



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

February 5, 2019

EA-16-090

Mr. Daniel G. Stoddard
Senior Vice President and Chief Nuclear Officer
Dominion Energy, Inc.
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION – INTEGRATED INSPECTION REPORT
05000336/2018004 AND 05000423/2018004

Dear Mr. Stoddard:

On December 31, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Millstone Power Station (Millstone), Units 2 and 3. On January 17, 2019, the NRC inspectors discussed the results of this inspection with Mr. John Daugherty, Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors did not identify any findings or violations of more than minor significance.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Daniel L. Schroeder, Chief
Reactor Projects Branch 2
Division of Reactor Projects

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

Enclosure:
Inspection Report 05000336/2018004
and 05000423/2018004

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05000336/2018004 AND 05000423/2018004 DATED FEBRUARY 5, 2019

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Numbers: 50-336 and 50-423

License Numbers: DPR-65 and NPF-49

Report Numbers: 05000336/2018004 and 05000423/2018004

Enterprise Identifier: I-2018-004-0061

Licensee: Dominion Energy Nuclear Connecticut, Inc. (Dominion)

Facility: Millstone Power Station, Units 2 and 3

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

Inspection Dates: October 1 to December 31, 2018

Inspectors: J. Fuller, Senior Resident Inspector
L. McKown, Resident Inspector
C. Highley, Resident Inspector
H. Anagnostopoulos, Senior Health Physicist
J. Kulp, Senior Reactor Inspector
D. Silk, Senior Operations Engineer
J. Brand, Reactor Inspector
A. Turilin, Reactor Inspector
J. DeBoer, Emergency Preparedness Physicist
K. Mangan, Senior Reactor Inspector

Approved By: Daniel L. Schroeder, Chief
Reactor Projects Branch 2
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring Dominion's performance at Millstone, Units 2 and 3 by conducting the baseline inspections described in this report in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information. NRC-identified and self-revealing findings, violations, and additional items are summarized in the table below.

No findings or more-than-minor violations were identified.

Additional Tracking Items

Type	Issue number	Title	Inspection Results Section	Status
NOV	05000423/2016-001-01	Repetitive Failures to Correct Unit 3 Turbine Driven Auxiliary Feedwater Pump Performance (Enforcement Action (EA)-16-090)	71152	Closed

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PLANT STATUS

Unit 2 began the inspection period in a scheduled refueling outage and raised power to approximately 19 percent power on November 3 and then shut down on November 4 for an unplanned outage due to equipment issues. On December 2, during the Unit 2 power ascension, a Heater Drain Tank Normal Level Control Valve was operating erratically and reactor power was lowered to approximately 75 percent to complete repairs. Unit 2 then returned to rated thermal power on December 4.

Unit 3 operated at or near rated thermal power for the entire inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed plant status activities described in IMC 2515, Appendix D, "Plant Status," and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess Dominion Energy's performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Seasonal Extreme Weather (2 Samples)

The inspectors evaluated readiness for seasonal extreme weather conditions prior to the seasonal cold temperatures at Unit 2 on December 12, 2018, and Unit 3 on November 15, 2018.

External Flooding (1 Sample)

The inspectors evaluated readiness to cope with external flooding on October 15, 2018.

71111.04 - Equipment AlignmentPartial Walkdown (2 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

Unit 2

- (1) Partial equipment alignment of shutdown cooling system during containment spray isolation valve maintenance on October 1, 2018.

Unit 3

- (2) Partial equipment alignment of the service water system to reactor plant closed cooling water heat exchangers during isolation valve maintenance on November 29, 2018.

Complete Walkdown (1 Sample)

The inspectors evaluated system configurations during a complete walkdown of the Unit 2 pressurizer pressure relief system on November 20, 2018.

71111.05A/Q - Fire Protection Annual/QuarterlyQuarterly Inspection (6 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

Unit 2

- (1) Containment (Fire Area C-1 elevations 14'6", -3'6", and -22') during routine refueling outage activities on October 5, 2018
- (2) Containment (Fire Area C-1 elevation 38'6") during welding and grinding activities associated with flow accelerated corrosion repairs on October 9, 2018
- (3) Control room, operator breakroom, and new computer room (Fire Areas A-25, A-26, and A-27) on November 26, 2018
- (4) Auxiliary building general area and safeguard rooms at the -45'6" elevation on December 9, 2018 (Fire Zones A-1A,A-8A, and Fire Areas A-3, A4)

Unit 3

- (5) Cable spreading area spurious fire alarm (Fire Area CB-8) on October 16, 2018
- (6) Main steam valve building (Fire Area MSV-1) on October 24, 2018

71111.07 - Heat Sink PerformanceHeat Sink (1 Sample)

The inspectors evaluated Dominion's monitoring and maintenance of the Unit 2 increased heat load on service water due to a planned inverter modification on October 12, 2018.

71111.08 - Inservice Inspection Activities (1 Sample)

The inspectors evaluated pressurized water reactor non-destructive examination and welding activities by reviewing the following examinations from October 8 to 18, 2018:

- (1) Volumetric Examinations
 - a) Manual ultrasonic and phase array ultrasonic testing of feedwater welds FWA-C-G-06-A, FWA-C-G-05-A, and FWA-C-G-04-C.
 - b) Manual encoded phased array ultrasonic testing of safety injection weld overlays BSI-C-1001, BSI-C-1003, BSI-C-2001, BSI-C-2003, BSI-C-3000, BSI-C-3002, BSI-C-4000, and BSI-C-4002.
 - c) Manual ultrasonic testing of Loop 2 hot leg shutdown cooling line weld BSD-C-2005.
 - d) Manual ultrasonic testing of safety injection to loop 2A cold leg weld BSI-C-2005 and loop 2B cold leg weld BSI-C-4006.
 - e) Manual ultrasonic and phase array ultrasonic testing of welds W11 BPV-C-5039B, W12 BPV-C-5049B, W1 BPV-C-5029B, and W2 BPV-C-5051B associated with the PORV 2-RC-402 and 2-RC-404 replacement.
- (2) Visual Examinations
 - a) General visual examination of containment liner.
 - b) System leakage test (VT2) of reactor head penetration #26, 38, 42, and 72 area performed in accordance with American Society of Mechanical Engineers (ASME) Section XI Code Case N-729-4.
 - c) System leakage test (VT2) of Loop 2B Cold Leg instrument Tap 3 performed in accordance with ASME Section XI Code Case N-722-1.
 - d) Remote visual examination (VT-3) of eight shroud assembly tie rods located at 342°/18°, 72°/108°, 162°/198°, and 252°/288° performed in response to industry operating experience OE #434420.
- (3) Surface Examination (PT/MT)
 - a) Magnetic particle tests of feedwater system welds FWA-C-G-06-A, FWA-C-G-05-A, and FWA-C-G-04-C.
 - b) Liquid penetrant tests of welds W11 BPV-C-5039B, W12 BPV-C-5049B, W1 BPV-C-5029B, and W2 BPV-C-5051B associated with the pressurizer PORV 2-RC-402 and 2-RC-404 replacement. This review involved welding activities associated with a pressure boundary risk significant system.
- (4) The inspectors reviewed the welding activities associated with the replacement of a portion of line of 18"-EBB-6 in accordance with MP2-17-00177 (welds W201 FWA-C-G-06-A, W202 FWA-C-G-05-A, and W203 FWA-C-G-04-C).
- (5) The inspectors reviewed the welding activities associated with the replacement of the pressurizer PORV 2-RC-402 and 2-RC-404 and associated piping (welds W11 BPV-C-5039B, W12 BPV-C-5049B, W1 BPV-C-5029B, and W2 BPV-C-5051B).
- (6) The inspectors evaluated Dominion's boric acid corrosion control program performance.
- (7) The inspectors performed an independent walkdown of accessible portions of the containment liner and moisture barrier.
- (8) The inspectors did not review steam generator tube or reactor vessel head examination activities because none were performed during this refueling outage.

71111.11 - Licensed Operator Requalification Program and Licensed Operator Performance

Operator Requalification (2 Samples)

The inspectors observed and evaluated operators in the plant simulators during just in time training for the Unit 2 startup on October 13, 2018, and Unit 3 licensed operator requalification training on November 27, 2018.

Operator Performance (2 Samples)

The inspectors observed Unit 2 operator performance in the control room during reactor startup and low power physics testing on November 2, 2018, and Unit 3 operator performance in the control room during a downpower for turbine valve testing on November 9, 2018.

71111.11A – Licensed Operator Requalification Program and Licensed Operator Performance (Annual)

Operator Requalification Exam Results (Annual) (2 Samples)

The inspectors reviewed and evaluated requalification examination results for Unit 2 (written and operating test) and Unit 3 (written and operating test) on December 20, 2018.

71111.11B – Licensed Operator Requalification Program and Licensed Operator Performance (Biennial)

Operator Requalification Program and Operator Performance (Biennial) (1 Sample)

The inspectors reviewed and evaluated operator performance, evaluator performance, and simulator performance during the Unit 2 requalification examinations completed on December 6, 2018.

71111.12 - Maintenance Effectiveness

Routine Maintenance Effectiveness (1 Sample)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

- (1) Review of the licensee's 10 CFR 50.65 (a)(3) Periodic Evaluation for the period of July 1, 2015 to December 31, 2016

71111.13 - Maintenance Risk Assessments and Emergent Work Control (3 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

Unit 2

- (1) Elevated shutdown risk due to performance of 'A' and 'B' train containment spray header isolation valve invasive maintenance during high decay heat load and decreased reactor vessel inventory on October 1, 2018
- (2) Contingency risk plan for temporary bonnet on 2-CS-16.1A/B during invasive valve maintenance on October 5, 2018

Unit 3

- (3) Emergent high risk when the 15G-14T-2, southern disconnect to Unit 3 normal station supply transformer breaker, was opened online, which resulted in a single output breaker in service on October 10, 2018

71111.15 - Operability Determinations and Functionality Assessments (3 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

Unit 2

- (1) CR1106817 - Non-Conservatism in Main Steam Line Break Departure from Nucleate Boiling Ratio Analysis Methodology on October 11, 2018
- (2) Immediate operability determination for 'A' and 'B' pressurizer block valves being closed due to leakage past pressurizer power operated relief valves on December 3, 2018

Unit 3

- (3) CR1107892 – Potential Impact to UFSAR 15.1.5.4 Dose Consequence for Main Steam Line Break due to Delayed Natural Circulation Cooldown on November 2, 2018

71111.18 - Plant Modifications (4 Samples)

The inspectors evaluated the following temporary or permanent modifications:

Unit 2

- (1) Replacement of 'A' and 'B' trains containment spray header isolation valve Anchor Darling motor operated valve stem on October 1, 2018
- (2) 'C' reactor protection system bistable and auxiliary bistable trip units design change number MP2-15-01097 on October 9, 2018
- (3) Cutout and weld repair of access hole in the containment airlock on October 29, 2018
- (4) Pressurizer power operated relief valve replacement during the refueling outage (October – November 2018)

71111.19 - Post Maintenance Testing (3 Samples)

The inspectors evaluated post maintenance testing for the following maintenance/repair activities:

Unit 2

- (1) 'A' emergency diesel generator jacket water and aftercooler heat exchanger replacement on October 15, 2018
- (2) 2-SI-468, Shutdown cooling pump suction relief valve replacement with flange leak check on October 17, 2018
- (3) Local leak rate testing and nondestructive examination associated with modification to containment airlock penetration on October 29 and 30, 2018

71111.20 - Refueling and Other Outage Activities (2 Samples)

The inspectors evaluated Unit 2 scheduled refueling outage (2R25) activities from October 1 through November 3, 2018, and unplanned forced outage activities from November 4 through November 30, 2018.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Containment Isolation Valve (1 Sample)

- (1) SP 2605D-013, Containment Leak Test Type 'C,' Penetration 5(O), 2-CS-4.1B, as performed on October 6, 2018

Routine (2 Samples)

- (1) Unit 2, MOV 1220, Motor Operated Valve Testing as performed under joint owners group commitments for 'A' containment sump outlet header isolation valve as performed on October 11, 2018
- (2) Unit 2, Train 'B' solid state protection system operational test on December 12, 2018

71114.04 - Emergency Action Level and Emergency Plan Changes (1 Sample)

The inspectors verified that the changes made to the emergency plan were done in accordance with 10 CFR 50.54(q)(3), and any change made to the Emergency Action Levels, Emergency Plan, and its lower-tier implementing procedures, had not resulted in any reduction in effectiveness of the plan. This evaluation does not constitute NRC approval.

71114.06 - Drill EvaluationEmergency Planning Drill (1 Sample)

The inspectors evaluated the conduct of a routine emergency planning drill for Unit 2 on December 13, 2018.

Drill/Training Evolution (1 Sample)

The inspectors evaluated and observed the Unit 2 licensed operator requalification program simulator annual operating examination with two event classifications on November 14, 2018.

RADIATION SAFETY71124.01 - Radiological Hazard Assessment and Exposure ControlsRadiological Hazard Assessment (1 Sample)

The inspectors evaluated radiological hazards assessments and controls.

Instructions to Workers (1 Sample)

The inspectors evaluated worker instructions.

Contamination and Radioactive Material Control (1 Sample)

The inspectors evaluated contamination and radioactive material controls.

Radiological Hazards Control and Work Coverage (1 Sample)

The inspectors evaluated radiological hazards control and work coverage.

High Radiation Area and Very High Radiation Area Controls (1 Sample)

The inspectors evaluated risk-significant high radiation area and very high radiation area controls.

Radiation Worker Performance and Radiation Protection Technician Proficiency (1 Sample)

The inspectors evaluated radiation worker performance and radiation protection technician proficiency.

71124.02 - Occupational As Low As Reasonably Achievable (ALARA) Planning and ControlsImplementation of ALARA and Radiological Work Controls (1 Sample)

The inspectors reviewed ALARA practices and radiological work controls by reviewing the following activities:

- (1) ALARA Plan AP-2-18-01
- (2) ALARA Plan AP-2-18-11
- (3) ALARA Plan AP-2-18-13
- (4) ALARA Plan AP-2-18-26

Radiation Worker Performance (1 Sample)

The inspectors evaluated radiation worker and radiation protection technician performance.

71124.03 - In-Plant Airborne Radioactivity Control and MitigationUse of Respiratory Protection Devices (1 Sample)

The inspectors evaluated respiratory protection.

OTHER ACTIVITIES – BASELINE71151 - Performance Indicator Verification

The inspectors verified Dominion's performance indicators submittals listed below for the period from October 2017 through October 2018. (2 Samples)

- (1) OR01: Occupational Exposure Control Effectiveness
- (2) PR01: Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences

The inspectors verified Dominion's performance indicators submittals listed below for the period from October 2017 through October 2018. (12 Samples)

Unit 2

- (1) MS05: Safety System Functional Failures
- (2) MS06: Emergency AC Power System Mitigating System
- (3) MS07: High Pressure Injection System Mitigating System
- (4) MS08: Heat Removal System
- (5) MS09: Residual Heat Removal System
- (6) MS10: Cooling Water Support System

Unit 3

- (7) MS05: Safety System Functional Failures
- (8) MS06: Emergency AC Power System Mitigating System
- (9) MS07: High Pressure Injection System Mitigating System
- (10) MS08: Heat Removal System
- (11) MS09: Residual Heat Removal System
- (12) MS10: Cooling Water Support System

71152 - Problem Identification and ResolutionAnnual Follow-up of Selected Issues (5 Samples)

The inspectors reviewed Dominion's implementation of its corrective action program related to the following issue:

- (1) NRC Notice Of Violation (NOV) 05000423/2016001-01, Repetitive Failures to Correct Unit 3 Turbine Driven Auxiliary Feedwater Pump Performance Issues (EA-16-090)
- (2) Corrective action (CA3066486), associated with the repair and replacement activities associated with the through wall leak on the Unit 2 containment spray recirculation test header

- (3) Condition report CR1098865, Part 21 Notification Westinghouse control rod drive mechanism (CRDM) Unit 3 Thermal Sleeve Wear
- (4) Condition report CR1103594, High Differential Temperature Across RCP Seal Package, and CR 1039762, 'A' Reactor Coolant Pump Return Controlled Bleed-off Flow at 0.8 Gallons per Minute
- (5) Repetitive degraded performance of Millstone Unit 2 service water train 'A' flow instrumentation

INSPECTION RESULTS

Observation	71152 Follow-up of selected issues
<p><u>NRC Notice Of Violation (NOV) 05000423/2016001-01, Repetitive Failures to Correct Unit 3 Turbine Driven Auxiliary Feedwater Pump Performance Issues (EA-16-090)</u></p>	
<p>NRC issued NOV 05000423/2016001-01 (EA-16-090) for Dominion’s repetitive failure to take effective corrective actions for a significant condition 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 had not fully considered all potential failure modes such that continued unreliable operation due to linkage and control systems problems resulted in another overspeed trip in February 2016. Inspectors previously documented this condition in 2014 under NCV 05000423/2014013-02, a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” and in violation (VIO) 05000423/2014008-02, a White VIO, also of 10 CFR Part 50, Appendix B Criterion XVI, “Corrective Action.” Dominion’s root cause evaluation (RCE-CA3024960) determined the February 22, 2016, TDAFW overspeed trip was due to a seized cam follower bearing caused by corrosion due to control valve packing leakage as a result on an oversized stuffing box allowing excessive play and bypass of the carbon rings and spacers that accelerated packing wear and resulted in steam/water impingement on the cam follower bearing and linkage.</p>	
<p>By letter dated June 3, 2016, Dominion responded to NOV EA-16-090. Dominion committed to perform a comprehensive evaluation of additional methods to improve design and operating margins within the TDAFW pump linkage and control system, and to notify the NRC of the results of the comprehensive evaluation and planned corrective actions. These results were presented to the NRC via letter 16-204A, dated September 29, 2016. Applicable corrective actions included: commissioning an independent third party failure modes and effect analysis, and consulting with industry and vendor representatives to develop appropriate corrective actions; replacement of the cam follower bearing with a lubricated bearing; replacement of the governor control valve bonnet with a new stem packing assembly designed, developed, and recommended by the vendor; changing the governor as-left (starting) rack setting to increase available stem force at turbine start-up; creating an activity to inspect and lubricate linkage joints, cam follower bearing, and packing assembly every refueling outage; lowering the turbine speed; replacement of steam traps with continuous restriction orifices and added daily operators temperature checks to verify proper operation of the orifices or to initiate blowdown as necessary; and implementing a design change to install a metal shield to reduce the amount of steam and condensate impact on the cam follower bearing. The inspectors reviewed the comprehensive evaluation and completed corrective actions to verify they have been properly implemented.</p>	
<p>The inspectors reviewed applicable modifications of the cam follower and metal shield, performed field walkdowns to verify installation of these components and restriction orifices, verified</p>	

procedures and drawings have been revised, and reviewed quarterly surveillance tests and the full flow tests performed on the TDAFW pump since February 2016. The inspectors noted that no related overspeed trips have occurred since the implementation of these corrective actions. The inspectors determined the causes of the problems were reasonably identified and that corrective actions were completed focused on addressing the problems and intended to prevent recurrence. No issues of concern were identified.

Observation	71152 Follow-up of selected issues
<p><u>Corrective action (CA3066486), associated with the repair and replacement activities associated with the through wall leak on the unit 2 containment spray recirculation test header</u></p>	
<p>On September 21, 2017, Dominion identified a very small through-wall leak on an ASME Class 2 pressure boundary pipe associated with the emergency core cooling system. The inspectors reviewed Dominion’s corrective actions associated with this nonconforming condition including the ASME Section XI repair and replacement activities during the Unit 2 refueling outage. The inspectors determined that Dominion’s corrective action to replace the leaking pipe was appropriate; however, the inspectors noted that Dominion had several opportunities to identify the leak prior to September 21, 2017.</p>	
<p>The inspectors noted that Dominion initiated condition report CR1067106 on May 3, 2017, in response to the identification of white residue on the piping insulation during an ASME Section XI VT-2 leakage inspection. Dominion’s chemistry department incorrectly stated that the white residue was not boric acid, but they recommended that the piping insulation be removed for a closer inspection of the pressure boundary piping. This was not performed and all work orders were canceled. Dominion documented a “relevant indication” on the VT-2 inspection report, but failed to take further corrective actions to identify the source of the leakage. A work order had been created, but was canceled with no actions taken.</p>	
<p>The inspectors noted that Dominion initiated a second condition report related to this through-wall leak on September 5, 2017, which stated that this was a repeat indication of leakage from CR1067106; however, Dominion referred back to the previous, incorrect evaluation from chemistry stating that the white residue was not boric acid. Therefore, Dominion took no further corrective action at that time to remove the insulation and investigate the leak. The inspectors noted that the ASME Section XI VT-2 inspection report remained open without an evaluation of the relevant indication. This was identified by the NRC inspectors as a second missed opportunity to identify and correct the leak.</p>	
<p>Based on questions asked by the NRC resident inspectors and engagement of Dominion senior management, the insulation was removed and the piping inspected on September 21, 2017. CR1078830 was then written to document a through-wall leak on the ASME Class 2 pressure boundary piping and an immediate operability determination was performed followed by supplemental ultrasonic inspections and leak rate monitoring until the piping was replaced in the Fall 2018 refueling outage.</p>	
<p>The inspectors noted that CR1078830 provided an adequate operability determination but failed to acknowledge the untimely identification of the condition. The inspectors noted that the management review screening of CR1078830 called for a “lost opportunity evaluation,” which if performed, would have likely identified similar concerns to those described above. However, the inspectors noted that this lost opportunity evaluation was not performed.</p>	

This issue was determined to be of minor significance because the emergency core cooling system remained operable after Dominion determined that the flaw was within the limits established by a structural integrity evaluation in accordance with Code Case N-513-3, Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1.

Dominion entered the inspector's observations into their corrective action program as condition report CR1113486.

Observation	71152 Follow-up of selected issues
<p><u>Condition report CR1098865, Part 21 Notification Westinghouse control rod drive mechanism (CRDM) Unit 3 Thermal Sleeve Wear.</u></p> <p>The inspectors assessed Dominion's corrective actions associated with CR1098865 to address the recommendations of NSAL 18-1, Thermal Sleeve Flange Wear Leads to Stuck Control Rod. This condition was identified at a foreign nuclear power plant and is described in NRC Information Notice 2018-10 (ADAMS Accession No. ML18214A710). The inspectors reviewed Dominion's measurement results completed for Millstone Unit 3 during the 3R18 refueling outage in October 2017 and their technical evaluation of measurement results. The inspectors determined Dominion's response implemented the recommendations, was timely and commensurate with the safety significance of the issue, and included appropriate corrective actions involving planned actions to monitor via periodic measurement.</p>	

Observation	71152 Follow-up of Selected Issues
<p><u>Condition report CR1103594, High Differential Temperature Across RCP Seal Package, and CR 1039762, 'A' Reactor Coolant Pump Return Controlled Bleed-off Flow at 0.8 Gallons per Minute.</u></p> <p>The inspectors reviewed Dominion's corrective actions that were planned or performed following the identification of degradation of the seal faces installed in the Unit 3 reactor coolant pumps (RCPs) documented in CR1103594 and CR1039762. Dominion first identified the degradation following the failure of the 'A' RCP 3-stage seal in June 2016. New RCP 3-stage seal packages were installed in the 'A' and 'D' RCP in October 2014, and the 'B' and 'C' RCP in April 2016. The seals were expected to be in service for up to 10 years before replacement. Following the failure of the seal, Dominion entered the issue into the corrective action program, replaced the 'A' RCP seal, and developed actions to troubleshoot and evaluate the cause of the failure. Dominion staff identified an increasing temperature trend across the other RCP seals and was informed that two similar seal packages installed at another U.S. nuclear power plant experienced similar problems. Dominion staff in consultation with the seal manufacturer determined the seal face degradation was caused by electrical charges passing between the seal plates. Corrective actions included the installation of RCP motor shaft grounding straps to eliminate shaft induced voltage concerns.</p> <p>Dominion staff later identified similar temperature trends during the operating cycle following the completion of the corrective actions. Dominion staff evaluated the temperature rise in the corrective action program and developed actions to minimize the degradation. Dominion's corrective actions included optimizing seal cooling parameters in order to minimize the degradation mechanism and monitoring RCP seal temperatures to identify degradation in the seal. Based on the results of this</p>	

monitoring program, Dominion staff intend to replace several seals during the next Unit 3 refueling outage. The inspectors noted that Dominion staff are working with the industry on the seal degradation to develop the appropriate final corrective actions. The inspectors were informed that Flowserve personnel have performed additional testing on the seal and concluded that the most likely cause of the degradation was due to electro-corrosion and is working on a solution within their corrective action program. Dominion's final corrective action to address the RCP seal degradation is to install a new seal design when the design is complete and tested. The inspectors concluded that the corrective actions to monitor seal performance and optimize seal cooling parameters while planning for seal replacement with an improved design in the future was reasonable and commensurate with the safety significance of the issue.

Observation	71152 Follow-up of selected issues
<p><u>Repetitive degraded performance of Millstone Unit 2 service water train 'A' flow instrumentation</u></p> <p>The inspectors assessed Dominion's corrective actions associated with repetitive degraded performance of Millstone Unit 2 service water train 'A' flow instrumentation. Dominion began to observe the instrument intermittently failing low as documented in 2015 in CR579486, in 2016 in CR1042477 and CR1042902, in 2017 in CR1072632, and in 2018 in CR1107186. The inspectors reviewed Dominion's corrective actions in each case and the establishment of a plant modification to perform long term restoration.</p> <p>Based upon the conditions reviewed and corrective actions taken, the inspectors have identified no more than minor concerns associated with this issue. Dominion appears to have identified adverse conditions upon inappropriate instrument performance and established corrective actions in accordance with their safety significance.</p>	

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On January 17, 2019, the inspectors presented the quarterly resident inspector inspection results to Mr. John Daugherty, Site Vice President, and other members of the Millstone staff.

THIRD PARTY REVIEWS

Inspectors reviewed the Institute of Nuclear Power Operations report that was issued during the inspection period.

DOCUMENTS REVIEWED**71111.01 - Adverse Weather Protection**Procedures

C OP 200.13, Seasonal Weather Operations, Revision 11
 C OP 200.13-003, Unit 3 Cold Weather Preparation Checklist, Revision 001-01
 SP 2665, Building Flood Gate Inspections, Revision 005
 MP 2701E, Unit 2 Flood Gates Installation and Removal, Revision 000

Miscellaneous

U2 cold weather status of corrective actions check list, dated December 7, 2018
 U3 cold weather status of corrective actions check list, dated November 15, 2018
 MP2 FSAR Chapter 2, Section 2.5.4.2.3, Intake Flood Protection

71111.04 - Equipment AlignmentMiscellaneous

P&ID 25203-260014 SH 2, Reactor Coolant System, Revision 49
 25203-26015, PID Low Pressure Safety Injection System, Sheet 1, Revision 50
 25212-26933, PID Service Water System, Sheet 2, Revision 91

71111.05 - Fire ProtectionProcedures

U2-24-FFS-BAP01-CONT, Fire Fighting Strategies for Containment, Revision 003
 C SP 600.22, U2 Containment Fire Hose Station Flow Test, Revision 005

Condition Reports

1112858*	1106814	1112508	1112533
1112538	1112541	1112544	1112866

Miscellaneous

U3-24-FFS, Millstone Unit 3 Fire Fighting Strategies, Revision 0
 Millstone Unit 3 Fire Protection Evaluation Report, Revision 21.3

71111.07 - Heat Sink PerformanceProcedures

SPROC ENG18-2-005, S-SW-181A Summer Valve Position Determination, Revision 1

Miscellaneous

Calculation PA-090-070-01223EE, MS U2 Electrical Heat Release Calculation in the Z1, 480V West Switchgear Room at Elevation 36' 6", Turbine Building, Revision 1
 Calculation 12-280, PROTO-HX Model Development of MP2 Room Coolers X-181 A/B and X-183 and Elevation of 80 F Service Water with Addendum Heat Exchanger Heat Load Updates for 1, 3, 5 Inverter Replacement, Revision 00
 Calculation 92-FFP-00934ES, MPS2 West 480 Volt AC Load Center Heat Gains, Revision 04
 Calculation 12-001, MP2 SW Model and Design Bases Analysis with Addendum Heat Load Changes Due to Inverter Replacement in the East DC Vital Switchgear Room and the West 480V Switchgear Room, Revision 02

71111.08 – Inservice Inspection ActivitiesProcedures

ER-AA-CII-102, ASME Section XI Containment Inservice Inspection (Metal/IWE) Program Fleet Implementation Requirements, Revision 3
 ER-AP-BAC-101, Boric Acid Corrosion Control Program (BACCP) Inspections, Revision 12
 ER-AA-NDE-UT-706, Ultrasonic Examination for the Detection of Laminar Indications, Revision 1
 ER-AA-NDE-UT-801, Ultrasonic Examination of Ferretic Piping Welds in Accordance with ASME Section XI, Appendix VIII, Revision 7
 ER-AA-NDE-MT-200, ASME Section XI Magnetic Particle Examination Procedure, Revision 5
 ER-AA-NDE-UT-742, Encoded Phased Array Ultrasonic Examination of Ferretic and Austenitic Welds, Revision 3
 ER-MP-NDE-UT-816, Manual Phased Array Procedure for Weld Overlaid Similar and Dissimilar Metal Welds, Revision 1
 ER-AA-NDE-VT-604, Visual Examination (VE) for Leakage of PWR Reactor Head Penetrations, Revision 3
 ER-AA-NDE-VT-607, VE Examination of Pressure Retaining welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Revision 2
 ER-AA-NDE-VT-608, VT-3 Visual Examination Procedure for Examination Category B-N-1, Interior of Reactor Vessel, Revision 0
 ER-AA-NDE-UT-802, Ultrasonic Examination of Austenitic Piping Welds in Accordance with ASME Section XI, Appendix VIII, Revision 5

Condition Reports (*initiated in response to inspection)

1012448	1064672	1065914	1099890
1105795	1106136	1106137	1106140
1106237	1106290	1106297	1106308
1106389	1106402	1106471	

Maintenance Order/Work Order

53102884929	53103117773	53103120600	53103147770
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NDE Reports

M2-UT-18-003, UT Examination Report for FWA-C-G-05-A, dated September 25, 2018
 M2-UT-18-004, UT Examination Report for FWA-C-G-05-A, dated September 25, 2018
 M2-UT-18-028, UT Examination Report for FWA-C-G-04-C, dated October 13, 2018
 M2-UT-18-029, UT Examination Report for FWA-C-G-06-A, dated October 13, 2018
 M2-MT-18-001, MT Examination Report for FWA-C-G-05-A, dated September 25, 2018
 M2-MT-18-004, MT Examination Report for FWA-C-G-04-C, dated October 13, 2018
 M2-MT-18-005, MT Examination Report for FWA-C-G-06-A, dated October 13, 2018
 FAC2-Weld-203, UT Examination Report for 18"-EBB-6, dated October 13, 2018
 FAC2-Weld-201, UT Examination Report for 18"-EBB-6, dated October 13, 2018
 M2-UTU-18-009, UT Examination Report for BSI-C-1001, dated October 4, 2018
 M2-UTU-18-011, UT Examination Report for BSI-C-1003, dated October 4, 2018
 M2-UTU-18-006, UT Examination Report for BSI-C-2001, dated October 4, 2018
 M2-UTU-18-012, UT Examination Report for BSI-C-2003, dated October 4, 2018
 M2-UTU-18-005, UT Examination Report for BSI-C-3000, dated October 4, 2018
 M2-UTU-18-008, UT Examination Report for BSI-C-3002, dated October 4, 2018
 M2-UTU-18-013, UT Examination Report for BSI-C-4000, dated October 6, 2018
 M2-UTU-18-014, UT Examination Report for BSI-C-4002, dated October 6, 2018

BOP-VT-18-041, VT Examination Report for RPV Head Penetrations 26, 38, 42 and 72, dated October 5, 2018
 M2-VT-18-108, VT Examination Report for Loop 2B CL Instrument Tap 3, dated October 2, 2018
 BOP-VT-18-042, VT Examination Report for M2H1-CSB – Examined per OE Condition Report CR1099890, dated October 7, 2018
 M2-UT-18-011, UT Examination Report for BSD-C-2005, dated October 6, 2018
 M2-UT-18-012, UT Examination Report for BSD-C-2005, dated October 6, 2018
 M2-UT-18-007, UT Examination Report for BSI-C-2005, dated October 5, 2018
 M2-UT-18-008, UT Examination Report for BSI-C-2005, dated October 5, 2018
 M2-UT-18-013, UT Examination Report for BSI-C-4006, dated October 7, 2018
 M2-PT-18-006, PT Examination Report for BPV-C-5029B, dated October 8, 2018
 M2-PT-18-007, PT Examination Report for BPV-C-5039B, dated October 8, 2018
 M2-PT-18-008, PT Examination Report for BPV-C-5049B, dated October 8, 2018
 M2-PT-18-009, PT Examination Report for BPV-C-5051B, dated October 8, 2018
 M2-UT-18-017, UT Examination Report for BPV-C-5029B, dated October 8, 2018
 M2-UT-18-021, UT Examination Report for BPV-C-5029B, dated October 9, 2018
 M2-UT-18-019, UT Examination Report for BPV-C-5039B, dated October 8, 2018
 M2-UT-18-022, UT Examination Report for BPV-C-5039B, dated October 9, 2018
 M2-UT-18-020, UT Examination Report for BPV-C-5049B, dated October 8, 2018
 M2-UT-18-023, UT Examination Report for BPV-C-5049B, dated October 9, 2018
 M2-UT-18-018, UT Examination Report for BPV-C-5051B, dated October 8, 2018
 M2-UT-18-024, UT Examination Report for BPV-C-5051B, dated October 9, 2018
 PORV-W1, UT Examination Report for PORV Weld W1, dated October 9, 2018
 PORV-W2, UT Examination Report for PORV Weld W2, dated October 9, 2018
 PORV-W11, UT Examination Report for PORV Weld W11, dated October 9, 2018
 PORV-W12, UT Examination Report for PORV Weld W12, dated October 9, 2018
 M2-UT-17-032, UT Examination Report for SI-CF-F-049, dated April 13, 2017

Miscellaneous

NRC Letter, Millstone Power Station, Units Nos. 2 and 3 – Alternative Request RR-04-27 and IR-3-38, Revision 0, for the Use of Encoded Phased Array Ultrasonic Examination Techniques in lieu of Radiography (EPID-L-2018-LLR-0011), (ML18252A003), dated September 17, 2018
 Millstone Power Station Unit 2 In-Service Inspection Program - Owner's Activity Report, Refueling Outage 24, dated June 27, 2017
 ETE-MP-2017-1015, Millstone Unit 2 Steam Generator Integrity Degradation Assessment (2R24), Revision 0
 ETE-MP-2017-1060, Millstone Unit 2 Steam Generator Integrity Condition Monitoring and Operational Assessment Refueling Outage (2R24), Revision 0
 ETE-MP-2018-1071, Degradation Assessment Technical Review for not Performing Primary or Secondary Inspections of the Steam Generators During 2R25, Revision 0

71111.11 - Licensed Operator Requalification Program

Procedures

Unit 2 LORP 2C26 JITT, Reactor Start Up and Low Power Physics Testing Course # 75098, Dated 12 October, 2018
 Unit 2 LORP 2C26 Startup JITT, 2C26 Turbine Overspeed (ICCE), Main Turbine Synch to the Grid and 2nd SGFP Startup Course # 75099, dated October 12, 2018
 OP 2204, Load Changes, Revision 040
 SP 3623.2, Turbine Overspeed Protection System Test, Revision 012

Miscellaneous

Reactivity Plan, M3C19 RXMANP03.3, Update 1

71111.12 - Maintenance EffectivenessMiscellaneous

Periodic 10 CFR 50.65 (a)(3) self-assessment [July 1, 2015 to December 31, 2016];
PIR1059274

71111.13 - Maintenance Risk Assessments and Emergent Work ControlProcedures

OU-AA-200, Shutdown Risk Management, Revision 10

WM-AA-301, Operational Risk Assessment, Revision 20

OU-M2-201, Shutdown Safety Assessment Checklist, Revision 23

MP 2702D1B, Anchor Darling 4 inch and Larger Double Disc Gate Valve Maintenance, Revision
0

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

Condition Reports

1109048

Work Orders

53102909963

53203148327

Miscellaneous

25203-26015, PID Low Pressure Safety Injection System, Sheet 1, Revision 50

2R25 Shutdown Risk Assessment

2R25 Shutdown Risk Schedule Review

Millstone Unit 2 Shutdown Safety Assessment Checklist dated October 1, 2018

Millstone Unit 2 Shutdown Safety Assessment Checklist dated October 5, 2018

EOOS Version 4.1 for Millstone Unit 3 on 10/5/2018

High Risk Plan for Sulfur Fluoride Gas addition to 15G-14T-2, Millstone Unit 3 South Bus Output
Breaker as Implemented on October 5, 2018

71111.15 - Operability Determinations and Functionality AssessmentsCondition Reports

1106817

1107892

1107987

1111536

Miscellaneous

ETE-SU-2017-0069, SPS Emergency Diesel Generator Mission Time, Revision 0

71111.18 - Plant ModificationsProcedures

SP-M2-ME-1053, Procurement and Design Specification for MP2 Power Operated Valves 2-
RC-402 and 2-RC-404, Revision 6

SP 2401SE, PORV, Trip Inhibit, Trip Inhibit Annunciator and Matrix Circuit Ground Detection
Functional Test, Revision 002-00

SP 2401BB3, Channel "C" Wide Range Monitor Start-up Functional Test Data Sheet, Revision 003-00
 SP 2401C, RPS Turbine Loss of Load Test with EHC system Initially Tripped Data Sheet, Revision 009-04
 SP 2401D, RPS Matrix Logic and Trip Path Relay Test Data Sheet, Revision 016-00
 MP 2702D1B, Anchor Darling 4 Inch and Larger Double Disc Gate Valve Maintenance, Revision 0

Condition Reports

1100125 1105171 1107996

Maintenance Orders/Work Orders

53102909963 53103042453 53103080132 53103081255
 53103081259 53103147770 53203148327

Miscellaneous

Design Equivalent Change Package Number MP2-17-00178, Millstone 2 PORV Replacement, Revision 0 and Revision 1
 ETE-MP-2018-1085, Transmittal of PORV Stroke Time for use in Thermal-Hydraulic Analysis, Revision 0
 Calculation Number 32-5072658-005, Millstone Unit 2 PORV/PSV Relief Piping Transient Loads Calculation, Revision 5
 25203-26015, PID Low Pressure Safety Injection System, Sheet 1, Revision 50
 DC-18-00131, Containment Spray Header Isolation Valve Stem Replacement, Revision 0

71111.19 - Post-Maintenance Testing

Procedures

ER-AA-NDE-RT-400, Radiographic Examination Procedure, Revision 1
 SP 2613A, Periodic DG Operability Test, Facility 1 (Fast Start, Loaded Run), Revision 023
 SP 2670, A RBCCW HX D/P Determination, Revision 011-01

Condition Reports

1108817 1110413 1110584

Maintenance Orders/Work Orders

53102842362 53102842741 53103106290 53103118384
 53203150809

Miscellaneous

Post Maintenance Test Plan for U2 Containment Airlock dated 10/29/18
 ETE-MP-2018-1092, MP2 Containment Personnel Air Lock Access Window, Revision 0

71111.22 - Surveillance Testing

Procedures

SP 3446B12, Train B Solid State Protection System Operational Test, Revision 017

Work Orders

53102573331 53102909963 53102909966 53203148327
 53203148330

Condition Reports
1107290

71114.04: Emergency Action Level and Emergency Plan Changes

Miscellaneous

MP-18-07S, MP-26-EPI-EPMP, Millstone Power Station Emergency Plan, Revision 56
MP-18-08S, MP-26-EPA-REF03, Millstone Unit 3 Emergency Action Level Scheme (I-7 of 8),
Revision 23

71151 - Performance Indicator Verification

Procedures

4Q2017 Derivation and Margin Reports for Millstone Unit 2 Mitigating System Performance Index Performance Indicator Emergency AC, High Pressure Injection, Heat Removal, Residual Heat Removal, and Cooling Water System Inputs
1Q2018 Derivation and Margin Reports for Millstone Unit 2 Mitigating System Performance Index Performance Indicator Emergency AC, High Pressure Injection, Heat Removal, Residual Heat Removal, and Cooling Water System Inputs
2Q2018 Derivation and Margin Reports for Millstone Unit 2 Mitigating System Performance Index Performance Indicator Emergency AC, High Pressure Injection, Heat Removal, Residual Heat Removal, and Cooling Water System Inputs
3Q2018 Derivation and Margin Reports for Millstone Unit 2 Mitigating System Performance Index Performance Indicator Emergency AC, High Pressure Injection, Heat Removal, Residual Heat Removal, and Cooling Water System Inputs
4Q2017 – 3Q2018, Safety System Functional Failure Performance Indicator Submittal, Millstone Unit 2
3Q2018 Derivation and Margin Reports for Millstone Unit 3 Mitigating System Performance Index Performance Indicator Emergency AC, High Pressure Injection, Heat Removal, Residual Heat Removal, and Cooling Water System Inputs
2Q2018 Derivation and Margin Reports for Millstone Unit 3 Mitigating System Performance Index Performance Indicator Emergency AC, High Pressure Injection, Heat Removal, Residual Heat Removal, and Cooling Water System Inputs
4Q2017 – 3Q2018, Safety System Functional Failure Performance Indicator Submittal, Millstone Unit 3
Nuclear Energy Institute Documents 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7

71152 - Problem Identification and Resolution

Condition Reports (*initiated in response to inspection)

CA3066486	1112355 *	1112359 *	535411
537933	538353	538743	579486
1027923	1034887	1039762	1042477
1042902	1072632	1078830	1082517
1083296	1098865	1103594	1105524
1107186	1109579		

Procedures

OP 3304A, Revision 40
OP 3337, Revision 19

OP 3301D, Reactor Coolant Pump Operation, Revision 21
 Instruction Manual TM-0400, Three Stage NX Seal Cartridge, Revision G

Engineering Evaluations

ETE-MP-2017-1172, Evaluation of Wear of MPS3 Closure Head Penetration Thermal Sleeves
 Upper Flanges, Revision 1

Drawings

25212-29001, SH-6010, RPV General Arrangement Elevation, Revision 0C
 25212-29001, SH-6024, Sh 7 of 9, RPV As Built Closure Head Penet, Revision 0A

Miscellaneous

MRP 2018-027, NEI 03-08 Needed Inspection Guidance for PWR CRDM Thermal Sleeve Wear,
 dated August 31, 2018
 LTR-NRC-18-34, Westinghouse Letter: Notification of the Potential Existence of Defects
 Pursuant to 10CFR Part 21, dated May 23, 2018
 NSAL-18-1, Thermal Sleeve Flange Wear Leads to Stuck Control Rod, dated July 9, 2018
 PWROG-16003-P, Evaluation of Potential Thermal Sleeve Flange Wear, Revision 1
 TB-07-2, Reactor Vessel Head Adapter Thermal Sleeve Wear, Revision 3
 142-927824-000, Millstone Unit 3 CRDM Thermal Sleeve As-Found Dimensional Report, dated
 October 27, 2017
 MP2-18-01079, Replacement of FIT-6471 with Flexim Flowmeter, Revision 0
 Reactor Coolant Pump Seal Injection Temperature data, dated 13/12/18
 Reactor Coolant Pumps A, B, C and D Vibration data, 5/27/02 to 3/31/18
 Operational Decision Making Checklist for CR 1103594
 The Evolution of Successful Elimination of Electro-Corrosion In Mechanical Seals for Reactor-
 and Boiling Feed Water Pumps Handling Ultra-Pure Water, Proceedings of the Twenty-
 ninth International Pump Users, Symposium, September 30 - October 3, 2013
 Letter from Flowserve to NextEra FPL, Subject: Updated to NX Seal Root Cause Evaluation,
 dated 6/11/18
 3033992, Root Cause Evaluation, Revision 1
 3069444, Root Cause Evaluation, Revision 0
 25212-26945, Piping & Instrumentation Diagram, Turbine Plant Miscellaneous Drains, Rev. 44
 25212-29736, Governor Lever and Valve Section, Rev. E
 DCN MP3-16-01145, MP3 TDAFW Pump Control Valve 3MSS*MCV5 Reliability Enhancement,
 dated 7/11/17
 ETE-MP-2016-1023, Engineering Technical evaluation- TDAFW Pump Cam Follower Bearing
 Greasing and Steam Spray Shield, Rev. 0
 RCE CA3024960, Root cause Evaluation MP3 TDAFW Pump Tripped While Starting for
 Operational Test, Rev. 0
 Q3-2018 U-3, 3322 Auxiliary Feedwater & DWST System Health Report, dated 12/4/18
 SP 3622.3, Auxiliary Feedwater Pump 3FWA*P2, Operational Readiness Test, Rev. 25
 3FWA*P2 (3M) IST Pump Reference Value Evaluation, dated 10/7/18
 SP 3622.3-001, TDAFW Pump Operational Readiness and Quarterly IST Group B Pump Test,
 completed 10/25/18
 SP 3622.3-005, TDAFW Pump IST Comprehensive Pump and Check Valve Test, completed
 9/28/16
 SP 3622.3-005, TDAFW Pump IST Comprehensive Pump and Check Valve Test, completed
 3/5/18
 SP 3622.3-006, TDAFW Pump Overspeed Test (Using Compressed Air), completed 11/1/17
 SP 3636C.1-001, Main Steam Drain Valve Stroke Time Test, completed 9/25/18

SP 3670.1-011, Plant Equipment Rounds-Radwaste, Rev. 16
U-3, M33FWA*P2, Lubricating Oil Analysis History
U-3, M33FWA*P2, Vibration Data History
U-3, Steam Traps A, B, D Line temperatures-History

Work Orders

53102961658

53103031305

53103120906