



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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

June 25, 2015

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

SUBJECT: MILLSTONE POWER STATION UNIT 2 – NRC INSPECTION REPORT  
05000336/2015009

Dear Mr. Heacock:

During the period May 4 – 22, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Millstone Power Station, Unit 2. The enclosed report documents the inspection activities, observations, and results, which were discussed on May 21, 2015, with Site Vice President, Mr. John Daugherty and other members of your staff.

The inspection team examined activities conducted by your staff to complete commitments Dominion Nuclear Connecticut, Inc. made to the NRC as a part of your application for a renewed operating license. The commitments reviewed by this inspection are recorded in NUREG-1838, "Safety Evaluation Report Related to the License Renewal of Millstone Power Station, Units 2 and 3," Appendix A, dated February 2003. The inspection also verified your compliance with conditions placed on the renewed operating license, added as a part of approving your application for a renewed operating license. The team reviewed selected programs enhanced for the purpose of managing the effects of aging. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

No findings were identified during this inspection. The NRC determined that the commitments reviewed associated with the license renewal application were appropriately implemented.

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

Sincerely,

/RA/

Mel Gray, Branch Chief  
Engineering Branch 1  
Division of Reactor Safety

Mr. David A. Heacock  
President and Chief Nuclear Officer  
Dominion Resources  
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Sincerely,

/RA/

Mel Gray, Branch Chief  
Engineering Branch 1  
Division of Reactor Safety

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D. Heacock

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Docket No: 50-336  
License No: DPR-65

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Inspection Report 05000336/2015009

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**U. S. NUCLEAR REGULATORY COMMISSION  
REGION I**

Docket No. 50-336

License No. DPR-65

Report No. 05000336/2015009

Licensee: Dominion Nuclear Connecticut, Inc.

Facility: Millstone Power Station, Unit 2

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

Dates: May 4 – 22, 2015

Inspectors: Michael Modes, Senior Reactor Inspector  
Jeffry Kulp, Senior Reactor Inspector  
Suresh Chaudhary, Reactor Inspector  
Stephanie Galbreath, Reactor Inspector

Approved By: Mel Gray, Chief  
Engineering Branch 1  
Division of Reactor Safety

## **SUMMARY OF FINDINGS**

The commitments reviewed by this inspection are recorded in NUREG-1838, "Safety Evaluation Report Related to the License Renewal of Millstone Power Station, Units 2 and 3," Appendix A, dated February 2003 (ADAMS Accession No. ML053270483). The inspection also verified compliance with conditions placed on the renewed operating license that were added as a part of approving the application for a renewed operating license and reviewed selected programs enhanced for the purpose of managing the effects of aging.

No findings were identified during this inspection. The NRC determined that the commitments reviewed associated with the license renewal application were appropriately implemented.

## REPORT DETAILS

### 4. OTHER ACTIVITIES

#### 4OA5 Other Activities

##### .1 Inspection Procedure 71003 Post-Approval Site Inspection For License Renewal

The purpose of this team inspection was to verify the license conditions added as part of the renewed operating license, regulatory commitments, and selected aging management programs were implemented and/or completed in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, "Requirements for the Renewal of Operating Licenses for Nuclear Power Plants." This inspection also verified the updated final safety analysis report included any newly identified systems, structures, and components that should have been within the scope of the license renewal program and subject to an aging management review or time limited aging analysis, pursuant to 10 CFR 54.37(b). The inspection verified the description of the aging management programs were contained in the Updated Final Safety Analysis Report (UFSAR) and the description of the programs was consistent with the programs implemented by the licensee. Lastly this inspection verified the licensee submitted a license amendment request to the U.S. Nuclear Regulatory Commission (NRC) in accordance with 10 CFR 50.90 for changes to a license condition for license renewal; managed changes to the UFSAR supplement in accordance with 10 CFR 50.59; and managed changes to regulatory commitments in accordance with Nuclear Energy Institute (NEI) 99-04, "Guidelines for Managing NRC Commitment Changes" as endorsed by Regulatory Issue Summary (RIS) 2000-017.

The inspection included observations of license renewal commitments which were enhancements to exiting programs already implemented under the current license. The inspection included a review of selected aging management programs supporting the implementation of commitments. For each commitment the inspectors reviewed supporting documents including completed surveillances, conducted interviews, and in some instances performed visual inspection of structures and components and observed selected activities described below to verify the licensee completed the necessary actions to comply with the commitments. When the performance of an existing program was evaluated by the inspectors, the basis for the evaluation was the current licensing basis and the license renewal enhancements were considered separately in the evaluation. For license renewal activities the report documents inspector observations, because the license renewal commitments do not have to be completed until the facility enters the extended period of operation.

#### Sample Selection Process

The reviewed commitments, license conditions, and enhanced aging management programs were selected based on several attributes including:

- the risk significance of structures, systems, and components associated with the regulatory commitments, using insights gained from sources such as the NRC's "SDP Risk Informed Inspection Notebooks," Revision 2,

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- the extent of previous license renewal audits and inspections,
- the extent to which baseline inspection programs inspect a structure, system, or component,
- the amount of time since the renewed license was granted and beginning of the period-of-extended operation,
- the type and maturity of the Aging Management Program (AMP), for example, programs such as the selective leaching one-time inspection program, or infrequent inspection activities may take priority over long-standing programs such as the Steam Generator Tube Integrity Program, which are routinely inspected,
- issues that were addressed in an Atomic Safety Licensing Board hearing or Advisory Committee on Reactor Safeguards committee meeting,
- issues that were extensively reviewed and questioned at the time of the application review, and
- whether the licensee updated its AMPs as a result of recent operating experience, as a result of updates to the Generic Aging Lessons Learned (GALL) Report or other approved guidance.

The inspectors selectively verified the licensee implemented the aging management programs, included in the staff's license renewal safety evaluation report, in accordance with 10 CFR Part 54, "Requirements for the Renewal of Operating Licenses for Nuclear Power Plants." The inspectors verified a selected sample of licensee corrective actions that were the result of license renewal activities.

#### Commitment Management

During this inspection the inspectors verified that changes, if any, to these commitments were identified and properly reviewed and approved. The inspectors concluded Dominion Connecticut was applying the principals of commitment management contained in NEI 99-04 (Revision 0), "Guidelines for Managing NRC Commitment Changes" (ML003680088).

#### License Conditions

The inspectors verified compliance with the following license conditions:

Condition (2)(c)(10) "The Final Safety Analysis Report (FSAR) supplement, as revised, submitted pursuant to 10 CFR 54.21 (d), shall be included in the next scheduled update to the FSAR required by 10 CFR 50.71 (e)(4) following the issuance of this renewed operating license. Until that update is complete, DNC may make changes to the programs and activities described in the supplement without prior Commission approval, provided that DNC evaluates such changes pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section."

The inspectors determined the UFSAR was supplemented in compliance with 10 CFR 54.21 (d). The information required by this license condition is contained in Chapter 15

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of the UFSAR. Dominion Nuclear Connecticut did not revise the program descriptions, or commitments, contained in the FSAR during the period prior to the supplement being included nor did they revise the program descriptions, or commitments, contained in the UFSAR subsequent to the supplement being issued. The licensee did not revise any commitments obviating the use of 10 CFR 50.59 rules prior to, or after, the UFSAR revision.

Condition (2)(c)(11) "The FSAR supplement, as revised, describes certain future activities to be completed prior to the period of extended operation. DNC shall complete these activities no later than July 31, 2015, and shall notify the NRC in writing when implementation of these activities is complete and can be verified by NRC inspection."

At the time of the inspection, the inspectors determined Millstone staff had completed, or were tracking to completion, all the activities required prior to the extended period of operation. The inspectors reviewed the letter Millstone staff was preparing to send the NRC in compliance with the above requirement.

(2)(c)(12) All capsules in the reactor vessel that are removed and tested must meet the test procedures and reporting requirements of American Society for Testing and Materials (ASTM) E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the NRC prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the NRC, as required by 10 CFR Part 50, Appendix H.

The inspectors discussed this license condition with the responsible program manager. Millstone Unit 2 staff have removed and tested all but three capsules in conformance with ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule. The reactor contains three capsules, one end-of-life capsule, and two spare capsules. Dominion Nuclear Connecticut has no capsules in storage and no plans to remove any capsules prior to the end of the extended period of operation at 54 effective full power years. The inspectors reviewed Calculation 95-SDS-1008MG, Revision 5, March 15, 2007, to determine the adjusted nil-ductility temperature at 54 effective full power years at  $\frac{1}{4}$  and  $\frac{3}{4}$  thicknesses of the reactor pressure vessel. The inspectors reviewed Calculation 95-SDS-1007MG, Revision 7, August 17, 2005, documenting the response to NRC Generic Letter 92-01. The inspectors noted, in Westinghouse WCAP-16012, Revision 0, February 2003, "Analysis of Capsule W-83 from Dominion Nuclear Connecticut Millstone Unit 2 Reactor Vessel Radiation Surveillance Program," that the Millstone Unit 2 surveillance capsule data for the plate material failed one of the five credibility standards of NRC Regulatory Guide 1.99, Revision 2, May 1998 and therefore could not be used. This indicates the license condition is not applicable to the plate material contained in the surveillance capsules.

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a. Inspection Scope

Commitment 1 – “The existing inspection program will be modified to include those battery racks that require monitoring for license renewal, but are not already included in the program.”

The inspectors reviewed documentation, performed a walkthrough inspection, and discussed the status of implementation of the commitment with Dominion technical and management personnel. The inspectors determined that the applicant had modified the battery rack inspection program to include the battery racks that are required for license renewal. Battery racks and trays were being visually inspected to ensure their physical conditions were not degraded. The program required that battery rack inspections be performed on a periodic basis to provide reasonable assurance that the integrity of the racks will be maintained and there is no loss of intended function.

Commitment 2 – “Implementing procedures will be modified to include loss of material as a potential aging effect and to provide guidance on the inspection of items (such as anchorages, bracing and supports, side and end rails, and spacers), which contribute to battery rack integrity or seismic design of the battery racks.”

The inspectors reviewed documentation, performed a walkthrough inspection, and discussed the status of implementation of the commitment with the Dominion technical and management personnel. The inspectors determined that the applicant had modified the implementing procedures to include the loss of material as a potential aging effect and to provide guidance on the inspections. The procedures were updated to ensure that the battery support racks and trays were visually inspected to ensure their physical condition is not degraded. Items such as anchorages, bracing and supports, sides and rails, and spacer were also inspected. The program required that battery rack inspections be performed on a periodic basis to provide reasonable assurance that the integrity of the racks will be maintained and there is no loss of intended function.

Commitment 3 – “A baseline inspection of the in-scope buried piping located in a damp soil environment will be performed for a representative sample of each combination of material and protective measures. Inspection for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods.”

The inspectors reviewed completed work packages, inspection reports, and condition reports (CR) for buried pipe inspections completed by Dominion staff. Additionally, the inspectors interviewed the buried pipe program engineer and reviewed Dominion inspection procedures to ensure that the inspection results were performed and evaluated in accordance with applicable industry standards

A baseline inspection of the in-scope buried piping located in a damp soil environment was performed for a representative sample of each combination of material and protective measures. Inspection for the loss of material due to selective leaching was performed, where appropriate by visual, and mechanical or other appropriate means. These completed inspections were documented in ETE-MP-2013-1202, Attachment 1, “Unit 2 Buried Pipe Completed Inspections.”

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Commitment 4 – “The maintenance and work control procedures will be revised to ensure that inspections of buried piping are performed when the piping is excavated during maintenance or for any other reason. These procedures will include the inspection for the loss of material due to selective leaching which will be performed by visual, and mechanical or other appropriate methods.”

The inspectors reviewed maintenance and work control procedures SA-AA-106, WM-AA-100, and WM-AA-101, and determined they were revised to ensure that inspections of buried piping are performed when the piping is excavated during maintenance or for any other reason. SA-AA-106 and WM-AA-101 have been revised to ensure that inspections for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods.

Commitment 5 – “The Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be established.”

The inspectors reviewed documentation and discussed the status of implementation of the commitment with the Dominion technical and management personnel. The inspectors determined that the applicant had established a program for the electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification (EQ) requirements that are required for license renewal. The program will concentrate on inspecting accessible non-EQ cables and connectors located in adverse localized environments, where the effects of aging may be accelerated due to excessive heat, radiation, or moisture. The program required that visual inspections be performed prior to the period of extended operation and at least once every 10 years thereafter. The inspectors verified the appropriate inspections had been completed.

Commitment 6 – “Fuse holders meeting the requirements will be evaluated prior to the period of extended operation for possible aging effects requiring management. The fuse holder will either be replaced, modified to minimize the aging effects, or this program will manage the aging effects. The program (if needed for fuse holders) will consider the aging stressors for the metallic clips.”

The inspectors reviewed documentation and discussed the status of implementation of the commitment with Dominion technical and management personnel. The inspectors determined that the applicant had no metallic fuse holders that require aging management for license renewal implementation. As a result of the licensee not having any metallic fuse holders, no inspection procedures were created and there are no inspection results, no future work orders, no trend evaluation, and no follow-up actions.

Commitment 8 – “A baseline visual inspection will be performed on a representative sample of the buried fire protection piping and components, whose internal surfaces are exposed to raw water, to confirm there is no degradation.”

The inspectors reviewed documentation and discussed the status of implementation of the commitment with Dominion technical and management personnel. The inspectors determined that the applicant had completed visual inspections of a sample of buried fire protection piping and components and confirmed there was no degradation. Work

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Control procedures were updated to continue visual inspections through the work control process through normal maintenance activities to provide inspection opportunities for verifying coatings on the external surfaces of buried piping and the condition of buried concrete building and equipment foundations.

Commitment 9 – “Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program.”

The inspectors reviewed documentation and discussed the status of implementation of the commitment with Dominion technical and management personnel. The inspectors determined that the applicant had modified the fire protection program to include testing or replacing sprinkler heads that have been in service for 50 years of service life. The first test will be completed prior to the sprinkler heads achieving 50 years of service life and are planned thereafter to not exceed intervals of 10 years.

The inspectors concluded that Dominion staff had performed adequate evaluations, including appropriate scoping of fire protection sprinkler heads into the aging management program. The inspectors also determined that program-level documents provided adequate guidance to ensure that the aging effects of the fire protection sprinkler heads were appropriately identified and addressed.

Commitment 10 – “The procedures and training for personnel performing General Condition Monitoring inspections and walkdowns will be enhanced to provide expectations that identify the requirements for the inspection of aging effects.”

The procedures and training for personnel performing General Condition Monitoring inspections and walkdowns have been enhanced to provide expectations that identify the requirements for the inspection of aging effects.

The inspectors verified that the General Condition Monitoring Program was enhanced to provide inspection guidance to operators, engineers, and technicians on what to look for in terms of aging management issues. The inspectors walked down the “A” turbine driven auxiliary feedwater pump, “C” condenser discharge valve and the security diesel, with the respective system engineers, to verify that deficiencies identified during Dominion walkdowns were entered into the corrective action program and corrected in an appropriate amount of time. The inspectors reviewed Dominion’s training plans to ensure that personnel responsible for performing monitoring functions received appropriate training on recognizing aging management issues.

Commitment 11 – “In-scope cable found to be submerged will be subject to an engineering evaluation and corrective action. The evaluation of cables having significant voltage found to be submerged in standing water for an extended period of time will be based on appropriate testing (using available technology consistent with NRC positions) of cables that are determined to be wetted for a significant period of time. The engineering evaluation will also address the appropriate testing requirements for the corresponding 10-year intervals during the period of extended operation. The test will use a proven methodology for detecting deterioration of the insulation system due to

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wetting. Examples of such tests include power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, "Effects of Moisture on the Life of Power Plant Cables," or other appropriate testing. Testing will have acceptance criteria defined in accordance with the specific test identified. Occurrence of degradation that is adverse to quality is entered into the Corrective Action Program."

The inspectors reviewed documentation and discussed the status of implementation of the commitment with Dominion technical and management personnel. The inspectors determined that the applicant had tested and evaluated all the cables associated with Commitment #11. Dominion implemented a Cable Management Program in support of the evaluation and testing of medium voltage cables. The inspectors reviewed the aging management basis document for medium voltage cables to determine if appropriate effects of aging were identified and addressed.

The inspectors concluded that Dominion staff had performed adequate evaluations, including appropriate scoping of inaccessible medium voltage cables into the aging management program. The inspectors also determined that program-level documents provided adequate guidance to ensure that the aging effects of the inaccessible medium voltage cables were appropriately identified and addressed.

Commitment 12 – "The Infrequently Accessed Areas Inspection Program will be established."

The Inspection Program for Unit 2, Infrequently Accessed Areas, was established using recurring events RE97057 for the Station vent stack and RE100499 for the intake structure. A third infrequently accessed area for Unit 2 is the winter bypass line, but that area is no longer in service, has been retired in place as documented in design change MP2-13-01204, and does not require inspection. The inspection program for the station stack and Unit 2 intake structure is described in ETE-MP-2013-1059.

The inspectors reviewed ETE-MP-2013-1059 and verified that the Infrequently Accessed Inspection Program was established for the station vent stack and the intake structure. The inspectors reviewed design change MP2-13-01204 and verified that the winter bypass line was retired in place. Additionally, the inspectors interviewed the structures monitoring program manager to ensure that the requirements of the Infrequently Accessed Inspection Program were consistent with the structures monitoring program.

Commitment 13 – "Millstone will follow the industry efforts on reactor vessel internals regarding such issues as thermal or neutron irradiation embrittlement (loss of fracture toughness), void swelling (change in dimensions), and stress corrosion cracking (PWSCC and IASCC) and will implement the appropriate recommendations resulting from this guidance. The revised program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval."

The inspectors reviewed ETE-MP-2013-1044 "Inservice Inspection Program: Reactor Vessel Internals, License Renewal Aging (MP-LR-3711/MP-LR-4711)", Revision 0, dated 06/26/15, which provided the license renewal aging management program for

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addressing mandated enhanced inspections of reactor vessel internals. The inspectors noted Dominion Nuclear Connecticut sent Letter 13-398 to the NRC on July 31, 2013, stating the reactor vessel internals inspection program was updated to include the 10 elements of NUREG-1801 and industry guidance from Electric Power Research Institute guidance document report 1022863, "Material Reliability Program: Pressurized Water Reactor Inspection and Evaluation Guidelines (MRP-227-A)."

Commitment 14 – "Millstone will follow the industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance. The revised program description will be submitted at least two years prior to the period of extended operation for staff review and approval to determine if the program demonstrates the ability to manage the effects of aging in nickel based components per 10 CFR 50.54.21(a)(3)."

The inspectors reviewed ETE-MP-2013-1154, "Alloy 600 Management Program," License Renewal Aging Management Program Millstone Power Station Unit 2, Revision 0, dated 07/15/13 which provided the license renewal aging management program to address the age-related degradation of Alloy 600 components. Dominion Connecticut Nuclear sent the NRC letter 13-399 on July 31, 2013, providing the attributes from the program. The inspectors also reviewed ETE-MP-2013-1040, "Inservice Inspection Program: Systems, Components and Support; License Renewal Aging Management Program" (MP-LR-3701/MP-LR-4701), Revision 0, dated 08/13/13, and ETE-MP-2013-1046, "Steam Generator Structural Integrity Program, License Renewal Aging Management Program" (MP-LR-3714/MP-LR-4714), Revision 0, dated 11/7/13. These three procedures cover all the Alloy 600 components, structures, and systems that contain Alloy 600 susceptible to aging related degradation.

Commitment 16 – "Implementing procedures and documentation will be modified to include visual inspections for the loss of material on the crane and trolley structural components and the rails in the scope of license renewal in Commitment 15."

The inspectors verified that procedures that specify inspections for the structural condition of crane and trolleys, and for seismic monorails, have been revised to address loss of material. The relevant procedures are MP-2701J-106 for the containment polar crane (M2H8), MP-2701J-008 for the spent fuel cask crane (M2H9), OPS-FH 226 for the spent fuel platform crane (M2H10), OPS-FH-212 for the new fuel elevator (M2H23), OPS-FH 204 for the refueling machine (M2H12), OPS-FH 222 for the fuel transfer machine/fuel tilting mechanism (M2H13), and C EN 1041 for the seismic monorails for the reactor building closed cooling water (RBCCW) heat exchanger, the "A" diesel generator room, and the process computer (RE102803 for M2L809, RE102807 for M2L810, and RE102808 for M2L811).

Commitment 17 – "The implementing procedures will be modified to include ACI 349.3R-96 and ANSI/ASCE 11-90 as references and as input documents for the inspection program."

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The inspectors determined that Commitment #17 required that implementing procedures for structural inspections be modified to include ACI 349-3R-96 and ANSI/ASCE 11-90 as references and input documents for the inspections program. ACI 349-3R-96 provides a definition of “age-related degradation mechanisms” which is useful when performing structural inspections for license renewal aging management. ANSI/ASCE 11-90 also provides relevant information for evaluation as found conditions. The implementing document for Milestone Unit 2 license renewal is Common Engineering Procedure C EN 1041, “Condition Monitoring Structures.” That procedure includes ACI 349-3R-96 and ANSI/ASCE 11-90 as basis documents in Step 1.2.4, and states in Step 1.2.4 that those two references are to be used as guidance for assessing structural inspection results. The modifications of C EN 1041 complete the requirements for Commitment #17.

At the time of the inspection Dominion staff were unable to show a technically valid correlation, empirically or otherwise, correlating cracking in the coating of recently painted concrete surfaces with the degradation that might be occurring beneath the coating, in the body of the structure. Dominion implemented this program in conformance with NUREG-1801, “Generic Aging Lessons Learned (GALL) Report”, Revision 2, December 2010. As a consequence the inspectors were unable to verify that XI.S6, Structures Monitoring, Evaluation and Technical Basis, 5, Monitoring and Trending, was being implemented. Specifically the inspectors were unable to determine if Regulatory Position 1.5, “Monitoring of Structures” in NRC RG 1.160, Revision 2 was being met. This position requires that “Licensees would evaluate the results of the assessments to determine the extent and rate of any degradation of the structures.” As a consequence Dominion fulfilled their license renewal commitment to modify the Structural Monitoring Program per the commitment, however the inspectors had a question about the effectiveness of the program which will be reviewed during a subsequent inspection. The licensee entered this issue into their corrective action program in CR 580204.

Commitment 18: The Structures Monitoring Program and implementing procedures will be modified to include all in-scope structures.

The inspectors determined that Attachments 1 and 2 in Common Engineering Procedure C EN 1041, “Condition Monitoring of Structures,” identified structures for Units 1 and 2 that are susceptible to age-related degradation, and require periodic monitoring for license renewal. The existence of Attachment 2 in C EN 1041 completed the requirement to include all Unit 2 in-scope structures in the Structures Monitoring Program.

Commitment 19 – “Groundwater samples will be taken on a periodic basis, considering seasonal variations, to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.”

The inspectors determined that Common Engineering Procedure C EN 1041, “Common Monitoring of Structures,” was revised to provide direction for groundwater sampling on a periodic basis, considering seasonal variation, to evaluate the potential that the groundwater may cause degradation of the below-grade concrete.

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Commitment 20 – “The Structures Monitoring Program and implementing procedures will be modified to alert the appropriate engineering organization if the structures inspections identify that medium voltage cables in the scope of license renewal have been submerged.”

The inspectors determined that Common Engineering Procedure CEN 1041, “Condition Monitoring of Structures,” has been revised to provide direction (in Section 3.3 and 4.2.14) for submitting a CR to notify the appropriate engineering group, and to request an engineering evaluation, if inspections of underground manholes or cable enclosures identify evidence of submergence for those medium-voltage cables that are in the scope of license renewal.

Commitment 21 – “The maintenance and work control procedures will be revised to ensure that inspections of inaccessible areas are performed when the areas become accessible by such means as excavation or installation of shielding during maintenance or for any other reason.”

The inspectors reviewed Dominion procedures SA-AA-106, WM-AA-100, WM-AA-101, RP-AA-222, and RP-AA-223 and verified that appropriate revisions were included to ensure that notifications will be made to allow license renewal inspections to be performed in normally inaccessible areas when they become accessible.

Commitment 22 – “Appropriate inspections of sealants and caulking used for moisture intrusion prevention in and around above ground tanks will be performed.”

The inspectors determined that the requirement for inspections of sealants and caulking used for moisture intrusion prevention in and around above ground tanks were added to Unit 2 Engineering Procedure EN 21154A, “Tank Inspection Plan,” and Unit 3 Engineering Procedure EN 31154, “Tank Inspection Plan.”

A review of completed inspections of in-scope tanks using sealants and caulking for moisture intrusion prevention concluded that appropriate inspections have been performed.

Commitment 23 – “Non-destructive volumetric examination of the in-scope inaccessible locations, such as the external surfaces of tank bottoms, will be performed prior to the period of extended operation. Subsequent inspections will be performed on a frequency consistent with scheduled tank internals inspection activities.”

The inspectors determined that non-destructive volumetric examinations of the in-scope inaccessible locations, such as the external surfaces of tank bottoms, have been performed for Unit 2. Subsequent inspections are planned on a frequency consistent with scheduled tanks internals inspection activities as delineated in Procedure EN21154A, Attachment 5.



The inspectors reviewed completed work packages, inspection reports, CRs, and associated engineering evaluations for baseline inspections on tank bottoms completed by Dominion. The inspectors reviewed scheduled work orders for tank internal inspections to ensure that subsequent tank bottom non-destructive volumetric examinations were included in the inspection plans. Additionally, the inspectors interviewed the tank inspection program manager to ensure the appropriate tanks were included in the inspection plan.

Commitment 26 – “Dominion actively participates in a comprehensive industry initiative, in response to NRC Generic Issue 23 (GI-23), “Reactor Coolant Pump Seal Failure.” Dominion is following the industry efforts on this issue and will implement the appropriate recommendations resulting from this guidance prior to the period of extended operation.”

This commitment is a cost-beneficial severe accident mitigation strategy per NUREG-1437, Supplement 22, July 2005.

The inspectors noted the industry efforts to generically address seal failure was the development of a risk model reported in topical report WCAP-16175-P-A. This report was reviewed and approved by the NRC in 2007. The NRC inspectors noted the recommendation of WCAP-16175-1-A is subsumed by Dominion Connecticut Nuclear procedural guidance, AOP 2564 “Loss of RBCCW.” The inspectors reviewed Dominion CM-AA-ETE-101, ETE-MP-2014-1155, “License Renewal Commitment 26, Evaluation of GSI-23, ‘Reactor Coolant Pump Seal Failure’” which concluded the accident mitigation strategy in AOP 2564 “Loss of RBCCW” directs the operator to allow subcooling to slowly decrease to within a specified band following the reactor trip, and only cool down as necessary to maintain subcooling within that band. This strategy conforms to the risk model developed as a consequence of WCAP-16175-1-A.

As a result of the WCAP-16175-P-A model incorporation into the Millstone 2 Probabilistic Risk Assessment a rapid reactor coolant system (RCS) cool down is not required as a result of loss of RBCCW and the accompanying loss of RCP seal cooling. The procedure changes that were anticipated in 2004 are no longer applicable, and have not been implemented, as a consequence of following industry guidance for this issue.

Commitment 27 – “For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.3.”

The inspectors reviewed the Structural Integrity Associates reports (Technical Report TR 1100816.401, “Aging Management of CASS Piping in Millstone Unit 2,” Task 1 Report, “Perform Screening to Determine Which Components are Susceptible to Thermal Aging Embrittlement and Require Augmented Inspection or Analysis,” March 2012, Technical Report TR 1100816.402, “Aging Management of CASS Piping in Millstone Unit 2,” Task 2 Report, “Determination of Saturated Fracture Toughness for Potentially Susceptible Components,” December 2012, and Technical Report TR 1200738.401, “Aging Management of CASS Piping in Millstone Unit 2,” Task 3 Report,

Enclosure

"Flaw Tolerance Evaluation of CASS Piping at Millstone Unit 2," December 2012). The inspectors noted the analysis initially identified 41 CASS components as potentially susceptible to thermal aging embrittlement. Only the components in the pressurizer surge line including two piping segments and three elbows that are manufactured from SA-351 CF8-M with greater than 20 percent ferrite exceeded the screening criteria.

A flaw tolerance evaluation determined that the five components in the pressurizer surge line are flaw tolerant. The five components were interrogated using phased-array ultrasonic testing during the refueling outage in April/May 2014. This examination confirmed that no flaws existed that are greater in dimension than the calculated critical flaw size. The inspections found that either no recordable indications exist, or that recordable indications were evaluated to be due to ID geometry (counterbore).

Commitment 28 – "Millstone will follow industry efforts that will provide specific guidance to license renewal applicants for evaluating the environmental effects of fatigue on applicable locations, other than those identified in NUREG/CR-6260. Millstone will also implement the appropriate recommendations resulting from this guidance."

The inspectors reviewed procedure MP-24-NCFM-PRG, "Nuclear Component Fatigue Management Program," ER-AA- MAT-10, "Reactor Coolant System Materials Degradation Management," and ER-AA-MAT-101, "Identifying and Tracking NEI 03-08 Sanctioned Industry Guidance." These procedures were compared with the guidance contained in NEI 03-08, "Guideline for the Management of Materials Issues."

The inspectors reviewed Calculation Package MILL-02Q-321, "License Renewal Time-Limited Aging Analysis for Millstone 2/3," January 30, 2004. This analysis computed the stresses and associated fatigue usage for components in the Millstone Unit 2 surge line for a projected 60-year operation. This analysis resulted in the addition of the Hot Leg Nozzle and Pressurizer Surge Nozzle to the list of locations monitored for fatigue. This analysis was predicated based on a report SIR-03-062NP, Revision 3, "Transient and Fatigue Monitoring System Review for the Millstone Nuclear Power Station, Units 2 and 3." The environmental effects of fatigue were considered in Calculation Package MILL-02Q-316, "License Renewal Time-Limited Aging Analysis for Millstone 2/3," dated November 17, 2003.

Commitment 35 – "Millstone Unit 2 will complete the SAMA evaluation of the capability to flash the Diesel Generator field in the event of extended loss of direct current (DC) power with a loss of offsite power. If this SAMA is cost beneficial (i.e., can be accomplished without a hardware modification), a Severe Accident Management Guideline (SAMG) addressing this mitigation strategy will be developed."

SAMG 4217, MP2 b.5.B Event Technical Support Center (TSC) Response, provided the mitigation strategy for providing capability to flash the field for the emergency diesel generators (EDG) in the event of extended loss of DC power with a loss of offsite power. That SAMG was superseded in February 2006 by Extreme Damage Mitigation Guideline (EDMG) 2.02, MP2 b.5.B Event TSC Response.

Attachment 5 of EDMG 2.02 lists conditions necessary to operate EDGs, and includes alternate methods to satisfy EDG operational requirements. The DC power requirement is listed as 125 VDC. The alternate method to correct for loss of DC field flash and control power uses twelve 12-volt batteries that are placed in series to supply terminal C-38 for the "A" EDG, and terminal C-39 for the "B" EDG. No further action is required for closing Commitment 35.

The inspectors reviewed Dominion's severe accident management analysis (SAMA) evaluation and implementing procedure EDMG 2.02, "MP2 B.5.B Event TSC Response," to verify that Dominion evaluated and developed a mitigation strategy for flashing the EDG generator field in the event of a prolonged loss of DC power coupled with a loss of offsite power. Additionally, the inspectors walked down the EDMG with a Dominion electrician and operator to verify the adequacy of the procedure.

Commitment 36 – "Dominion will replace the Millstone Unit 2 pressurizer using materials that are resistant to PWSCC."

The NRC confirmed the implementation of this commitment in 2006. The NRC inspection of the Millstone Unit 2 pressurizer is documented in NRC inspection report 05000336/2006013, dated January 12, 2007 (ADAMS ML070160068). The report states, in part:

"This inspection verified that engineering evaluations and design changes associated with the pressurizer replacement were completed in conformance with requirements in the facility license, the applicable codes and standards, *licensing commitments*, and the regulations."

Commitment 37 – "Updated USE,  $RT_{PTS}$ , and P-T limits based on fluence values developed in accordance with Regulatory Guide 1.190 requirements, as amended or superseded by future regulatory guidance changes, will be submitted to the NRC for review at least two years prior to the period of extended operation."

The NRC inspectors reviewed the Dominion submittal of July 14, 2005, requesting a Technical Specifications change subsequently amended January 11, 2006. The request changed the updated pressure-temperature limit curves for 54 EFPY of operation. The inspectors noted the limits were calculated based on reactor vessel surveillance coupon fluence results for the license renewal period of extended operation, and were consistent with updated calculations for upper shelf energy use and  $RT_{NDT}$ . The inspectors noted that the term  $RT_{PTS}$ , as used in Commitment 37, is defined as the maximum  $RT_{NDT}$  in the limiting reactor vessel beltline material. As stated in Letter 05-307, the updated pressure-temperature limit curves were determined for the most limiting reactor vessel material.

The NRC approved the technical specifications change request for updated pressure-temperature limit curves as indicated in Letter Number 06-420.

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b. Findings

No findings were identified. The inspectors concluded the reviewed commitments were being implemented and there is reasonable assurance the effects of aging will be managed during the extended period of operation.

4. OTHER ACTIVITIES

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented their preliminary inspection results to Mr. John Daugherty, Site Vice President, and other members of the site staff at an exit meeting on May 21, 2015. No proprietary information was included in this inspection report.

Attachment: Supplemental Information

**SUPPLEMENTAL INFORMATION**

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

Opened and Closed:

None

**KEY POINTS OF CONTACT**

John Daugherty, Site Vice President \*  
Matt Adams, Plant Manager \*  
David Blakeney, Director Nuclear Safety and Licensing \*  
Craig Olsen, Assistant Director Nuclear Engineering \*  
Tom Cleary, Supervisor Licensing \*  
Ethan Treptow, Manager Site Engineering \*  
Joe Rigatti, Manager Equipment Reliability \*  
Budd Hayes Nuclear, Oversight Specialist \*  
Bill Watson, Supervisor Primary System Engineering  
Paul Thomas, Consultant  
Tom Snow, Consultant  
Jim Petrosky, Supervisor Structural Engineering  
Kevin Perkins, Supervisor Engineering Programs  
Don Cleary, Manager Nuclear Engineering Programs

\* Exit Meeting

## **LIST OF DOCUMENTS REVIEWED**

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records.

### Procedures:

ER-AP-BAC-10, Boric Acid Corrosion Control Program, Revision 11  
ER-AP-BAC-101, Boric Acid Corrosion Control Program (BACCP) Inspections, Revision 11  
MP-22-CHM-REF04, Strategic Primary Water Chemistry Plan for Millstone Station, Revision 006-00  
CP 2802A, Primary Chemistry Control, Revision 08-01  
EDMG 2.02, Millstone Unit 2: B.5.b Event TSC Response, Revision 9  
EN21154A, Tank Inspection Plan, Revision 2  
C SP 760, Battery Discharge Test, Revision 004-05  
C SP 788B, Fire Pump Diesel Engine Battery 18- Month Surveillance, Revision 000-05  
MP 3786AB, SBO Battery Inspection and Equalize Procedure, Revision 003-02  
MP 2720F14, Security Diesel Electrical Inspection, Revision 000-01  
ER-AA-CBL-10, Cable Management Program, Revision 1  
ER-AA-CBL-101, Evaluation and Testing of Low Voltage Cables, Revision 2  
ER-AA-CBL-103, Evaluation and Testing of Medium Voltage Cables, Revision 2  
WM-AA-101, Work Order Planning, Revision 5  
CM-AA-FPA-100, Fire Protection/Appendix R (Fire Safe Shutdown) Program, Revision 10  
SP 2618L, Fire Protection Coating Inspections, Revision 002-04  
SFP 17, Fire Penetration Seal and Barrier Inspections, Revision 003-03  
C SP 600.25, Fire Door Inspections, Revision 000-04  
SFP 10, Fire Prevention Inspections, Revision 005-03  
SP 2618G, Fire Damper Operability Verification, Revision 006-02

### Documents Reviewed:

Technical Report: MP-LR-3905/MP-LR-4905, Identification of Fuse Holders requiring aging management review in accordance with ISG-5, Dated: 2/7/05  
Technical Report: MP-LR-3655, Cables and Connectors, Dated: 2/17/05  
ETE-MP-2011-1028, Technical Basis for closing commitment item 8 from Millstone Unit 2 FSAR, Chapter 15, Revision 0  
Technical Report: MP-LR-3720/MP-LR-4720, Fire Protection Program, Revision 0  
ETE-MP-2014-1141, License Renewal- Unit 2 Commitment Item #11, #33, #34- Medium Voltage Cable Evaluations and Tan-Delta Testing results, Revision 0  
Aging Management Program Documents  
ETE-MP-2013-1061, Battery Rack Inspections License Renewal Aging Management Program, Revision 1  
ETE-MP-2013-1058, Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements License Renewal Aging Management Program, Revision 1  
ETE-MP-2013-1051, Fire Protection Program License Renewal Aging Management Program, Revision 2

ETE-MP-2015-1021, License Renewal- Unit 2 Commitment #9, Testing and/or Replacing Fire Protection Sprinkler Heads, Revision 0

ETE-MP-2013-1066, Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements License Renewal Aging Management Program, Revision 0

Drawings:

25203-LR26015, L.P. Safety Injection System, Sheet 1, Revision 15  
25203-LR26015, High Pressure Safety Inj. Pumps, Sheet 2, Revision 14  
25203-LR26015, Safety Injection Tanks, Sheet 3, Revision 7  
25203-LR26017, Deborationing & Purification System, Sheet 2, Revision 5  
25203-LR26022, RBCCW System Spent Fuel Pool and Shut-down Heat Exchangers, Sheet 2, Revision 2  
25203-LR26023, Spent Fuel Pool Cooling and Cleanup System Tanks, Sheet 2, Revision 7  
DMG-00-0001-10, Sub-Base Tank with Rupture Tank, Revision 1  
D-72-280, Condensate Storage Tank, Revision 6  
UTD-14888-100, Condensate Storage Tank Bottom UT Results, Revision 4  
D-72-253, Refueling Water Storage Tank, Revision 10  
UTD-14888-201, Refueling Water Storage Tank Bottom UT Results, Revision 5  
C EN 104I, Condition Monitoring of Structures, Revision 008-01  
ER-AA-SYS-1002, System Engineering Walkdowns, Revision 10  
ER-AA-SYS-1004, System Engineering Handbook, Revision 4  
RP-AA-222, Radiation Surveys, Revision 2  
RP-AA-223, Contamination Surveys, Revision 4  
SP-2669A, PEO Rounds, Revision 017-08  
SA-AA-106, Drilling, Digging, and Cutting, Revision 8  
WM-AA-100, Work Management, Revision 25  
WM-AA-101, Work Order Planning, Revision 5  
ER-AA-BPM-10, Underground Piping and Tank Integrity Program Description, Revision 6  
ER-AA-BPM-101, Underground Piping and Tank Integrity Program, Revision 8

Design Changes:

MP3-14-01165, Millstone Unit 3 Turbine Driven Auxiliary Feedwater Pump Control Circuit Modifications, Revision 0

Work Orders:

53102714681 53102287481 53102517557 53102606839 53102606838  
M2-02-09174 53102482971 53102456874 53102675095 53102635295  
53102736168 53102425254 53102665897 53102431580 53102425254  
53104741207 53102720219 53102442897 53102539823 53102442849  
53102442896 53102442987 53102539816 53102539815 53102539823  
53102597778 53102517282 53102575061 53102578336 53102578300  
53102568325 53102748123 53102652096 53102230383 53102431722  
53102431605 53102431725 53102431751 53102821945 53M30607156  
53102271072

Corrective Actions:

CR501288	CA252813	CR542400	CR366403	CA158621
CR350908	CR491794	CR492217	CA247305	CA247306
CR364297	CA157011	CR560553	CR579142	CR579044
CR580308	CR544492	CR544488	CA284222	CR544500
CR544498	CA280772	CA280768	CA284242	CA280769
CA280770	CR530058	CR552203	CR530058	CR466961
CR467890	CR468390	CA231233	CR451911	ACE018949
CA221262	CR368888	CA160661	CR550414	CR428582
CR526315	CR423129	MRE013606	CR428582	CR544162
CA280593	CA280594	CR452759	CA252477	CA257980
CA257981	CR519265	CR452844	CR578812	CR578914
CR579120	CR500550	CR578914	CR452759	CR579120
CA252477	CA257980	CA257981	CR503915	CA254704
CR519265	CR471151	CA232670	CR572555	CR385619
CA172148	CA173519	CR438080	CA209787	CA209896
CR552038	CA285213	CA285214	CA298250	

**LIST OF ACRONYMS**

AMP	Aging Management Program
ASTM	American Society for Testing and Materials
CFR	<i>Code of Federal Regulations</i>
CR	Condition Report
DC	Direct Current
EDG	Emergency Diesel Generator
EQ	Environmental Qualification
GALL	Generic Aging Lessons Learned
IASCC	Irradiation-Assisted Stress Corrosion Cracking
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
PWSCC	Primary Water Stress Corrosion Cracking
RBCCW	Reactor Building Closed Cooling Water
RCS	Reactor Coolant System
RIS	Regulatory Issue Summary
SAMA	Severe Accident Management Alternatives
SAMG	Severe Accident Management Guideline
TR	Technical Report
TSC	Technical Support Center
UFSAR	Updated Final Safety Analysis Report