



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION I  
2100 RENAISSANCE BLVD., SUITE 100  
KING OF PRUSSIA, PA 19406-2713

May 4, 2016

EA-16-090

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

SUBJECT: MILLSTONE POWER STATION – INTEGRATED INSPECTION REPORT  
05000336/2016001 AND 05000423/2016001, AND NOTICE OF VIOLATION

Dear Mr. Heacock:

On March 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Millstone Power Station (Millstone), Units 2 and 3. The enclosed inspection report documents the inspection results, which were discussed on April 27, 2016, with Mr. John Dougherty, Site Vice President, and other members of your staff.

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. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The inspectors documented two findings of very low safety significance (Green) in this report involving violations of NRC requirements. The violations were evaluated in accordance with the NRC's Enforcement Policy. The current Enforcement Policy is available for review on the NRC's website (<http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>). For one of the findings, the NRC is treating the associated violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy. For the other finding, the associated violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in the enclosed inspection report. This violation, which involves Dominion Nuclear Connecticut, Inc.'s (Dominion's) failure to take effective corrective actions for significant conditions adverse to quality involving the degradation of the Unit 3 turbine driven auxiliary feedwater pump turbine control valve linkage, meets the criteria in Section 2.3.2.a of the NRC Enforcement Policy to disposition as an NCV. However, the NRC considered that Dominion has, on two previous occasions, failed to appropriately correct this issue, which involves a safety-significant system. Therefore, the NRC is issuing the Notice of Violation and is requiring a response from Dominion regarding, in part, its planned long-term corrective actions.

You are required to respond to this letter and follow the instructions specified in the enclosed Notice when preparing your response. Your response, in accordance with the instructions, should describe your actions to address the violation and your plans and milestones to resolve the issue. If you have additional information that you believe the NRC should consider, you may

provide it in your response to the Notice. The NRC's review of your response to the Notice will determine whether enforcement action is necessary to ensure compliance with regulatory requirements.

Additionally, a licensee-identified violation, which was determined to be of very low safety significance, is listed in this report. If you contest any of the violations in this report, you should provide a 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, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Millstone. In addition, if you disagree with the cross-cutting aspect assigned to any finding, 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 NRC Resident Inspector at Millstone.

In accordance with Title 10 of the *Code of Federal Regulations* (CFR) 2.390 of the NRCs "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Glenn T. Dentel, Chief  
Reactor Projects Branch 2  
Division of Reactor Projects

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

Enclosures:

1. Inspection Report 05000336/2016001 and 05000423/2016001  
w/Attachment: Supplementary Information
2. Notice of Violation

cc w/encl: Distribution via ListServ

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**U.S. NUCLEAR REGULATORY COMMISSION**

## REGION I

Docket Nos. 50-336 and 50-423

License Nos. DPR-65 and NPF-49

Report Nos. 05000336/2016001 and 05000423/2016001

Licensee: Dominion Nuclear Connecticut, Inc. (Dominion)

Facility: Millstone Power Station, Units 2 and 3

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

Dates: January 1 through March 31, 2016

Inspectors: J. Ambrosini, Sr. Resident Inspector, DRP  
C. Newport, Sr. Resident Inspector (Acting), DRP  
L. McKown, Resident Inspector, DRP  
C. Highley, Resident Inspector, DRP  
K. Reid, Project Engineer, DRP

Approved By: Glenn T. Dentel, Chief  
Reactor Projects Branch 2  
Division of Reactor Projects

## TABLE OF CONTENTS

SUMMARY .....	3
REPORT DETAILS .....	5
1. REACTOR SAFETY .....	5
1R01 Adverse Weather Protection .....	5
1R04 Equipment Alignment .....	5
1R05 Fire Protection .....	6
1R06 Flood Protection Measures .....	7
1R11 Licensed Operator Requalification Program and Licensed Operator Performance ....	7
1R12 Maintenance Effectiveness .....	8
1R13 Maintenance Risk Assessments and Emergent Work Control .....	9
1R15 Operability Determinations and Functionality Assessments .....	10
1R18 Plant Modifications .....	15
1R19 Post-Maintenance Testing .....	15
1R22 Surveillance Testing .....	18
1EP6 Drill Evaluation .....	18
4. OTHER ACTIVITIES .....	19
4OA1 Performance Indicator Verification .....	19
4OA2 Problem Identification and Resolution .....	19
4OA3 Follow-Up of Events and Notices of Enforcement Discretion .....	21
4OA6 Meetings, Including Exit .....	21
4OA7 Licensee-Identified Violations .....	21
KEY POINTS OF CONTACT .....	A-1
LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED .....	A-2
LIST OF ACRONYMS .....	A-10

## SUMMARY

Inspection Report 05000336/2016001, 05000423/2016001; 01/01/2016 – 03/31/2016; Millstone Power Station (Millstone), Units 2 and 3; Operability Determinations and Functionality Assessments, Post-Maintenance Testing, and Follow-up of Events and Notices of Enforcement Discretion.

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The inspectors identified one non-cited violation (NCV) and one Notice of Violation (NOV), both of which were of very low safety significance (Green). Additionally, a licensee-identified violation, which was determined to be of very low safety significance (Green), is listed in this report. The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated December 4, 2014. All violations of U.S. Nuclear Regulatory Commission (NRC) requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

### Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green NOV of Title 10 of the *Code of Federal Regulations* (10 CFR) 50, Appendix B, Criterion XVI, "Corrective Action," for Dominion's repetitive failure to take effective corrective actions for significant conditions adverse to quality involving the degradation of the Unit 3 turbine driven auxiliary feedwater (TDAFW) pump turbine control valve linkage. Specifically, Dominion's corrective actions to correct the TDAFW control system have not fully considered all potential failure modes such that continued unreliable operation due to linkage and control systems problems resulted in an overspeed trip of the TDAFW system in February 2016. Inspectors have previously documented this condition under two separate violations of 10 CFR 50, Appendix B, Criterion XVI.

The performance deficiency was determined to be more than minor since it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected its objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. In accordance with IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," the inspectors determined this issue required a detailed risk evaluation based on the finding representing an actual loss of function of a single train for greater than its technical specification (TS) allowed outage time. A Region I Senior Reactor Analyst (SRA) completed a detailed risk evaluation and concluded the risk significance of this issue was in the high E-8 range, or very low safety significance (Green). In accordance with IMC 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014, this finding has a cross-cutting aspect in Human Performance, Design Margins, in that the organization failed to operate and maintain equipment within design margins. The Unit 3 TDAFW has little margin to inoperability. Dominion did not pursue a thorough review of the potential interactions of different failure modes after correcting the obvious causes from past failures, which contributed to the February 22, 2016, overspeed event [H.6]. (Section 1R15)

- Green. The inspectors identified a self-revealing Green NCV of TS 3.3.2 for Dominion's failure to meet the operability requirements for the 'C' feedwater isolation valve (FWIV) testing and valve limit testing work associated with Design Change MP3-09-01030, an electrical jumper was left installed in the 'C' FWIV (3FWS\*CTV41C) control circuit. This prevented both channels of the engineered safety features actuation system (ESFAS) signal from closing the 'C' FWIV when called upon during an actual feedwater isolation actuation associated with the reactor trip on January 25, 2016. The installed jumper rendered the 'C' FWIV inoperable for over one year. Dominion's immediate corrective actions included restoring the channels for 3FWS\*CTV41C to operable status by removing the electrical jumper, inspecting the other FWIV control circuits for electrical jumpers, and retesting all of the FWIVs for proper operation.

The performance deficiency was determined to be more than minor because it adversely affected the configuration control attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to remove an electrical jumper on the 'C' FWIV during the implementation of a design change led to the failure of the valve to perform its closure safety function when called upon. The finding was evaluated in accordance with IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," and determined to be of very low safety significance (Green) since it did not represent an actual loss of safety function of the system as there was a redundant means of feedwater isolation. The finding has a cross-cutting aspect in Human Performance, Work Management, because Dominion did not implement a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. Specifically, maintenance and operations personnel did not follow the work management procedure for generating a new work order when the additional electrical jumper was installed [H.5]. (Section 1R19)

## **Other Findings**

A violation of very low safety significance that was identified by Dominion was reviewed by the inspectors. Corrective actions taken or planned by Dominion have been entered into Dominion's corrective action program (CAP). This violation and corrective action tracking number are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Unit 2 operated at full power for the quarter, with the exception of a down power to 90 percent on February 19 for performance of main turbine control valve testing.

Unit 3 began the inspection period at 100 percent power and down powered to 90 percent on January 8 for performance of main turbine control valve testing. Following return to full power on January 8, an automatic trip occurred on January 25, due to a trip of the 'B' reactor coolant pump caused by a failed capacitor. Unit 3 repaired the reactor coolant pump and returned to full power on January 31. Unit 3 operated at or near full power for the remainder of the inspection period.

## 1. REACTOR SAFETY

### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

1R01 Adverse Weather Protection (71111.01 – 1 sample)

.1 Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

The inspectors reviewed Dominion's preparations for the onset of a blizzard on January 23 and 24, at Units 2 and 3. The inspectors reviewed the implementation of adverse weather preparation procedures before the onset of and during this adverse weather condition. The inspectors walked down the emergency diesel generators (EDGs) and service water (SW) system to ensure system availability. The inspectors verified that operator actions defined in Dominion's adverse weather procedure maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment

Partial System Walkdowns (71111.04 – 3 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

#### Unit 2

- 'B' low pressure safety injection with 'A' low pressure safety injection out of service on March 17



### Unit 3

- 'A' train SW return to service on March 9
- 'B' EDG with 'A' EDG out of service on March 15

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the Updated Final Safety Analysis Report (UFSAR), TSs, work orders, condition reports (CRs), and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted the system's performance of its intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether Dominion staff had properly identified equipment issues and entered them into the CAP for resolution with the appropriate significance characterization.

#### b. Findings

No findings were identified.

### 1R05 Fire Protection

#### Resident Inspector Quarterly Walkdowns (71111.05Q – 6 samples)

#### a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that Dominion controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for out of service, degraded, or inoperable fire protection equipment, as applicable, in accordance with procedures.

### Unit 2

- Reactor building closed loop cooling water and heat exchanger area (A-1B) on January 21

### Unit 3

- Circulating water and 'B' SW intake building (CWS-1 & CWS-3) on January 14
- Fuel building 11', 24' and 52', (FB-1) on January 14
- Control room, computer room, and instrument rack room (CB-9, 10B, 11B, & 12) on January 20
- East & West MCC rod control rooms 45' & 24' (AB-5 & AB-6A) on February 3

- Engineered safety features building East floor area (ESF-4), and Southeast floor area (ESF-5) on March 22

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

.1 Internal Flooding Review

a. Inspection Scope

The inspectors reviewed the UFSAR, the site flooding analysis, and plant procedures to assess susceptibilities involving internal flooding. The inspectors also reviewed the CAP to determine if Dominion identified and corrected flooding problems and whether operator actions for coping with flooding were adequate. The inspectors focused on the Unit 2 turbine building, 14' 6" elevation, on January 21 to verify the adequacy of equipment seals located below the flood line, floor, and water penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, control circuits, and temporary or removable flood barriers.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program and Licensed Operator Performance  
(71111.11Q – 3 samples)

.1 Quarterly Review of Licensed Operator Regualification Testing and Training (1 sample)

a. Inspection Scope

Unit 3

The inspectors observed Unit 3 licensed operator simulator training on March 23, which included damage to the station blackout diesel generator, a fire in vital switchgear bus 34D, and a loss of offsite power. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classifications made by the shift manager and the technical specification action statements (TSASs) entered by the unit supervisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Room (2 samples)

a. Inspection Scope

Unit 2

The inspectors observed Unit 2 operator performance during a planned down power and quarterly turbine valve testing on February 19. The inspectors observed crew briefings and focus briefings to verify that the briefings met the criteria specified in Dominion's Operations Section Expectations Handbook. Additionally, the inspectors observed test performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

Unit 3

The inspectors observed Unit 3 operator performance during a planned down power and quarterly turbine valve testing on January 8. The inspectors observed crew briefings and focus briefings to verify that the briefings met the criteria specified in Dominion's Operations Section Expectations Handbook. Additionally, the inspectors observed test performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 1 sample)

a. Inspection Scope

The inspectors reviewed the sample listed below to assess the effectiveness of maintenance activities on structure, system, and component (SSC) performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance work orders, and maintenance rule basis documents to ensure that Dominion was identifying and properly evaluating performance problems within the scope of the maintenance rule. For each sample selected, the inspectors verified that the SSC was properly scoped into the maintenance rule in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by Dominion staff was reasonable. As applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these SSCs to (a)(2). Additionally, the inspectors ensured that Dominion staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

Unit 2

- Engineered safeguards actuation signal on February 5

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 6 samples)a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Dominion performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that Dominion personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When Dominion performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the TS requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

Unit 2

- High risk plan for volume control tank auto divert valve (CH-500) troubleshooting on January 6
- High risk plan for steam generator feed pump vibration adjustment on January 7
- High risk plan for Bussmann fuse replacements on February 4
- Risk mitigation actions for extended SW pump unavailability due to 'C' circulating water bay outage on February 17
- TDAFW surveillance testing while protected to support 'C' SW outage on March 2

Unit 3

- Unit 3 fire water system risk mitigation actions for Unit 2 while Unit 3 diesel driven fire pump and Unit 2 TDAFW out of service during 'C' SW outage on March 10

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 6 samples)a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions:

Unit 2

- Main steam system hydraulic snubber low oil level on February 16
- TDAFW pump failure to mechanically trip on March 2

Unit 3

- Steam generator flow transmitter isolation valve steam leak in containment on January 28
- TDAFW system following surveillance test failure on February 24
- SW leak on line 3-SWP-018-082-3 to 'D' recirculation spray system heat exchanger on March 8
- SW fittings identified as non-conforming to American Society of Mechanical Engineers (ASME) Boiler Pressure Vessel Code Section III, on March 29

The inspectors selected these issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the operability determinations to assess whether TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TSs and UFSAR to Dominion's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled by Dominion.

b. Findings

Introduction. The inspectors identified a Green NOV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for Dominion's repetitive failure to take effective corrective actions for significant conditions adverse to quality involving the degradation of the Unit 3 TDAFW pump turbine control valve linkage. Specifically, Dominion's corrective actions to correct the TDAFW control system have not fully considered all potential failure modes such that continued unreliable operation due to linkage and control systems problems resulted in an overspeed trip of the TDAFW system in February 2016. Inspectors have previously documented this condition in 2014 under NCV 05000423/2014013-02, a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," and in violation (VIO) 05000423/2014008-02, a White VIO, also of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action."

Description. Dominion has experienced several operational challenges and overspeed trips of the Unit 3 TDAFW in the recent past, attributed to different potential failure modes, as illustrated in the following chart:

Date	Event	Attributed Cause	Condition Report Number	Immediate Corrective Actions
November 4, 2013	Overspeed trip during surveillance	Condensate buildup in the steam supply lines	531536	<ul style="list-style-type: none"> <li>• Blowdown of steam lines</li> <li>• Isolate D steam supply line</li> <li>• Weekly surveillance testing to demonstrate reliability</li> </ul>
December 18, 2013	Overspeed trip during surveillance	Condensate buildup, exacerbated by the reopening of the D steam line (done for this surveillance)	535411	<ul style="list-style-type: none"> <li>• Continued actions listed above</li> <li>• Incorporated event into the November failure root cause evaluation (RCE 001111)</li> </ul>
January 23, 2014	Overspeed trip during surveillance	Incorrectly installed Heim joint on the linkage between the governor and the TDAFW control valve	537933	<ul style="list-style-type: none"> <li>• Corrected Heim joint configuration</li> <li>• Replaced cam follower bearing</li> <li>• Replaced governor</li> <li>• Evaluated governor valve internals</li> </ul>
January 29, 2014	Unexpected wear and oxidation observed on removed cam follower bearing on both 8/11/13 and 1/26/14	Incorrect cam follower bearing supplied by manufacturer	538353 538743	<ul style="list-style-type: none"> <li>• TDAFW taken out of service on 2/3/14 to replace cam follower bearing with correct part</li> </ul>
September 11, 2014	Governor replacement	N/A		
October 2014	Detailed linkage evaluation in refueling outage uncovers linkage misalignment issues, including cam-plate pivot bushing wear and non-optimal linkage setup, which allowed	N/A		

Date	Event	Attributed Cause	Condition Report Number	Immediate Corrective Actions
	degradation of the cam-follower spherical bearing and potential linkage sluggishness and binding			
February 22, 2016	Overspeed trip during surveillance	Oxidation of the cam follower bearing due to the presence of moisture in a non-lubricated bearing	1027923	<ul style="list-style-type: none"> <li>• Replaced cam follower bearing</li> <li>• Addition of lubrication to the bearing</li> <li>• Installation of a steam shield to minimize moisture</li> </ul>

In response to the first three overspeed trips, the NRC initiated a Special Inspection in February 2014 and May 2014 to review Dominion's troubleshooting activities and corrective actions. The Special Inspection team documented a White VIO of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," involving Dominion's failure to promptly identify and correct a condition adverse to quality. Specifically, the Unit 3 TDAFW pump was operated from May 2013 through February 2014 in an adverse configuration due to the installation of an incorrect cam follower bearing. The NRC conducted a supplemental inspection of this White VIO in accordance with Inspection Procedure 95001 in June 2015. As stated in this inspection report (05000423/2015010):

Based on the results of the inspection, the inspectors concluded that Dominion had adequately performed root cause analyses of the event, and in general, corrective actions, both completed and planned, were reasonable to address the related issues. Notwithstanding this conclusion, the inspectors identified a general weakness associated with a missed opportunity within the root cause evaluations (RCE) to identify a corrective action to address a contributing cause for the event. Dominion had identified within the RCE that the organization failed to understand the integral relationship of the Unit 3 governor control system components. However, the evaluation did not establish a corrective action to ensure the TDAFW maintenance procedures resulted in the establishment of critical settings and tolerances for the governor linkage setup. The inspectors noted that proper control valve linkage setup ensures that the maximum force will be applied from the governor through the linkage to the valve stem to close the control valve on startup. Dominion identified this non-optimal linkage setup independent of the RCE's performed and corrective actions were implemented during the October 2014 refueling outage. This issue was previously docketed as an issue of very low safety significance (Green) associated with a NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions" within NRC Inspection Report 05000423/2014013 (ML15015A078), dated January 15, 2015.

The Unit 3 TDAFW experienced two additional failures in July 2014 and September 2014. These were failure to start events, not overspeed trips, and are therefore not included in the above chart. However, the NRC initiated another Special Inspection as a result of these failures.

The NRC documented the Green NCV referred to in the Inspection Procedure 95001 inspection report in this Special Inspection report as 05000423/2014013-02, a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," associated with the failure to identify and correct adverse conditions related to the TDAFW pump governor to control valve linkage which potentially could have affected the reliability of the pump. Specifically, previously unidentified cam-plate pivot bushing wear and non-optimal linkage setup allowed degradation of the cam-follower spherical bearing and potential linkage sluggishness and binding until October 29, 2014, when refueling outage 3R16 began.

The inspectors determined that Dominion has not completely solved the challenges of the TDAFW as evidenced by an overspeed trip during a scheduled surveillance test on February 22, 2016. Dominion immediately quarantined the TDAFW pump and began troubleshooting activities, which identified that the linkage was not operating smoothly due to binding somewhere in the system. Further analysis revealed that the cam follower spherical bearing was binding. Dominion identified corrosion products on the bearing and determined the preliminary cause of the failure to be oxidation due to the presence of moisture on the non-lubricated bearing. Dominion documented the issue in CR 1027923 and initiated a root cause evaluation, which was still in progress at the end of the inspection period. Immediate corrective actions included replacing the cam follower bearing, adding lubrication to the replaced bearing, and the installation of a shield to minimize moisture and the potential for an environment conducive to corrosion until Dominion completes the root cause evaluation and develops more comprehensive corrective actions.

The inspectors noted the similarities between the February 2016 failure and previous TDAFW failures in that Dominion continues to have difficulties understanding the relationship between the different linkage components and how the potential failure modes can best be corrected to prevent recurrence. Specifically, the cam follower bearing appears to be a system vulnerability, where small amounts of degradation can cause system inoperability. In addition, governor performance appears to have significant impact on the ability of the control system to allow the TDAFW pump to perform its design basis function. This is complicated by the fact that the Unit 3 TDAFW pump operates close to the limits of the system's capabilities. In order to produce the required flow, the pump must operate near the limits of what the system can handle in terms of pump speed and discharge pressure. Thus, apparently small degradation can have a magnified effect on the Unit 3 TDAFW that is not typically seen in the rest of the industry. While the inspectors do not have a current operability concern, the overall reliability of the Unit 3 TDAFW continues to be challenged.

Analysis. The inspectors determined that the failure to take effective corrective action for a significant condition adverse to quality was a performance deficiency that was reasonably within Dominion's ability to foresee and prevent. Specifically, Dominion staff has been unsuccessful in restoring the reliability and dependability of this safety system following multiple failures of the Unit 3 TDAFW pump. This performance deficiency was determined to be more than minor since it was associated with the equipment



performance attribute of the Mitigating Systems cornerstone and adversely affected its objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. In accordance with IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," the inspectors determined this issue required a detailed risk evaluation based on the finding representing an actual loss of function of a single train for greater than its TS allowed outage time. A Region I SRA completed a detailed risk evaluation and concluded the risk significance of this issue was in the high E-8 range, or very low safety significance (Green).

The SRA used the Systems Analysis Programs for Hands-On Evaluation Revision 8.1.0 and the Standardized Plant Analysis Risk Model for Millstone Unit 3, Model Version 8.20, to conduct the internal events detailed risk evaluation and Dominion's Individual Plant Examination for Severe Accident Vulnerabilities and the Individual Plant Evaluation of External Events to assess the external events risk contribution for this performance deficiency. Assuming a 13.5 day exposure period ( $T/2$ , where  $T$  equals 27 days, the time between the February 22 failure to start and the last successful pump operation on January 25, 2016) the internal risk contribution was calculated to be approximately  $5E-7$ /year delta core damage frequency (CDF). The dominant core damage sequences involve loss of direct current buses with total loss of auxiliary feedwater. The external risk contribution was dominated by fire events and estimated to be approximately  $2E-7$  delta CDF. The dominant fire scenarios involve control room and cable spreading room fires requiring control room abandonment. Based upon past experience with TDAFW pump overspeed trip failures, the associated exercising of the governor control linkage typically allowed for operator action to recover this turbine-driven pump. With the available procedural guidance and operator training, the SRA applied an operator recovery credit of 0.1. Using this conservative recovery credit, the total increase in CDF was estimated to be  $7E-8$ /year delta CDF, or very low safety significance (Green).

In accordance with IMC 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014, this finding has a cross-cutting aspect in Human Performance, Design Margins, in that the organization failed to operate and maintain equipment within design margins. The Unit 3 TDAFW has little margin to inoperability. Dominion did not pursue a thorough review of the potential interactions of different failure modes after correcting the obvious causes from past failures, which contributed to the February 22, 2016, overspeed event [H.6].

Enforcement. 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, since November 4, 2013, Dominion has not established measures to assure that the cause of a significant condition adverse to quality has been determined and corrective actions taken to preclude repetition. Specifically, Dominion's corrective actions for multiple failures of the TDAFW control system have not fully considered all potential failure modes, leading to continued unreliable operation due to linkage and control system problems. This resulted in an overspeed trip of the TDAFW system in February 2016. This violation meets the criteria in Section 2.3.2.a of the NRC Enforcement Policy to disposition as a NCV. However, the NRC considered that Dominion has, on two previous occasions, failed to correct this issue, which involves a safety-significant system. Therefore, the

NRC is issuing an NOV and is requiring a response from Dominion regarding, in part, its planned long-term corrective actions. The NOV is enclosed. Dominion entered this issue into their CAP as CR 1027923 (**VIO 05000423/2016001-01, Repetitive Failures to Correct Unit 3 Turbine Driven Auxiliary Feedwater Pump Performance Issues**).

1R18 Plant Modifications (71111.18 – 2 samples)

.1 Temporary Modifications

a. Inspection Scope

The inspectors reviewed the temporary modification listed below to determine whether the modification affected the safety functions of systems that are important to safety. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns of the modifications to verify that the temporary modification did not degrade the design bases, licensing bases, and performance capability of the affected systems.

- Temporary modification to encapsulate steam leakage at Unit 2 TDAFW pump trip throttle valve on March 10

b. Findings

No findings were identified.

.2 Permanent Modifications

a. Inspection Scope

The inspectors evaluated a modification to the Unit 3 diesel driven fire pump battery charger implemented by DCN-MP3-15-01100, Revision 0, on March 10. The inspectors verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification. In addition, the inspectors reviewed modification documents associated with the upgrade and design change, including vendor technical manuals, electrical schematics and control logic diagrams, and component electrical response characteristic charts.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 7 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the test procedure to verify that the procedure adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis and/or design basis documents, and that

the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold points were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

## Unit 2

- 'A' Train cold leg recirculation piping following 2-SI-460 freeze seal on March 17
- 'A' SW pump following surveillance test failure on low differential pressure on March 18

## Unit 3

- Invertor 4 failure on January 7
- 'C' FWIV failure to close on January 25
- 'A' FWIV slow closure on January 25
- 'B' turbine driven main feed pump seal replacement on January 30
- TDAFW pump after cam follower bearing replacement on February 24

## b. Findings

Introduction. The inspectors identified a self-revealing Green NCV of TS 3.3.2 for Dominion's failure to meet the operability requirements for the 'C' feedwater isolation valve (FWIV) testing and valve limit testing work associated with Design Change MP3-09-01030, an electrical jumper was left installed in the 'C' FWIV (3FWS\*CTV41C) control circuit. This prevented both channels of the engineered safety features actuation system (ESFAS) signal from closing the 'C' FWIV when called upon during an actual feedwater isolation actuation associated with the reactor trip on January 25, 2016. The installed jumper rendered the 'C' FWIV inoperable for over one year.

Description. On January 25, Unit 3 experienced a reactor trip in which an ESFAS feedwater isolation signal was generated and the 'C' FWIV, one of four FWIVs, failed to automatically close. Operators subsequently closed the valve from the control room within one minute of the actual signal. During subsequent troubleshooting it was determined that an electrical jumper was left installed in the control circuit which prevented the actuation signal from reaching the circuitry to automatically close the valve. The investigation determined that the electrical jumper was installed as a part of Design Change MP3-09-01030, specifically the valve testing and valve limiting testing phase on November 7, 2014, and was not discovered because the maintenance and operations personnel failed to install and track the installation of the electrical jumper in accordance with the applicable procedure for control of maintenance, WM-AA-100, "Work Management," Revision 26. Additionally, the post-maintenance testing was performed in sections based on the original scope of the design change instead of as a comprehensive system test, which contributed to the jumper going undiscovered. TS 3.3.2, in part, requires that ESFAS instrumentation channels and interlocks shall be operable. Table 3.3-3 requires 2 channels operable in Modes 1, 2, 3, and 4 and with one channel inoperable it must be restored to operable status within 24 hours or be in hot standby within 6 hours and cold shutdown within the next 30 hours. The inspectors

noted that one of the modes of applicability for TS 3.3.2 is Mode 4, which Unit 3 entered on November 13, 2014. The inspectors concluded that Dominion failed to properly control the installation and removal of the electrical jumper. This rendered the 'C' FWIV inoperable and resulted in violating the TS and exceeding its allowed outage time. Dominion entered the condition in their CAP as CR 1025133.

Analysis. The inspectors determined that the failure to ensure that the required number of ESFAS channels was operable was a performance deficiency that was reasonably within Dominion's ability to foresee and correct. Specifically, the improper implementation of WM-AA-100, "Work Management," during the conduct of a design change to the 'C' FWIV led to an electrical jumper being left in place that caused the inoperability of the 'C' FWIV closure safety function.

The performance deficiency was determined to be more than minor because it adversely affected the configuration control attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to remove an electrical jumper on the 'C' FWIV during the implementation of a design change led to the failure of the valve to perform its closure safety function when called upon. The finding was evaluated in accordance with IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," and determined to be of very low safety significance (Green) since it did not represent an actual loss of the safety function of the system as there was a redundant means of feedwater isolation. The finding has a cross-cutting aspect in Human Performance, Work Management, because Dominion did not implement a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. Specifically, maintenance and operations personnel did not follow the work management procedure for generating a new work order when the additional electrical jumper was installed [H.5].

Enforcement. TS 3.3.2, "Engineered Safety Features Actuation System Instrumentation", states 'Channels and interlocks shown in table 3.3-3 shall be operable with their Trip Setpoints set consistent with the values shown in the Nominal Trip Setpoint column of table 3.3-4.' Table 3.3-3 line 1.b for Safety Injection (feedwater isolation) Automatic Actuation Logic and Actuation Relays requires a minimum of two operable channels when in Modes 1, 2, 3, and 4. TSAS 14A states, in part, with the number of operable channels one less than the Minimum Channels Operable requirement, restore the inoperable channel to operable status within 24 hours or be in at least Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours. Contrary to the above, on November 7, 2014 Dominion failed to properly implement WM-AA-100, "Work Management," Revision 26. Specifically, Dominion did not use the correct process to install the electrical jumper which subsequently was not removed, which led to the electrical jumper being left in place and causing a violation of TS 3.3.2 when Dominion entered Mode 4 without the required number of operable ESFAS channels for safety injection. Dominion's immediate corrective actions included restoring the channels for 3FWS\*CTV41C to operable status by removing the electrical jumper, inspecting the other FWIV control circuits for electrical jumpers, and retesting all of the FWIVs for proper operation. Because this violation is of very low safety significance (Green) and has been entered into Dominions CAP (CR 1025133), this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV-05000423/2016001-02: Failure of Feedwater Isolation Valve to Close Due to Electrical Jumper Being Installed)**

1R22 Surveillance Testing (71111.22 – 10 samples)a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant SSCs to assess whether test results satisfied TSs, the UFSAR, and Dominion procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

Unit 2

- Reactor coolant system (RCS) sample on February 12
- RCS leakage calculation on February 18 (RCS)
- TDAFW pump failure to trip on March 2
- 'A' train cold leg recirculation refueling water storage tank valve backleakage surveillance testing on March 17 (IST)

Unit 3

- 'B' control building ventilation chiller SW booster pump operational test on January 6 (IST)
- 'A' EDG operability test on January 19
- Source range monitor nuclear instrument testing on January 29
- RCS leakage calculation February 2 (RCS)
- RCS sample on February 3
- Moderator temperature coefficient and power coefficient measurements February 4

b. Findings

No findings were identified.

**Cornerstone: Emergency Preparedness**1EP6 Drill Evaluation (71114.06 – 1 sample)Emergency Preparedness Drill Observationa. Inspection Scope

The inspectors evaluated the conduct of a routine Dominion emergency preparedness drill on March 23 to identify any weaknesses and deficiencies in the classification and notification recommendation development activities. This training drill involved operators classifying events on Unit 3 related to natural phenomena. The inspectors observed emergency response operations to determine whether the event classification and notifications were performed in accordance with procedures. The inspectors also

attended the station drill critique to compare inspector observations with those identified by Dominion staff in order to evaluate Dominion's critique and to verify whether Dominion staff was properly identifying weaknesses and entering them into the CAP.

b. Findings

No findings were identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator Verification (71151)

RCS Specific Activity and RCS Leak Rate (2 samples)

a. Inspection Scope

The inspectors reviewed Dominion's submittal for the RCS specific activity and RCS leak rate performance indicators (PIs) for both Unit 2 and Unit 3 for the period of January 1, 2015 through December 31, 2015. To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed RCS sample analysis and control room logs of daily measurements of RCS leakage, and compared that information to the data reported by the PI. Additionally, the inspectors observed surveillance activities that determined the RCS identified leakage rate, and chemistry personnel taking and analyzing an RCS sample.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 1 sample)

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that Dominion entered issues into the CAP at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the CAP and periodically attended CR screening meetings.

b. Findings

No findings were identified.

.2 Annual Sample: Unit 3 'A' Diesel Fire on November 4, 2015

a. Inspection Scope

The inspectors performed an in-depth review of Dominion's apparent cause evaluation (ACE) and corrective actions associated with the fire on the Unit 3 'A' EDG that resulted in an Emergency Action Level entry and an alert being declared on November 4, 2015 described in NRC Inspection Report 05000336/2015004 and 05000423/2015004. The event is documented in multiple Dominion CRs, which include ACE report 3015575.

The inspectors interviewed the senior licensed operator on Unit 3 regarding the station's practices with assessing risk and the inspector reviewed the associated station risk assessment procedures.

To accomplish the inspection objectives, the inspectors reviewed operating and maintenance procedures, the vendor technical manual, work orders, and other design documentation associated with the 'A' EDG.

The inspectors assessed Dominion's problem identification threshold, causal analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of Dominion's corrective actions to determine whether Dominion was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Dominion's CAP and 10 CFR 50, Appendix B and assessed the effectiveness of the implemented corrective actions.

b. Findings and Observations

No findings were identified.

On November 3, as a result of troubleshooting activities, Dominion replaced the diesel mechanical and electrical governors. The engine must be operated at no load to calibrate the replacement governors for operation. Dominion started and ran the EDG at no load, while awaiting assistance from an outside vendor. Prior to the fire, Dominion ran the EDG at no load for approximately 10 hours followed by 2 hours of light load. Maintenance and operating procedure precautions and limitations informed operators that no load runs shall not exceed 12 hours total to minimize accumulation of combustion and lubrication products in exhaust systems. The inspectors determined that, although no precautions or limitations were exceeded during operation, there was non-conservative decision associated with running the diesel unloaded while waiting for the vendor to come onsite.

CR 1017050 directed an ACE (ACE 3015575) in which Dominion determined the cause of the fire to be unburned fuel oil pooling from exhaust gasket leakage underneath insulation on the exhaust manifold in the area of the heat shield. The exhaust gaskets are designed to seal in dry gases and not wet, unburned fuel oil. The source of the unburned fuel oil was the incomplete combustion products in the exhaust which developed during extended operation at no load. Dominion's corrective actions include performing an external visual inspection of the exhaust manifold flange connections, which was completed on February 19 and reviewed by the inspectors. Additional corrective actions include revising applicable procedures to further minimize operation at

no load and to provide a loading strategy to mitigate carry-over of incomplete combustion products into the exhaust. Procedure changes are due to be completed in April. The inspectors determined that Dominion has developed an appropriate plan to address the apparent causes listed in ACE 3015575.

The inspectors determined that Dominion's overall response to the November 4, 2015, diesel fire was commensurate with the safety significance, was timely, and included appropriate corrective actions. The inspectors determined that the actions taken were reasonable to resolve the issues.

#### 4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 – 2 samples)

##### .1 Plant Events

###### a. Inspection Scope

For the plant events listed below, the inspectors reviewed and/or observed plant parameters, reviewed personnel performance, and evaluated performance of mitigating systems. The inspectors communicated the plant events to appropriate regional personnel, and compared the event details with criteria contained in IMC 0309, "Reactive Inspection Decision Basis for Reactors," for consideration of potential reactive inspection activities. As applicable, the inspectors verified that Dominion made appropriate emergency classification assessments and properly reported the event in accordance with 10 CFR Parts 50.72 and 50.73. The inspectors reviewed Dominion's follow-up actions related to the events to assure that Dominion implemented appropriate corrective actions commensurate with their safety significance.

- Unit 3 automatic reactor trip on January 25
- Unit 3 TDAFW surveillance test failure and unplanned TSAS entry on February 22

###### b. Findings

No findings were identified.

#### 4OA6 Meetings, Including Exit

On April 27, 2016, the inspectors presented the inspection results to Mr. John Daugherty, Site Vice President, and other members of the Millstone staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

#### 4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by Dominion during a design basis review of Millstone Unit 3 SW system and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as an NCV.

- Dominion identified a Severity Level (SL) IV NCV of 10 CFR 50.59(d)(1), "Changes, Tests, and Experiments," for the failure to perform an evaluation of a change to the facility as described in the UFSAR which would have required prior approval. During



a design basis review of Millstone Unit 3 SW system, Dominion discovered that multiple fittings installed in the system beginning in 1989 were manufactured with Nickel Copper Alloy (UNS N04400) per material specification SB-366. Although a material with improved properties, this is not an ASME Boiler Pressure Vessel Code of record Section III (ASME III) permitted material fabrication specification without required additional documentation. The Millstone Unit 3 UFSAR Table 3.2-1, "List of QA Category I and Seismic Category I Structures, Systems, and Components," Revision 24.3, requires the SW system to be compliant with ASME III Code Class 3. The inspectors determined that the failure of Dominion to perform written evaluations in accordance with 10 CFR 50.59(d)(1) when installing non-conforming material into Unit 3 beginning in 1989 was a performance deficiency which was within Dominion's capability to foresee and prevent. The inspectors identified this condition as more than minor as installation of an ASME III non-conforming material into the Unit 3 SW system would have required prior approval. Because the performance deficiency impacted the ability of the NRC to perform its regulatory function, the inspectors evaluated the issue using the traditional enforcement process. In accordance with the NRC Enforcement Policy, Section 6.1.d.2, this condition screened as SL IV as it was assessed as having very low safety significance (Green) by IMC 0609, "Significance Determination Process," when the screening questions were all answered 'No'. 10 CFR 50.59(d)(1), "Changes, Tests, and Experiments," states in part, "The licensee shall maintain records of changes in the facility, of changes in procedures, and of tests and experiments made pursuant to paragraph (c) of this section. These records must include a written evaluation which provides the bases for the determination that the change, test, or experiment does not require a license amendment pursuant to paragraph (c)(2) of this section." Contrary to the above, from March 1993 through March 29, 2016, Dominion did not perform written evaluations to provide the bases for determining that a change, test, or experiment made pursuant to 10 CFR 50.59(c)(2) did not require a license amendment for installation of SB-366 components into the SW system. Because Dominion identified this issue of very low safety significance (Green) and it has been entered into their CAP (CR1031360), this finding is being treated as a SL IV, licensee-identified NCV consistent with the NRC Enforcement Policy Section 2.3.2. This item was considered licensee identified since Dominion identified this issue during a design basis review.

## **ATTACHMENT: SUPPLEMENTARY INFORMATION**

## **SUPPLEMENTARY INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee Personnel

J. Daugherty, Site Vice President  
C. Olsen, Plant Manager  
L. Armstrong, Director, Performance Recovery  
R. Borchart, Senior Reactor Engineer  
B. Bowen, Shift Supervisor, Health Physics  
J. Burkirk, Outage Control Center Health Physics Representative  
F. Cietek, Risk Analyst  
G. Cochran, Supervisor, Nuclear Site Safety  
S. Doboie, Unit 2 Shift Manager  
D. DelCore, Shift Supervisor, Health Physics  
D. Dodson, Manager of Programs  
M. Dunivan, Supervisor, Health Physics Auxiliary Building  
K. Gannon, Supervisor, Health Physics  
W. Gorman, RMS Supervisor  
B. Graber, Supervisor Exposure Control and Instrumentation  
M. Hall, Dominion Corporate Welding Engineer  
K. Hacker, Dominion Corporate Level III  
L. Lebaron, System Engineer  
K. Miles, Shift Supervisor, Health Physics  
L. Seplak, Regulatory Assurance  
D. Smith, Site Emergency Preparedness Manager  
T. Spakowski, Senior Nuclear Training Instructor  
J. Taylor, Supervisor, Health Physics Outage Containment  
T. Thull, Boric Acid Program Manager  
S. Turowski, Manager, Radiation Protection and Chemistry  
M. Wynn, Supervisor, Radiological Analysis  
A. Briggs, Engineering Supervisor  
H. Thompson, Contractor  
D. Reed, Unit 3 Shift Manager  
D. Balfour, Test Coordinator/CRS  
J. Susco, Unit 3 Operations  
K. Woods, Unit 3 Operations  
J. Weymouth, Technician  
C. Maxson, Miscellaneous  
B. Faye, System Engineer  
D. Rowe, Unit 3 Operations

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

05000336/2016001-01	VIO	Repetitive Failures to Correct Unit 3 Turbine Driven Auxiliary Feedwater Pump Performance Issues
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Opened/Closed

05000336/2016001-02	NCV	Failure of Feedwater Isolation Valve to Close Due to Electrical Jumper Being Installed
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**LIST OF DOCUMENTS REVIEWED****Section 1R04: Equipment Alignment**Procedures

AOP 2560, Storms, High Winds and High Tides, Revision 010-17  
 AOP 3569, Severe Weather Conditions, Revision 19  
 C OP 200.6, Storms and Other Hazardous Phenomena (Preparation and Recovery), Revision  
 003-01  
 C OP 200.13, Seasonal Weather Operations, Revision 004-04  
 C OP 200.13-003, Unit 3 Cold Weather Preparation Checklist, Revision 001-01  
 OP 2266, Response to Low or high Outside Air Temperature, Revision 001-04  
 OP 2268, Cold Weather Operation, Revision 005-04  
 OP 3326, Service Water System, Revision 28  
 SA-AA-111, Administrative Procedure, Revision 0

Condition Reports

1029533

Drawings

12179-EM-116A, Emergency Diesel Fuel Oil Sys, Revision 23  
 12179-EM-116C, Emergency Diesel Generator Lube Oil and Cooling Water, Revision 31  
 12179-EM-116D, Emergency Diesel Generator Starting, Revision 20  
 12179-EM-116E, Emergency Diesel Exhaust Combustion, Air, and Crankcase Vacuum System,  
 Revision 9  
 12179-EM-133B, Piping and Instrumentation Diagram Service Water, Revision 89  
 12179-EM-133C, Piping and Instrumentation Diagram Service Water, Revision 35  
 12179-EM-133D, Piping and Instrumentation Diagram Service Water, Revision 47  
 25203-26015, L.P. Safety Injection System, Revision 46

Miscellaneous

MP-26-EPA-REF08B, Millstone Emergency Planning Resource Book, Revision 39

**Section 1R05: Fire Protection**Procedures

U3-24-FFS, Millstone Unit 3 Nuclear Power Station MP3 Fire Fighting Strategies, Revision 0

Millstone Unit 3 Updated Final Safety Analysis Report

U2-FFS-BAP-01-AB-Map, Unit 2 Auxiliary Building -25' Level

C OP 200.17, Fire Watch and Impairment Tracking, Revision 000-01

AOP 2559, Fire, Revision 008-03

U3-24-FFS-BAP01-AB-MAP, East/West MCC Rod Control Rooms 45 ft, Revision 0

U3-24-FFS-BAP01-AB-MAP, East/West MCC Rod Control Rooms 24 ft, Revision 0

SP 3641D.6, Fire Rated Assemblies, Revision 010-03

SP 3641D.6-001, Fire Rated Assembly Inspection, Revision 007-02

U3-24-FFS-BAP01-CB-MAP, Main Control Room, Revision 0

SP 3641.D6, Control Building 24Ft CSR Ceiling & Support Columns, Revision 010-03

Technical Requirements Manual 3/4.7.13 Fire Rated Assemblies, LBDCR-07-MP3-018

Specification No. SP-CE-248, Specifications for Fireproof Coatings at Millstone Unit 3,  
Revision 1

Condition Reports

1024469

1024131

1031243

1033053

CA3021614

Work Orders

53102922364

Miscellaneous

NUREG/CR-7135, Compensatory and Alternative Regulatory Measures for Nuclear Power Plant  
Fire Protection

FP-EV-98-0061, Technical Evaluation for the Lack of Barriers in the Appendix R Boundaries  
Separating the Turbine Building and the Service Water Cable Tunnels, Millstone Unit 2,  
Revision 1

25203-SP-M2-SU-1046, Unit 2 Appendix R Compliance Report, Revision 1

98-ENG-01651-C3, Evaluation of the Effects of not Fireproofing Unistrut Attachments to  
Structural Steel in the Control Building, Revision 0

**Section 1R06: Flood Protection Measures**Procedures

C OP 200.4, Response to Plant Leaks and Flooding, Revision 002-03

OP 2340A, Domestic Water System, Revision 009-02

Condition Reports

1024610

Miscellaneous

PRA Notebook MPS2-IF.2, Internal Flooding – Flood Scenario Development, Revision 3 25203-  
26011, Sheet 2, P&ID for Domestic Water System

**Section 1R11: Licensed Operator Regualification Program**Procedures

ER-AA-RXE-1004 – Attachment 4, Reactivity Control Plan  
 OP 3204, Loading Changes for the Main Turbine, Revision 019-02  
 SP 3623.2, Turbine Overspeed Protection System Test, Revision 009-02  
 SP 3623.2-002, Cycle Test of HP Turbine Control Valves, Stop Valves, and LP Combined  
 Intermediate Stop and Intercept Valves, Revision 010-04  
 OP 2204, Load Changes, Revision 31  
 SP 2651N, Main Control Valve Operability Test, Revision 6  
 SP 2651M, Combined Intermediate Valves Operability Test, Revision 004-02  
 SP 2651L, Main Stop Valve Operability Test, Revision 004-01

Condition Reports

1019177

**Section 1R12: Maintenance Effectiveness**Procedures

ER-AA-SYS-1001, System Health Report, Revision 10  
 ER-AA-MRL-100 Implementing Maintenance Rule, Revision 10  
 ER-AA-SYS-1003, System Performance Monitoring, Revision 5

Condition Reports

1025895

491258

444164

Work Orders

53102927815

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**Procedures

WM-AA-301, Operational Risk Assessment, Revision 11  
 ARP 2590B-027, VCT Level Lo-Lo, Revision 000-02  
 AOP 2585, Immediate Operator Actions, Revision 001-01  
 OP 2321, Main Feedwater System, Revision 23  
 MP-CBM 104, Vibration Data Acquisition and Overall Vibration Analysis, Revision 4  
 OP-AA-102, Operability Determinations, Revision 14  
 OP-AA-600, Protected Equipment, Revision 4  
 OP-MP-601, Protected Equipment (Millstone), Revision 19  
 AOP 2579M, Fire Procedure for Hot Standby Appendix R Fire Area R-14, Revision 006-06

Condition Reports

562887

1015035

1016562

1016788

1022353

1026320

1026942

1028946

1029913

Work Orders

53102898317	53102867491	53102878158	53102917676
53102936960			

Miscellaneous

High risk plan for Unit 2 on January 6  
 High risk plan for Unit 2 on January 7  
 High risk plan for Unit 2 on February 4  
 Regulatory Guide 1.160, Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, Revision 3  
 NUMARC 93-01, Industry Guidance for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, Revision 4A  
 Clearance FPW16-0004, U3 Diesel Driven Fire Pump Battery Charger Modification  
 CR1026942 Reasonable Assurance of Safety for Unit 2 'C' Service Water Pump Out of Service greater than 30 days, Revision 0  
 CR1026942 Reasonable Assurance of Safety for Unit 2 'C' Service Water Pump Out of Service greater than 30 days, Revision 1

**Section 1R15: Operability Determinations and Functionality Assessments**Procedures

OP-AA-102, Operability Determinations, Revision 14  
 SP 21149, Snubber Visual Inspection Surveillance, Revision 13  
 NC 1940C, Hydraulic Snubber Installation and Removal, Revision 001-02  
 SP 3622.3, TDAFW Pump Operational Readiness and Quarterly IST Group B Pump Tests, Revision 014-14  
 OP-AA-101 Attachment 2, Operational Decision Making Checklist for 3MSS\*V078, Revision 0 and 1  
 SP 3601F.6, Reactor Coolant System Water Inventory Measurement, Revision 006-07  
 SP 3670.1, Mode 1-4 Daily and Shiftly Control Room Rounds, Revision 32

Condition Reports

566507	578477	605817	708081
1025073	1026411	1026559	1028946
1029187	1029339	1031360	

Work Orders

53102928096  
 53102934377

Miscellaneous

25212-28923, Piping and Instrumentation Drawing Main Steam and Reheat, Revision 59  
 ETE-MP-2016-1023, Turbine Driven Auxiliary Feedwater Pump Cam Follower Bearing Greasing and Steam Spray Shield  
 Summary of UT Inspection Results for Hole in 3-SWP-018-082-3  
 Millstone Power Station Unit 3 Updated Final Safety Analysis Report, Table 3.2-1, List of QA Category I and Seismic Category I Structures, Systems, and Components, Revision 24.3  
 1971 ASME Boiler and Pressure Vessel Code with 1972 and 1973 Addenda  
 DBS-2322, Design Basis Summary Auxiliary Feedwater System, Revision 2  
 DM2-00-0145-07, MEPL Entry for M2-MS-464

**Section 1R18: Plant Modifications**Procedures

ETE-MP-2015-1059, Revision 0

SP 788C, Fire Pump Diesel Engine Battery Weekly Surveillance, Revision 1

SP 2610BO, TDAFW Tests, Operating, Revision 3

Condition Reports

1030128

Work Orders

53102878158

53102917676

MiscellaneousDCN-MP3-15-01100, Unit 3 Diesel Fire Pump (M7-7) Battery Charger Replacement Design  
Change Package, Revision 0TCC-MP-2016-001, Temporary Leak Repair – Install Cap Nuts and Wire Wrap of 2-MS-464,  
Revision 0**Section 1R19: Post-Maintenance Testing**Procedures

SP 3622.3, Auxiliary Feedwater Pump 3FWA\*P2, Revision 017-28

OP 3321, Startup of the TDFW pump B, Revision 20

OP-AA-100, Conduct of Operations, Revision 29

Final Safety Analysis Report, Revision 21.3

MA-AA-103 Attachment 2, Troubleshooting Sheet, Revision 13

MA-AA-102 Attachment 3, Foreign Material Exclusion Evaluation (FMEE), Revision June 2013

MA-AA-102 Attachment 4, Foreign Material Exclusion Checklist (FMEE), Revision October 2015

SP 2612A-003, 'A' SW Pump and Facility 1 Discharge Check Valve IST, Revision 008

SP 2605P, RWST Valves Backleakage IST, Revision 001-07

Condition Reports

1023223	1025133	1025383	1030454
1030806	1030917	1031036	1031039
1031146	1031158	1031184	1031236
1031269			

Work Orders

53102424964	53102477883	53102708765	53102831249
53102917259	53102924036	53102924171	53102924234
53102924609	53102924655	53102934377	

Miscellaneous

Engineering Logs

Control Room Operations Logs

PI&amp;D 108D684, U3 Feedwater Control and Isolation Sheet 13

PI&D 25212-320001, Elementary Diagram 3FWS\*CTV41C Steam Generator Feed Water  
Isolation Valve

Apparent Causal Evaluation 3022443  
Apparent Causal Evaluation 3020713

### **Section 1R22: Surveillance Testing**

#### **Procedures**

SP 3341C01, Source Range SRN32 Channel Calibration, Revision 007-01  
SP 3646A.1-001, Emergency Diesel Generator A Operability Tests, Revision 018-08  
SP 3626.3-001, 3SWP AOV39A, EDG A Service Water HX Outlet, Stroke Test, Revision 006-03  
OP 3346A-014, EDG A – Operating Log, Revision 14  
OP 3346A-013, EDG – Data Sheet, Revision 007-04  
MP 3788AJ, Diesel Generator Bearing Insulation Check, Revision 003-002  
SP 3646A.1, Emergency Diesel Generator A Operability Test, Revision 019-07  
SP 3626.9-002, Control Building Air Conditioning Booster Pump 3SWP\*P2B Comprehensive Test, Revision 000-10  
SP 3626.9-001, Control Building Air Conditioning Booster Pump 3SWP\*P2B Group A Test, Revision 15  
ETE-CME-2015-1010, Engineering Technical Evaluation, Revision 0  
SP 3626.9, Control Building Air Conditioning Booster Pump, 3SWP\*P2B, Operational Readiness Test, Revision 12  
Technical Specification Limiting Condition for Operation 3/4.7.7 Control Room Emergency Ventilation System, Amendment 243 and 258  
LBDCR 07-MP3-018, Technical Requirements Manual, Technical Requirement 3/4.7.7 Control Room Ventilation  
SP31005A, Moderator Temperature Coefficient and Power Coefficient Measurements, Power Exchange Method, Revision 003-02  
SP 3680.1-003, Containment Leakage Trending, Revision 002-01  
Technical Specifications 3.4.6, RCS Leakage Operational, both Units 2 and 3  
COP 200.15, RCS Leakage Trending and Investigation, Revision 001-01  
SP 2602A-001, Manual RCS Leakage Rate Calculation, Revision 006-02  
SP 2602A, Reactor Coolant Leakage, Revision 8  
SP 2605P, RWST Valves Backleakage IST, Revision 001-07

#### **Condition Reports**

1025459  
1030806  
1030454

#### **Work Orders**

53102925757  
53102424964  
53102831249

#### **Miscellaneous**

Unit 2 and 3 RCS Identified Leakage Spread Sheets  
Unit 2 and 3 RCS Identified Leakage Performance Indicators



**Section 1EP6: Drill Evaluation**Procedures

EP-AA-400, Drill and Exercise Program, Revision 9

SA-AA-115, Conduct of Fire Drills, Revision 0

Condition Reports

1031488

1031614

1031724

1032166

1032168

Miscellaneous

Millstone Emergency Plan, Revision 49

Millstone Unit 3 Training Drill Package, March 23, 2016

**Section 4OA1: Performance Indicator Verification**Procedures

CP 8302E, Reactor Coolant Gas Sampling and Analysis, Revision 3

CP 2802N, Primary System Sampling and Analysis, Revision 001-06

Technical Specification 3.4.8 Specific Activity, Amendment No. 246

SP 3853-001, Reactor Coolant Analysis for Dissolved Oxygen, Chloride, and Fluoride, Revision 005-00

SP 3854.1-001, Reactor Coolant Analysis for Dose Equivalent Xe-133, Revision 000-01

CP 3802A-009, Mode 1 and 2 Reactor Coolant 72 Hour Analysis, Revision 1

CP 3802A-008, Mode 1 and 2 Reactor Coolant Daily Analysis, Revision 001-01

Miscellaneous

Control Room Operations Logs

Data Sheets for Unit 2 and 3 Specific Activity for Dose Equivalent Iodine 131

RCS Performance Indicators for RCS Activity for Unit 2 and 3

**Section 4OA2: Problem Identification and Resolution**Procedures

MP 3720CD, Slow Speed Start and Run- In of EDG Following Maintenance, Revision 009-06

OP 3346A, Emergency Diesel Generator, Revision 28

PT 31458J, EG-A Electric Governor and EG-B Mechanical Governor Adjustment, Revision 000-02

WM-AA-100, Work Management, Revision 26

NF-AA-PRA-370, Probabilistic Risk Assessment Procedures and Methods: MRule (a)(4) Risk Monitor Guidance, Revision 16

WM-AA-20, Risk Assessment of Maintenance Activities, Revision 2

Condition Reports

533137

571266

1015830

1017050

Work Order

53102816923

53102682895

53102754001

Miscellaneous

ACE 3015575

MP-VTM-000-25212-241-001, Colt-Pielstick-PC2V Engine Instructions, Revision 1

Millstone Unit 3 Operator Logs from October 27, 2015 – November 6, 2015

**Section 4OA3: Follow-up of Events and Notices of Enforcement Discretion**Procedures

SP 3621.1, Main Feedwater Valve Operability Test, Revision 12

SP 3622.3, Auxiliary Feedwater Pump 3FWA\*P2, Revision 017-28

MP 3762AB, Terry Turbine Governor Control Valve Maintenance, Revision 5

OP-AP-105-Attachment 4, Post Trip Review Report RCS Loop Low Flow, Revision June 2015

Condition Reports

1021697	1024993	1024999	1025028
1025046	1025067	1025073	1025079
1025080	1025082	1025103	1025104
1025108	1025133	1025135	1027923
1028163			

Work Orders

53102934270

53102934377

**LIST OF ACRONYMS**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ACE	apparent cause evaluation
ASME	American Society of Mechanical Engineers
CAP	corrective action program
CDF	core damage frequency
CR	condition report
EDG	emergency diesel generator
ESFAS	engineered safety features actuation system
FWIV	feedwater isolation valve
IMC	Inspection Manual Chapter
NCV	non-cited violation
NOV	Notice of Violation
NRC	Nuclear Regulatory Commission, U.S.
PI	performance indicator
RCS	reactor coolant system
SL	Severity Level
SRA	senior reactor analyst
SSC	structure, system, or component
SW	service water
TDAFW	turbine driven auxiliary feedwater
TS	technical specification
TSAS	technical specification action statement
UFSAR	Updated Final Safety Analysis Report
VIO	violation

## NOTICE OF VIOLATION

Dominion Nuclear Connecticut, Inc.  
Millstone Power Station

Docket Nos. 50-336, 50-423  
License Nos. DPR-65, NPF-49  
EA-16-090

During an NRC inspection conducted between January 1 and March 31, 2016, a violation of the NRC's requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition.

Contrary to the above, since November 4, 2013, Dominion Nuclear Connecticut, Inc. (Dominion) has not established measures to assure that the cause of a significant condition adverse to quality has been determined and corrective actions taken to preclude repetition. Specifically, Dominion's corrective actions for multiple failures of the Unit 3 turbine driven auxiliary feedwater (TDAFW) control system have not fully considered all potential failure modes, leading to continued unreliable operation due to linkage and control system problems. This resulted in an overspeed trip of the Unit 3 TDAFW system in February 2016.

This violation is associated with a Green Significance Determination Process finding.

Pursuant to the provisions of 10 CFR 2.201, Dominion 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 Millstone Power Station 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-16-090" and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation or its significance level; (2) the corrective steps to prevent recurrence that have been taken and the results achieved; (3) the corrective steps that will be taken to prevent recurrence; and (4) the date when full compliance will be achieved.

Your response must follow the handling requirements provided below and may reference or include previous docketed correspondence, if the correspondences 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's Website 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 of your claim of withholding (e.g., explain why the disclosure of 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.

Dated this 4<sup>th</sup> day of May, 2016