildings, Rev. 4  
Unit 2 FHA Boundary Dwg., Sh. 11, Yard Areas, Rev. 4

Fire Protection Program Procedures

CM-AA-FPA-100, Fire Protection / Appendix R (Fire Safe Shutdown) Program, Rev. 1  
CM-AA-FPA-101, Control of Combustible and Flammable Materials, Rev. 2  
CM-AA-FPA-102, Fire Protection, Fire Safe Shutdown Review, and Preparation Process and Design Change Process, Rev. 0  
Unit 2 Technical Requirements Manual, Section 7.1, Appendix R Safe Shutdown Requirements, 2/02/10



Calculations and Engineering Evaluation Reports

25203-ER-08-0042, Unit 2 Delayed AFW Following a Fire in Area R-2, Rev. 0  
 25205-ER-09-0002, Unit 2 & 3 Fire Protection Time Critical Operator Actions, Rev. 0  
 25203-ER-99-0092, Unit 2 App- R Cooldown Analysis Assumptions and Results, Rev. 3  
 25212-ER-97-0302, Section 6.4, Communications, Rev. 3  
 98-ENG-02411-C2, Flooding Outside of Containment Evaluation, Rev. 1  
 98-ENG-02621-M2, Instrument Air Requirement for Certain Safety Related Valves, Rev. 3  
 99-026, Millstone Site Fire Loop Hydraulic Model, Rev. 1  
 ACE 1392-CR107561, Potential for Water Relief through Pressurizer Safety Valves from a Control Room Fire, Rev. 0  
 C OP 200.18, Time Critical Action Validation and Verification, Rev. 0  
 M2-EV-970061, Unit 2 Compensatory Actions, Loss of Ventilation in Electric Switchgear Areas, Rev. 3  
 M2-EV-97-0061, Compensatory Actions for Loss of Ventilation to Switchgear Areas, Rev. 3  
 M2-EV-98-0013, 120 VAC Vital Bus Coordination Study, Rev. 0  
 M2-EV-99-0093, Compensatory Measures for Loss of Ventilation, Rev. 4  
 MP2-CD-1457, MEPL Determination, Rev. 0  
 P1164-MP2-COORD, Breaker & Fuse Coordination for Panels D11, D12, D21, and D22, Rev. 0  
 P1117-025, Unit 2 NFPA Code Compliance Deviation Closeout Review, 1/98  
 PA84-065-0753GE, Unit 2 480V Breaker Over-current Trip Devices, Rev. 2  
 PA85-082-0812GE, Unit 2 125VDC Coordination Study, Rev. 2  
 RAS 121147, Reasonable Assurance of Safety for CR 121147, 12/18/08  
 RAS 000159, Emergency Lighting Units with Melted & Discolored Lens, 7/21/10  
 RAS 000066, Potential for Fire Damage to LCV112B/C, VCT Outlet Valves, Could Result in Damage to "A" CHS PP Credited for Post Fire Shutdown, Rev. 1  
 S2-EV-99-0103, Safety Evaluation for TRM Change-99-2-16, Minimum Shift Staffing Required to Implement App-R Manual Actions, Rev. 0  
 SP-GEE-6, Specification for 600 Volt Switchboard Wire, Rev. 2  
 SP-GEE-19, Specification for 600 Volt Control Cable, Rev. 4  
 SP-GEE-20, Specification for 600 Volt Instrument Cable, Rev. 3  
 SP-GEE-22, Specification for 600 Volt Power Cable, Rev. 4  
 SP-M3-EE-269, Appendix R Breaker Coordination Study, Rev. 2  
 W2-517-744-RE, Unit 2 App-R Cooldown, Rev. 3

Drawings and Wiring Diagrams

25203-24071, Sh. 5, Unit 2 Fire Damper Schedule, Rev. 2  
 25203-24091, Sh. C0102, Unit 2 Conduit Fire Seal Foam for Floor & Wall Detail, Rev. 2  
 25203-24091, Sh. G0002, Unit 2 Fire Grout Seal Detail, Rev. 2  
 25203-24092, Sh. T10F12, Unit 2 Penetration Seal Survey Map & Inspection Record, Rev. 1  
 25203-28200, Sh. 69, Unit 2 LT-110X, LT-110Y Pressurizer Level Functional Diagram, Rev. 3  
 25203-28500, Sh. 69A, Unit 2 LT-110X & 110Y Pressurizer Level Loop Diagram, Rev. 11  
 25203-28500, Sh. 69B, Unit 2 LT-110X & 110Y Pressurizer Level Loop Diagram, Rev. 7  
 25203-28500, Sh. 69C, Unit 2 LT-110X, 110Y Pressurizer Level Loop Diagram, Rev. 9  
 25203-28500, Sh. 69D, Unit 2 LT-110X, 110Y Pressurizer Level Loop Diagram, Rev. 7  
 25203-28500, Sh. 381, Unit 2 LT1123B Steam Generator Level Loop Diagram, Rev. 10  
 25203-29550, Sh. 1, Unit 2 EDG Rooms Pre-action Systems, Rev. 1

25203-30001, Unit 2 Main Single Line Diagram, Rev. 30  
25203-30101, Unit 2 Fire Shutdown Panel C10, Rev. 3  
25203-31148, Sh. 3, Unit 2 Process Instruments Level Transmitters Connection Diag., Rev. 7  
25203-32020, Sh. 27, Unit 2 ADV PV4224 Schematic, Rev. 1  
25203-32020, Sh. 61, Unit 2 ADV Quick Open Control Schematic, Rev. 6  
25203-32021, Sh. 5, Unit 2 Cable Vault Recirculating Fan MF19 Schematic, Rev. 4  
25203-32023, Sh. 33, Unit 2 Cable Vault Fan MF123 Schmidt, Rev. 8  
25203-32041, Sh. 3, Unit 2 Diesel Generator 15G-12U Engine Control, Rev. 12  
25203-32041, Sh. 4, Unit 2 Diesel Generator 15G-12U Engine Control, Rev. 10  
25203-32041, Sh. 5, Unit 2 Diesel Generator 15G-12U Engine Control, Rev. 6  
25203-32041, Sh. 6, Unit 2 Diesel Generator 15G-12U Engine Control, Rev. 8  
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25203-32041, Sh. 8, Unit 2 Diesel Generator 15G-12U Engine Control, Rev. 2  
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25203-34060, Unit 2 Conduit Plan Fire Detail, Aux Bldg Elev. minus 14 ft., Rev. 7  
25203-37076, Sh. 1, Unit 2 Instrumentation System Cable Routing, Rev. 1  
25203-37076, Sh. 4, Unit 2 Instrumentation System Cable Routing, Rev. 1  
25203-39212, Sh. 1, Unit 2 "A" EDG Panel C26H Connection Diagram, Rev. 2  
25203-39212, Sh. 2, Unit 2 "B" EDG Panel C26G Connection Diagram, Rev. 2  
25212-30343, Sh. 70, Unit 3 PZR 3RCS\*TK1 Pressure Indication Test Loop Diag., Rev. 6  
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25212-30343, Sh. 75B, Unit 3 PZR Level Alarm, Indication, and Control Test Loop Diag., Rev. 4  
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25212-30343, Sh. 75E, Unit 3 PZR Level Alarm, Indication, and Control Test Loop Diag., Rev. 1  
25212-30343, Sh. 75F, Unit 3 PZR Level Alarm, Indication, and Control Test Loop Diag., Rev. 1  
25212-30343, Sh. 75G, Unit 3 PZR Level Alarm, Indication, and Control Test Loop Diag., Rev. 3  
25212-30343, Sh. 75H, Unit 3 PZR Level Alarm, Indication, and Control Test Loop Diag., Rev. 1  
25212-30343, Sh. 76, Unit 3 PZR Level Indication Test Loop Diag., Rev. 6  
25212-32001, Sh. 6AJS, Unit 3 Charging Header Isolation Valve Elementary Diag., Rev. 12  
25212-32001, Sh. 6QT, Unit 3 RHR Inlet Isolation Valve 3RHS\*MV8701A Elementary, Rev. 17  
25212-32001, Sh. 6TD, Unit 3 PZR Relief Isolation Valve 3RCS\*MV8000A Elementary, Rev. 20  
25212-32001, Sh. 8KC, Unit 3 EDG A Start Circuit 3EGSA01 3EGS\*EG-A, Rev. 12  
25212-32001, Sh. 8KD, Unit 3 EDG A Stop Circuit 3EGSA03 3EGS\*EG-A, Rev. 15  
25212-32001, Sh. 8KE, Unit 3 EDG A Governor Control Circuit 3EGSA05 3EGS\*EG-A, Rev. 14  
25212-32001, Sh. 8KJ, Unit 3 EDG A Shutdown Circuit 3EGSA06 3EGS\*EG-A, Rev. 12  
25212-32404, Unit 3 PZR Relief Isolation Valve 3RCS\*MV8000A Cable Block Diag., Rev. 9  
25212-32414, Unit 3 Charging Header Isolation Valve 3CHS\*MV8438C Cable Diag., Rev. 3  
25212-32449, Unit 3 RHS Inlet Isolation Valve 3RHS\*MV8701A Cable Block Diagram, Rev. 6  
25212-32722, Unit 3 EDG Excitation 3EGS\*EG-A Cable Block Diag., Rev. 4  
25212-32722, Unit 3 EDG 3EGS\*EG-A Start Circuit Cable Block Diag., Rev. 3  
25212-32722, Unit 3 EDG 3EGS\*EG-A Engine Control Cable Block Diag., Rev. 6  
25212-32722, Unit 3 EDG Governor Control 3EGS\*EG-A Cable Block Diag., Rev. 5  
25212-32722, Unit 3 EDG 3EGS\*EG-A Engine Shutdown Cable Block Diag., Rev. 2

- 25212-34032, Sh. 2, Unit 3 Conduit Plan Containment Structure Elev. 51 ft., Rev. 12
- 25212-34035, Unit 3 Conduit Plan Containment Structure Elev. 3 ft, Rev. 14
- 25212-34042, Unit 3 Containment Outer Annulus Elevation Safe Shutdown Review, Rev. 1
- 25212-34085, Unit 3 Conduit Plan, Auxiliary Building Elev. 24 ft., Rev. 17
- K-13942, Actuator Fail in Last Position for 2-SW-3.1A/B, 2-SW-3.2A/B, 2-SW-97A/B, Rev. 3

Piping and Instrumentation Diagrams

- 25203-26027, Sh. 1, EDG HVAC, Rev. 47
- 25205-25003, Fire Loop operating & Hydraulic Schematic, Rev. 9
- 25203-26002, Sh. 1, Unit 2 Main Steam System, Rev. 73
- 25203-26005, Sh. 3, Unit 2 Condensate Storage & Auxiliary Feedwater System, Rev. 57
- 25203-26008, Sh. 2, Unit 2 Service Water, Rev. 94
- 25203-26011, Sh. 1, Unit 2 Fire Protection System, Rev. 52
- 25203-26011, Sh. 4, Unit 2 Halon & Exciter CO2 Fire Protection, Rev. 6
- 25203-26011, Sh. 5, Unit 2 Fire Protection Auto Sprinkler Valve Details, Rev. 8
- 25203-26011, Sh. 7, Unit 2 Fire Protection Auto Sprinkler Valve Details, Rev. 1
- 25203-26017, Sh. 1, Unit 2, Charging System, Rev. 60
- 25203-26027, Sh. 1, Unit 2 HVAC for EDG Rooms, Rev. 47
- 25212-24036, Unit 3 Fire Stop & Seals Map Locations, Rev. 0
- 25212-26902, Sh. 3, Unit 3 Reactor Coolant System, Rev. 23
- 25212-26904, Sh. 1, Unit 3 Chemical and Volume Control, Rev. 50
- 25212-26912, Sh. 1, Unit 3 Low Pressure Safety Injection, Rev. 48
- 25212-26946, Sh. 1, Unit 3 Fire Protection, Rev. 29
- 25212-26946, Sh. 2, Unit 3 Fire Protection, Rev. 49
- 25212-26946, Sh. 3, Unit 3 Fire Protection, Rev. 21
- 25212-26946, Sh. 4, Unit 3 Fire Protection, Rev. 25
- 25212-26946, Sh. 5, Unit 3 Fire Protection System Details, Rev. 2
- 25212-26951, Sh. 2, Unit 3 Control Building Heating, Ventilation and Air Conditioning, Rev. 20
- 25212-26951, Sh. 3, Unit 3 Control Building Heating, Ventilation and Air Conditioning, Rev. 0

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- DCR-M3-08024, Unit 3 Main Transformer Fire Detection and Deluge Building, Rev. 0
- DM2-00-0073, Roof Hatch Seal Installation in Fire Area T-6, Rev. 10
- DM2-00-0343, Replace 24-inch Service Water Cross Connect Valve 2-SW-97A, Rev. 8
- DM3-00-0045-09, Charging Valve Control Circuit Appendix R Modification, Rev. 1
- DMG-00-0280, Fire Penetration Seal Installation in Fire Areas T-6 and T-10, Rev. 9
- DMG-00-0015-09, Power Supply Changes and Lighting Control, Rev. 0

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- |             |             |             |             |
|-------------|-------------|-------------|-------------|
| 24991-04-FP | 26756-07-FP | 37175-07-FP | 37981-08-FP |
| 26660-07-FP | 27077-08-FP | 37178-07-FP |             |
| 26675-07-FP | 28018-09-FP | 37191-07-FP |             |
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26656-07-IS	37262-07-IS	37672-07-IS	39454-10-IS
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27655-09-IS	37626-07-IS	38461-08-IS	

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 Unit 3, Load Centers, 1st Quarter 2010  
 Unit 3, Motor Control Centers, 1st Quarter 2010  
 Unit Common, Safe Shutdown Lighting - Category B, 1st Quarter 2010

Procedures

C MP 790, Emergency Lighting Inspection and Testing, Rev. 3  
 C OP 200.17, Fire Watch and Impairment Tracking, Rev. 0  
 C SP 600.8, Diesel Fire Pump M7-7 Monthly Operability Demonstration, Rev. 3  
 C SP 600.9, Diesel Fire Pump M7-7 Annual Operability Demonstration, Rev. 4  
 C SP 600.6, Electric Fire Pump M7-8 Monthly Operability Demonstration, Rev. 3  
 C SP 600.7, Electric Fire Pump M7-8 Annual Operability Demonstration, Rev. 4  
 C SP 600.13, Electric Fire Pump P-82 Monthly Operability Demonstration, Rev. 2  
 C SP 600.14, Electric Fire Pump P-82 Annual Operability Demonstration, Rev. 2  
 C SP 600.16, Fire Protection System Underground Main Flush & Flow Test, Rev. 0  
 CY-AA-AUX-310, Diesel Fuel Oil Sampling and Testing, Rev. 3  
 SAIC 2.4, Fire PRA Cable Selection, Routing, Circuit Analysis, Rev. 0  
 SAIC 4.1, Identification and Evaluation of Multiple Spurious Operations of Equipment Using Expert Panel, Rev. 0  
 SAIC 4.2, Draft SECY 08-0093 Analysis Process, Rev. 0  
 SFP 31, Fire Water System Back-up Supply Plan, Rev. 4  
 SP 2618C, Fire Protection System Smoke and Heat Detector Test, Rev. 13  
 SP 2618D, "B" EDG Deluge System Function Test, Rev. 0  
 SP 2669A, PEO Rounds, Rev. 17  
 SP 3442A02, RCS Wide Range Temperature Calibration, Rev. 6  
 SP 3446C20, Appendix R Instrumentation Calibration, Rev. 0  
 SP 3641D.5, Fire Damper Operability Verification, Rev. 10  
 SP 3646A.1, EDG A Operability Test, Rev. 18

Operations Procedures

AOP 2559, Fire, Rev. 7  
 AOP 2571, Inadvertent ESFAS Actuation, Rev. 5  
 AOP 2579A, Hot Standby for Fire Area R-1, Rev. 9  
 AOP 2579B, Hot Standby for Fire Area R-2, Rev. 6  
 AOP 2579H, Hot Standby for Fire Area R-8, Rev. 6  
 AOP 2579L, Hot Standby for Fire Area R-13, Rev. 6  
 AOP 2579AA, Cooldown and Cold Shutdown for Fire Area R-1, Rev. 4

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AOP 2579BB, Cooldown and Cold Shutdown for Fire Area R-2, Rev. 5  
AOP 2579FF, Cooldown and Cold Shutdown for Fire Areas R-8 and R-10, Rev. 5  
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EOP 2525, Standard Post Trip Actions, Rev. 23  
EOP 2541, App-41, Aligning Compensatory Cooling for Switchgear Rooms, Rev. 1  
EOP 3509, Fire Emergency, Rev. 24  
EOP 3509.1, Control Room, Cable Spreading Area, or Instrument Rack Room Fire, Rev. 13  
EOP 3509.2, Aux Bldg. Elev. 24 ft. South Floor, Elev. 43 ft. & 66 ft. Fire, Rev. 4  
EOP 3509.5, Aux Bldg, East MCC & Rod Control Area Fire, Rev. 2  
EOP 3509.5, EOP 3509.5 Basis Information, Rev. 2  
EOP 3509.8, Control Bldg. Elev. 4 ft., West SWGR Area Fire, Rev. 3  
EOP 35 GA-14, Establish Head Vent Letdown, Rev. 0  
MP-14-OPS-GDL400, Operations Administrative Procedures, Rev. 9  
MP-26-EPI-FAP06-002, Unit 2 Emergency Action Levels (EALs), Rev. 6  
MP-26-EPA-REF02, Unit 2 EAL Technical Basis Document, Rev. 15  
OP-AA-100, Conduct of Operations, Rev. 9  
OP-AA-102, Operability Determination, Rev. 5  
OP 2315K, Vital 480V Electrical Switchgear Room Cooling Systems, Rev. 1  
OP 2315L, Vital 125V DC Electrical Switchgear Room Cooling Systems, Rev. 1  
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MP 2720U1, Cold Shutdown Fire Damage Repair for Fire Area R-1, Rev. 4  
MP 2720U2, Cold Shutdown Fire Damage Repair for Fire Area R-3, Rev. 4  
MP 2720U3, Cold Shutdown Fire Damage Repair for Fire Area R-11, Rev. 4  
MP 2720U4, Cold Shutdown Fire Damage Repair for Fire Area R-16, Rev. 4  
MP 2720U5, Splicing Fire-Damaged Power Cables and Connecting Pump Motors Needed for Cold Shutdown, Rev. 3  
MP 3783EA, Component Cooling Pump Motor Replacement for Fire Protection, Rev. 5  
EOP 3509.1 Attachment-I, BAT "A" Level Instrument installation, Rev. 13

### Operator Safe Shutdown Training

C01216N, Auxiliary Shutdown Panel Operations, Rev. 0  
C01217C, PEO Briefing SO1306C, Fire Emergency/ Control Room Evacuation, Rev. 0  
C04602L, Operating Experience PowerPoint Presentation, Rev. 0  
C98205L, Fire Safe Shutdown Overview, Rev. 0  
C98027L, EOP 3509.1 In-Plant Walkdown, Rev. 1  
C9888206L, EOP 3509.1 Procedure Overview, Rev. 0  
E09809C, Chapter 0, Fire Emergency, Rev. 2  
FPS086C, Chapter 2, Fire Protection, Detection and Control, Rev. 4  
JIT-302-002, Just In Time Training for DCR M3-01008, Rev. 0  
JIT-304-001, Chapter 2, Just In Time Training for DCRs M3-02006 & 01008, Rev. 0  
JPM-052, Manual Operation of a 4160 Volt Breaker, Rev. 3  
JPM-088, Commence Shutdown from Outside the Control Room, Rev. 3  
JPM-092, Transfer Controls from the Control Room to C-10, Rev. 5

JPM-093, Local Manual Operation of the "A" Atmospheric Dump Valve, Rev. 9  
JPM-141, Remove/Install opening and Closing Coils for 480V MCC Breaker, Rev. 1  
JPM-206, Shutdown from Outside the Control Room (Alt. Path), Rev. 2  
JPM-207, Local Manual Operation of the "A" Atmospheric Dump Valve, Rev. 1  
JPM-217, Manual Operation of RBCCW SDC HX Outlet Valves, Rev. 2  
P07602N, PEO In-Plant Walkdown, Cycle 07-6, Rev. 0  
P08101JPM, Cycle 08-1 LORT/NLCT In-Plant JPMs, Rev. 0  
P09101JPM, In-Plant JPMs, Rev. 0  
PEO-04-J, Plant Equipment Operator On-the-Job Training, Rev. 6  
S01306C, Simulator Scenario 6, Fire Emergency, Control Room Evacuation, Rev. 1  
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S04405L, Cycle 04-4 Simulator Session 5, Rev. 0  
S05105, Cycle 05-1 Simulator Session 5, Rev. 0  
S05206L, Cycle 05-2 Simulator Session 6, Rev. 0  
S05405L, CTMT Fire and Loss of Shutdown Cooling and/or RCS Inventory, Rev. 0  
S05501L, Cycle 05-5 Simulator Session 1, Rev. 0  
S07405L, Cycle 07-4 Simulator Session 5, Rev. 0  
S98202L, Cycle 98-2 Simulator Session 2, Rev. 0  
S99306L, Simulator Scenario 6, Fire Emergency, Control Room Evacuation, Rev. 0

Fire Fighting Strategies (i.e., Pre-Fire Plans)

Unit 2 Zone A-16, "B" EDG Room, 4/30/05  
Unit 2 Zone T-6, West 480 Volt Load Center Room, 4/01/01  
Unit 2 Zone A-1B, Auxiliary Bldg RBCCW & Heat Exchanger Area, 4/01/01  
Unit 2 Zone T-10, Turbine Bldg 6.9 and 4.16 kV Switchgear Room, 4/01/01  
Unit 3 Zone AB-5, East MCC and Rod Control Area, March 1998  
Unit 3 Zone CB-1, West Switchgear Room, January 2002  
Unit 3 Zone CB-7, East Switchgear Room, March 1998  
Unit 3 Zone CB-8, Cable Spreading Area, April 2004

Fire Brigade Training, Drills, and Drill Critiques

TPD-7.209, Fire Protection Programs, Rev. 1

Unannounced Drills:

Unit 3 Turb. Bldg Enclosure, 3/16/09	Site Bldg 428, 12/23/08
Unit 2 Turbine Bearing, 5/14/09	Unit 2 Control Room A/C Area, 6/28/08
Unit 1 14H Bus, 9/13/09	Unit 2 DC SWGR "A" MG set, 9/14/07
Unit 3 Cable Spreading Area, 12/03/09	Unit 3 Fuel Pool Cooling Pumps, 10/10/07
Unit 2 4160 Switchgear, 12/27/09	Unit 2 Turbine Aux Battery Room, 11/07/07
Unit 3 East Elect. Rm Batt. Charger, 9/11/08	Bldg 434 - Site Warehouse, 11/09/07
Unit 2 Turb. Deck Wooded Bldg, 12/12/08	Unit 3 EDG, 12/12/07
Unit 3 Cable Spreading Room, 12/16/08	

Announced Drills:

Unit 2 "B" Main Transformers, 6/10/08  
 Unit 2 "A" EDG, 7/15/08  
 Unit 2 "B" EDG, 7/24/08

Unit 2 "B" EDG, 7/29/08  
 Unit 2 "A" EDG, 8/05/08  
 Unit 2 "A" EDG, 8/12/08

Completed Tests and Surveillances

C SP 600.6, Electric Fire Pump M7-8 Monthly Operability Demo, Performed 5/16/10 & 6/15/10  
 C SP 600.7, Electric Fire Pump M7-8 Annual Operability Demo, Performed 5/14/09 & 6/15/10  
 C SP 600.8, Diesel Fire Pump M7-7 Monthly Operability Demo, Performed 5/19/10 & 6/17/10  
 C SP 600.9, Diesel Fire Pump M7-7 Annual Operability Demo, Performed 9/12/08 & 5/26/09  
 C SP 600.10, Diesel Fire Pump Fuel Oil Storage Tank Sample Results, Performed 2/16/10 & 4/27/10  
 C SP 600.13, Electric Fire Pump P-82 Monthly Operability Demo, Performed 5/26/10 & 6/24/10  
 C SP 600.14, Electric Fire Pump P-82 Annual Operability Demo, Performed 4/28/09 & 4/01/10  
 C SP 600.26-002, Appendix R Ventilation Fan Operational Check, Performed 3/6/10  
 C SP 600.26-001, Auxiliary Building Safe Shutdown Portable Emergency Ventilation Fan  
 MTE 1122, MTE-00613 Calibration, Performed 5/2/08  
 MTE 1122, MTE-00666 Calibration, Performed 10/2/08  
 SP 2601M-01, Operability Test of Facility 2 Charging Pumps from C-10, Performed 3/4/10  
 SP 2601P, CVS Valve Operability Tests from C-10 and C-02, Performed 10/16/09  
 SP 2610BO-05, TDAFW Operational Tests from C-10, Performed 3/28/09  
 SP 2610E, Atmospheric Dump Valve Testing from C-10, C-70A/B, Performed 10/11/09  
 SP 2610E-03, Atmospheric Dump Valve Testing, Performed 11/18/04  
 SP 2618C-01, Unit 2 Fire Protection System Smoke & Heat Detector Test, Performed 9/27/09  
 SP 2618D-03, Unit 2 "B" EDG Deluge System Function Test, Performed 6/03/10 & 12/07/09  
 SP 2618G, Fire Damper Operability Verification, Performed 7/25/09, 12/09/08, 11/28/08, & 10/27/08  
 SP 2618L-01, Fire Protection Coating Inspection, Performed 1/27/09 & 9/09/08  
 SP 2618L-02, TSI (Thermo-Lag) Fire Wrap Inspection, Performed 1/29/10  
 SP 2619C-01, Control Room Weekly Checks, Performed 8/1/10  
 SP 2619E-01, Control Room Monthly Checks, Performed 7/10/10  
 SP 3641D.5, Fire Damper Operability Verification, Performed 8/25/08, 9/4/09, & 9/26/06  
 SP 3641D.6, Fire Rated Assemblies Inspection, Performed 11/29/08  
 SP 3646A.1, Local Operation Test of "A" EDG, Performed 8/16/05 & 5/20/08  
 SP 3673.2-02, Transfer Switch 3HVP\*FN1A & FN1C Function Test, Performed 12/30/08  
 SP 3673.2-03, Transfer Switch 3HVR\*FN14A Function Test, Performed 10/13/08  
 SP 3673.2-04, Transfer Switch 3HVR\*MOD50A Function Test, Performed 10/8/08  
 SP 3673.2-05, Transfer Switch 3HVR\*ACU1A Function Test, Performed 8/14/08  
 SP 3673.2-06, Transfer Switch 3HVV\*FN2A & AOD23A Function Test, Performed 10/1/08  
 SP 3673.2-07, Transfer Switch 3SWP\*MOV54A/C Function Test, Performed 11/24/09  
 SP 3673.2-08, Transfer Switch 3SWP\*MOV71A Function Test, Performed 12/29/08  
 SP 3673.2-09, Transfer Switch 3SWP\*MOV102A/C Function Test, Performed 12/28/08  
 SP 3673.2-10, Transfer Switch 3RCS\*PCV455A Function Test, Performed 5/8/10  
 SP 3673.2-11, Transfer Switch 3RCS\*HCV442A Function Test, Performed 12/4/07  
 SP 3673.2-12, Transfer Switch 3SIL\*HCV943A Function Test, Performed 6/14/08  
 SP 3673.2-13, Transfer Switch 3CHS\*HCV190A Function Test, Performed 5/13/08

SP 3673.4-02, Aux. Shutdown Panel Operability Test RHR Isolation, Performed 4/22/10  
 SP 3673.4-10, Aux. Shutdown Panel Operability Test, Charging Header MOVS, Performed  
 1/21/09  
 SP 3673.4-11, Aux. Shutdown Panel Operability Test, PORV Block Valve, Performed 6/14/08  
 SP 3673.4-12, Aux. Shutdown Panel Operability Test, SIL Accumulator Vent Valves, Performed  
 8/9/08  
 SP 3673.4-13, Aux. Shutdown Panel Operability Test, Charging Pump Cooling Pump A,  
 Performed 1/20/09  
 SP 3673.4-21, Aux. Shutdown Panel Operability Test, Charging Isolation Path, Performed  
 4/30/10  
 SP 3673.5-01, Remote Shutdown Monitoring Instrumentation, Performed 5/28/10  
 SFP 17-01, Unit 2 Group-1 Fire Penetration Seal Inspection, Performed 3/11/04 & 6/24/98  
 SFP 17-02, Unit 2 Group-2 Fire Penetration Seal Inspection, Performed 7/12/05, 7/11/05, &  
 9/24/98  
 SFP 17-04, Unit 2 Group-4 Fire Penetration Seal Inspection, Performed 12/05/06  
 SFP 17-09, Unit 2 Group-9 Fire Penetration Seal Inspection, Performed 4/18/01 & 1/17/00  
 SFP 6, Fire Protection System Underground Main Flow and Flush Test, Performed 9/26/03  
 SFP 6, Fire Protection System Underground Main Flow and Flush Test, Performed 2/22/07  
 SFP 21-01, Unit 2 Appendix R Fire Cage Inventory, Performed 9/4/09  
 SPROC 97-3-15, Unit 3 Emergency Lighting Test, Performed 12/5/97  
 T3341CP, Unit 3 Initial CO2 Discharge Test, West Switchgear Room, Performed 11/06/85  
 T3341CP, Unit 3 Initial CO2 Discharge Test, Cable Spreading Room, Performed 11/08/85  
 T3341CP, Unit 3 Initial CO2 Discharge Test, East MCC/Rod Control Area, Performed 11/16/85

Condition Reports (\* denotes NRC identified during this inspection)

CR-03-00383	CR119726	CR378579	CR383154
CR-03-00448	CR121019	CR378689	CR383205
CR-05-08134	CR121147	CR378691	CR383276
CR-05-08437	CR137203	CR378695	CR383304
CR-06-01133	CR316336	CR378699	CR383357
CR-06-02202	CR317567	CR378936	CR383363
CR-06-03953	CR320599	CR378939	CR383687
CR-07-08455	CR323868	CR378940	CR383841
CR-07-11917	CR327233	CR378941	CR384105
CR-07-12142	CR327631	CR378944	CR384243
CR-08-01677	CR331009	CR378945	CR384258
CR-08-02674	CR332133	CR378950	CR384311
CR-08-05317	CR332754	CR378951	CR384372
CR-08-05851	CR334825	CR378954	CR384384
CR-08-06786	CR336063	CR380609	CR384443
CR-08-08323	CR337602	CR382675	CR384805
CR-08-08741	CR340225	CR382835	CR385501*
CR108620	CR343586	CR382866	CR385687*
CR109594	CR344375	CR382968	CR387120*
CR119114	CR348684	CR382979	CR387186*
CR119611	CR358414	CR383130	CR387227*
CR119667	CR377915	CR383152	CR387870



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CR388484*	CR388786*	CR389495	CR389972
CR388508*	CR388788*	CR389590	CR390069*
CR388646*	CR388807	CR389660	CR390295*
CR388756*	CR388969	CR389736	M2-98-01891
CR388775	CR389332	CR389876*	

### Work Orders

53130710605	53102270437	53102304691	M3-05-14068
53102310955	53102274953	M2-04-12928	M3-06-08987
53102200513	53102276397	M3-02-11954	M3-06-00018
53102269887	53102291903	M3-04-17886	M2-07-02847
53102269887	53102292975	M3-05-11850	M3-07-03861

### Vendor Manuals

8M-1-70, Instructions for Fisher Actuators Types 496D, 496U, and 486L  
MS2 Vendor Inspection Report for UPS System, dated 1/4/10 and 4/14/10

### Industry Standards

Electric Power Research Institute (EPRI) TR-100249, Emergency Battery Lighting Unit  
Maintenance and Application Guide, Rev. 1  
NEI 2000-01, Guidance for Post-Fire Safe Shutdown Circuit Analysis, Rev. 2  
NFPA 13-1987, Installation of Sprinkler Systems  
NFPA 27-1975, Private Fire Brigades  
NRC RG 1.189, Fire Protection for Nuclear Power Plants, Rev. 2  
NRC EGM 2007-004, Enforcement Discretion for Post-Fire Manual Actions Used as  
Compensatory Measures for Fire induced Circuit Failures, 6/30/07  
NRC EGM 2009-002, Enforcement Discretion for Fire Induced Circuit Faults, 5/14/09

### Miscellaneous Documents

Cable database printouts of cable routing for Valve 2-CH-429 in Fire Areas R1, R2 and R3  
Cable database printouts of cable routing for Valve 2-MS-190B in Fire Areas R1, R2 R10  
and R11  
Calculation S-02824-S2, Millstone Unit 2, R-2 Fire, Appendix R Analysis, Rev. 2  
Example of auxiliary building plant equipment operator rounds  
Industry Position Paper on Use of Compensatory Measures for Multiple Spurious Operations,  
4/16/2010  
Letter B17399, 10CFR50, Appendix R Exemptions and Fire Protection Safety Evaluation Report  
Comments, 3/17/1999  
List of Millstone Power Station, Unit 2, expert panel members  
Maintenance Rule Functional Failures Database Report on ELU Failures, 12/23/01 to 7/22/10  
Millstone Power Station, Unit 2, Draft MSO Evaluation List  
Millstone Power Station, Unit 2, Final Safety Analysis Report, Section 9.10  
Millstone Power Station, Unit 2, Technical Requirements Manual, Sections 3.7.10 and 7.1  
MP-2009-246, App-R ELU Recurring PM Tasks, 8/04/10

Attachment

N-2005-2208-E1, Review of NRC IN 05-14, Loss of Seal Cooling to Reactor Coolant Pumps  
 NEI 00-01, Guidance for Post Fire Safe Shutdown Analysis, Rev. 2  
 OE31606, Burn Mark on Plastic Lens Degrades Halogen Emergency Light, 7/19/10  
 Part 9900 Technical Guidance - Operability Determinations & Functionality Assessments for  
 Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety  
 Reasonable Assurance of Safety RAS000117, Rev. 0  
 Regulatory Guide 1.189, Fire Protection for Nuclear Power Plants, Rev. 2  
 Results of component cable routing on a fire area basis for Generic Multiple Spurious  
 Operation 9 (MSO 9), Reactor Coolant System Makeup Isolation; MSO 18, Multiple  
 PORVs; MSO 19, Multiple PORV Block Valves; and MSO 28, Auxiliary Feedwater Flow  
 Isolation”  
 Safety Evaluation Report, Revocation of Exemption from 10 CFR Part 50, Appendix R,  
 Sections III.G and III.L for Certain Fire Areas – Millstone Nuclear Power Station, Unit 2,  
 7/17/1990  
 Self Assessment SAR000506, Triennial Fire Protection Preparation Assessment, 6/9/2010  
 Site Fire Protection Impairment Tracking Report (Active), 7/01/10 to 7/10/10  
 SO-08-024, Unit 2 Operations Standing Order, 12/3/08  
 Status update slides related to fire induced circuit failures/multiple spurious operations,  
 6/16/2010  
 Unit 2 Fire Protection Active Impairment List, 7/20/10  
 Unit 3 Fire Protection Active Impairment List, 7/19/10

**LIST OF ACRONYMS**

AC	Alternating Current
ADAMS	[NRC] Agency-wide Documents Access and Management System
AFW	Auxiliary Feedwater System
ASME	American Society of Mechanical Engineers
ASSS	Alternate Safe Shutdown System
BAT	Boric Acid Tank
BTP	[NRC] Branch Technical Position
CCW	Component Cooling Water
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CMEB	[NRC] Chemical Engineering Branch
CO <sub>2</sub>	Carbon Dioxide
CR	Condition Report
EDG	Emergency Diesel Generator
EGM	[NRC] Enforcement Guidance Memorandum
ELU	Emergency Lighting Units
FCU	Flow Control Valve
FHA	Fire Hazards Analysis
FPP	Fire Protection Program
FW	Feedwater
HRR	Heat Release Rate
IMC	[NRC] Inspection Manual Chapter
IP	[NRC] Inspection Procedure

IPEEE	Individual Plant Evaluation of External Events
IR	[NRC] Inspection Report
kV	kilo-volts
LOCA	Loss of Coolant Accident
MOV	Motor Operated Valve
MSO	Multiple Spurious Operation
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NCV	Non-Cited Violation
NOV	Notice of Violation
NRC	Nuclear Regulatory Commission
P&ID	Piping and Instrumentation Drawing
PAR	Publicly Available Records
PARS	[NRC] Publicly Available Records
PRA	Probabilistic Risk Assessment
PZR	Pressurizer
RAS	Reasonable Assurance of Safety
RBCCW	Reactor Building Closed Cooling Water
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RG	[NRC] Regulatory Guide
RIS	Regulatory Issue Summary
RWST	Refuel Water Storage Tank
SDP	[NRC] Significance Determination Process
SER	[NRC] Safety Evaluation Report
SG	Steam Generator
SSAR	Safe Shutdown Analysis Report
SSC	Structures, Systems and Components
SW	Service Water
SWGR	Switchgear
TD	Turbine Driven
TI	Temporary Instruction
TRM	Technical Requirements Manual
UFSAR	Updated Final Safety Analysis Report
URI	[NRC] Unresolved Item
VCT	Volume Control Tank