Dominion Nuclear Connecticut, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060
Web Address: www.dom.com

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Serial No.: 13-399
MPS Lic/GJC R0
Docket No.: 50-336
License No.: DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
INFORMATION IN SUPPORT OF LICENSE RENEWAL
COMMITMENT #14 PROGRAM DESCRIPTION FOR
ALLOY 600 AGING MANAGEMENT PROGRAM

Commitment Item No. 14 of NUREG-1838, the Safety Evaluation Report (SER) for the renewed operating license for Millstone Power Station Unit 2 requires the submission of a revised aging management program (AMP) description for the management of nickel-based alloy (also referred to as Alloy 600) components. NUREG-1838 included nickel-based alloy aging management in the Inservice Inspection Program: Systems, Components, and Supports AMP. After considering industry developments and operating experience, Millstone Power Station has developed a separate, new AMP to address nickel-based alloy aging management. In accordance with Commitment Item No. 14, the nickel-based alloy AMP inspection program is based on industry guidance and addresses the ten program elements of NUREG-1801. The Alloy 600 aging management program description is provided as Attachment 1.

If you have any questions or require additional information, please contact Mr. William D. Bartron at (860) 444-4301.

Sincerely,

Dan Stoddard

Daniel G. Stoddard
Senior Vice President – Nuclear Operations

Attachment:
1. Alloy 600 Aging Management Program Description

Commitments made in this letter: None

A106
A047
NRR

cc: U. S. Nuclear Regulatory Commission
Region I
2100 Renaissance Blvd, Suite 100
King of Prussia, PA 19406-2713

J. S. Kim
NRC Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North, Mail Stop 08-C2A
11555 Rockville Pike
Rockville, MD 20852-2738

NRC Senior Resident Inspector
Millstone Power Station

ATTACHMENT 1

AGING MANAGEMENT PROGRAM DESCRIPTION
ALLOY 600 MANAGEMENT PROGRAM

Millstone Power Station Unit 2
Dominion Nuclear Connecticut, Inc.

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1.0 BACKGROUND

At the time of submittal of the Millstone Power Station Units 2 and 3 (MPS2 and MPS3) License Renewal Application (LRA), NUREG-1801, Generic Aging Lessons Learned (GALL) Report, Rev. 0 was current guidance (reference 6.1). The GALL, Rev. 0 was the standard to which the Millstone Power Station (MPS) aging management programs (AMPs) were compared for technical adequacy. The results of this review were documented in NUREG-1838 (reference 6.2) and provide the technical basis for the MPS2 and MPS3 renewed licenses.

The GALL, Rev. 0 contains a nickel-based alloys aging management program, XI.M11, Nickel-Alloy Nozzles and Penetrations. In the MPS LRA, DNC did not specify a separate nickel-based alloys program; but instead credited four existing AMPs to manage the effects of aging on nickel-based alloy components. They are:

- Inservice Inspection (ISI) Program: Systems, Components & Supports (reference 6.18)
- Boric Acid Corrosion (reference 6.17)
- Steam Generator Structural Integrity Program (reference 6.14)
- Chemistry Control for Primary Systems (reference 6.19)

The ISI Program: Systems, Components & Supports section of the MPS License Renewal SER includes discussion of the GALL XI.M11 Program. At the time that NUREG-1838 was being finalized, the industry position on the management of Alloy 600 components was still evolving. MPS committed to following industry developments. MPS committed to submit an Alloy 600 aging management plan to the NRC for approval no later than two years before MPS2 and MPS3 enter their respective periods of extended operation. For MPS2, this is designated as license renewal commitment # 14

The MPS LRA stated that the ISI Program: Systems, Components & Supports was consistent with the GALL, with exceptions. Because the ISI Program: Systems, Components & Supports addresses five GALL programs, the Staff reviewed it in subsections corresponding to the GALL programs. The discussion following in Section 2.0 updates the Alloy 600 subsection and describes its conversion into a separate aging management program. Section 3.0 demonstrates the adequacy of the new program to provide reasonable assurance the effects of aging on in-scope components will be managed during the period of extended operation.

This AMP is only applicable to MPS2. MPS3 will not complete 30 years of its renewed license until after MPS2 enters its period of extended operation. A separate engineering technical evaluation (ETE) will be issued for MPS3 Alloy

600 components in the scope of license renewal after year 30 of the renewed license is completed. Until the MPS3 ETE is issued, the last revision of Technical Report MP-LR-3701/MP-LR-4701 remains the aging management program for MPS3.

2.0 DISCUSSION

The MPS LRA states the ISI Program Nickel Alloy Nozzles and Penetrations section is consistent with the GALL XI.M11 AMP with an exception. This exception concerns reactor vessel (RV) top head inspections.

At the time NUREG-1838 was being finalized, the industry was still developing a long term Alloy 600 management plan and RV head inspections were being performed in accordance with First Revised Order EA-03-009 (reference 6.16). MPS was also making plans to replace the original MPS2 RV head with a new head with Alloy 690 nozzles. As discussed in NUREG-1838, MPS committed to develop a long term Alloy 600 aging management program based on approved industry requirements. This program would be submitted to the NRC for review and approval two years before MPS2 enters the period of extended operation. Commitment # 14 in Table 15.6-1 of the MPS2 Final Safety Analysis Report (FSAR) resulted from this agreement.

The DNC Alloy 600 management plan (The Plan)(reference 6.11) manages the aging effects of primary water stress corrosion cracking (PWSCC) in Alloy 600 base metal, Alloy 82/182 dissimilar metal welds, Alloy 690 base metal, and Alloy 52/152 dissimilar metal welds. The program outlines performance of bare-metal visual, liquid penetrant, eddy-current, and ultrasonic examinations to detect cracking of the in-scope components in accordance with the ASME Section XI Inservice Inspection Program (reference 6.24), which is consistent with the regulatory requirements of 10 CFR 50.55a.

The program implementing procedures define the requirements and scope of the program. The procedures identify the specific base metal and dissimilar metal weld locations included in the program and the susceptibility of each location to primary water stress corrosion cracking. The in-scope locations include the RV closure head penetration nozzles, i.e., control element drive mechanisms (CEDMs), head vent, and in-core instrumentation (ICI) nozzles. The in-scope locations also include 23 reactor coolant system (RCS) piping nozzle/butt weld locations and multiple instrumentation penetrations on the RCS hot leg and cold leg piping and on the cold leg side of each steam generator. The MPS2 Alloy 600 locations are listed in Table 3 of ER-AA-MAT-11 (reference 6.11).

The Alloy 600 Inspections program activities for the pressure boundary base metal and dissimilar metal weld locations are performed in accordance with the

MPS2 Fourth 10-Year Interval ASME Section XI Inservice Inspection (ISI) Program (reference 6.12), which is consistent with the regulatory requirements of 10 CFR 50.55a. This program includes the procedures for performing the inspections, the acceptance criteria for each examination technique, and the requirements for review and disposition of inspection results. Augmented inspection requirements in the MPS2 ISI program specifically address class 1 Alloy 600 pressure retaining welds in accordance with current, applicable industry requirements including ASME Code Cases N-722-1, N-729-1, and N-770-1 (references 6.3, 6.4, and 6.6) subject to the conditions stipulated in 10 CFR 50.55a(g)(6)(ii)(D), (E), and (F).

The MPS2 ISI program has proactively addressed industry operating experience for PWSCC of the Alloy 600 and 690 base metals and associated dissimilar metal welds. Based on MPS operating experience and other industry experience, the MPS2 RV head was replaced during the spring 2005 refueling outage and the MPS2 pressurizer was replaced in the fall 2006 refueling outage. MPS2 has also proactively implemented structural overlays on most Alloy 600 butt welds and performed half nozzle repairs on the 19 Alloy 600 hot leg instrumentation nozzles.

The Alloy 600 inspection program has evolved to implement the requirements of applicable NRC publications and industry guidance including references 6.5, 6.7, and 6.9. The Plan is described in program description ER-AA-MAT-11 (reference 6.11). The Plan applies to the Alloy 600/82/182 components in the primary system at each of the Dominion nuclear plants. Attachment 3 of ER-AA-MAT-11 provides a comprehensive list of the identified Alloy 600/82/182 pressure boundary and non-pressure boundary locations for MPS2. The list will be updated if:

- Alloy 600/82/182 components are replaced with PWSCC resistant components or are mitigated by methods such as structural weld overly (SWO) or mechanical stress improvement process (MSIP™), etc.
- The estimated susceptibility to cracking or consequences associated with cracking or leaks is significantly changed.
- Additional industry information that could impact The Plan becomes available.

Alloy 600/82/182 components in Attachment 3 of ER-AA-MAT-11 are qualitatively ranked according to:

- Material defect probability (the probability of the onset of PWSCC), which is strongly dependent upon operational time and temperature.

- Plant availability impact (the safety and/or economic consequences of the discovery of PWSCC defects/leaks that must be repaired).

The Plan credits inspections performed under existing inspection processes. Inspection requirements for each type of component are listed in the column under the management strategies heading. Defects found during inspections shall be dispositioned in accordance with applicable regulatory and code requirements, utilizing the corrective action system.

2.1 MECHANICAL NOZZLE SEAL ASSEMBLIES (MNSA)

At the time NUREG-1838 (reference 6.2) was being drafted, the MPS2 pressurizer had two nickel-based penetrations with a MNSA installed on each to prevent leaking. The installation of the MNSAs was not considered a long term repair and the NRC wanted to know how the cracking of nickel-based alloys on the pressurizer would be managed by the ISI program for the life of the plant. In a letter dated June 3, 2004, (reference 6.26), DNC committed to replace the MPS2 pressurizer during the fall 2006 refueling outage with a pressurizer made of materials resistant to PWSCC. Commitment # 36 was added to Table 15.6-1 of the MPS2 FSAR to track this commitment. The MPS2 pressurizer was replaced during the fall 2006 refueling outage and Commitment # 36 can be closed. Table 15.6-1 will be updated to reflect this closure with the same FSAR change request that includes commitment # 14.

3.0 EVALUATION USING NUREG-1801, GENERIC AGING LESSONS LEARNED (GALL) REPORT ELEMENTS

3.1 SCOPE

Attachment 3 of ER-AA-MAT-11 provides a comprehensive list of the identified Alloy 600/82/182 pressure boundary and non-pressure boundary locations for MPS2. The MPS2 locations are:

- RV
  - Closure head
    - Sixty-nine Alloy 690 control element drive mechanisms head penetrations
    - Eight Alloy 690 incore instrument head penetrations
    - One Alloy 690 head vent head penetration
    - Alloy 52/152 J-groove welds for above
- RCS/Code Class 1 Piping & Vessel Nozzle Welds
  - Alloy 600 instrument nozzles on hot and cold legs
    - Ninteen hot leg instrumentation nozzles

- Twelve cold leg instrumentation nozzles

- RCS primary loop hot leg nozzle welds
  - One – 12 inch Nominal pipe size (NPS) Nozzle-to-surge line safe end
  - One – 12 inch NPS Nozzle-to-Shutdown Cooling safe end
  - One – two inch NPS Drain line nozzle-to-safe end
- RCS primary loop cold leg nozzle welds
  - Four – 12 inch NPS safety injection nozzles-to-safe end
  - Four - 36 inch NPS RCP suction elbows-to-safe end
  - Four - 36 inch NPS RCP discharge safe end-to-pipe
  - Five - two inch NPS Charging/drain line nozzles-to-safe end
  - Two - three inch NPS Pressurizer spray line nozzles
  - One – two inch Letdown nozzle-to-safe end
- RV Flange Leakage Monitor Tube (Exempt from Code Case N-722-1)
- RV Core Guide Lugs/Welds
- RV Core Guide Lug Shell Cladding
- RV Flow Baffle
- Clevis Inserts and Lock Keys

- Steam Generator (S/G)
  - 8 instrumentation nozzles on cold leg side of S/Gs
  - S/G Tubes Alloy 690 TT
  - S/G Tubesheet Cladding
  - S/G Tube-TS Autogenous Weld
  - Divider Plate Retaining Bars/Welds
  - S/G Primary Nozzle Closure Ring* (one or two piece rings)
  - S/G Closure Ring Weld(s)

* This component is also referred to as the nozzle dam hold down ring for the MPS2 S/Gs. The possibility of PWSCC occurring in the hold down rings and their associated welds is evaluated in ETE-CEP-2012-1003 (reference 6.28). The evaluation concluded that for this non-pressure boundary location the periodic visual inspection of the S/Gs that occurs as part of normal S/G inspection activities is considered sufficient to manage these locations.

The RV flange leakage monitor tube, Item five of Attachment 3, is exempt from Code Case N-722-1. The RV flange leakage monitor tube exemption is discussed in more detail in ETE-CEP-2012-1002 (reference 6.27).

3.2 PREVENTIVE ACTIONS

The Plan is an inspection program and is designated condition monitoring. The Plan does not include preventive actions.

The Plan relies on the ISI Program: Systems, Components & Supports; the S/G structural integrity program; and the boric acid corrosion AMPs for inspections. Preventive action is provided by the chemistry control for primary systems AMP.

3.3 PARAMETERS MONITORED/INSPECTED

The Plan monitors for indications of cracking due to PWSCC in Alloy 600 components in the MPS2 primary systems.

3.4 DETECTION OF AGING EFFECTS

The Plan directs visual, surface, and volumetric examinations to detect cracking of in-scope components due to PWSCC. In-scope Alloy 600 components and welds inspection plans are based on the guidance of MRP-126 (reference 6.5) and ASME Section XI Code Cases N-722-1, N-729-1, and N-770-1 (references 6.3, 6.4. and 6.6). These inspections are performed by the ISI Program (reference 6.24), the S/G program (reference 6.29), or the boric acid corrosion control program (reference 6.31).

The ISI Program: Systems, Components & Supports directs Alloy 600 inspections according to the regulatory requirements of 10 CFR 50.55a and industry guidance including:

- Visual inspection scope and schedule in accordance with ASME Code Case N-722-1.
- RV head inspections for the replacement RV head per ASME Code Case N-729-1.
- Class 1 piping and vessel nozzle butt weld examinations for mitigated and unmitigated joints in accordance with ASME Code Case N-770-1.

The S/G structural integrity program is based on Nuclear Energy Institute (NEI) 97-06, S/G program guidelines and associated EPRI guidelines (refer to the S/G structural integrity program AMP for detailed list of industry references), and is incorporated into Technical Specifications. The S/G program administrative procedure, ER-AP-SGP-101 (reference 6.29) directs the site program owners to document visual examinations as required by The Plan.

The boric acid corrosion control program (reference 6.31) directs visual inspections of the RCS and ASME Class 1, 2, and 3 borated water systems. Leaking components and adjacent structures and components that are targets of leakage are evaluated as directed by the program.

3.5 MONITORING AND TRENDING

The Plan relies on periodic inspections performed by the ISI Program, the S/G structural integrity program, and the boric acid corrosion control program to detect and address degradation of Alloy 600 components due to PWSCC. The Chemistry control for primary systems also monitors and trends results in order to provide timely indication of abnormal chemistry conditions (reference 6.33).

3.6 ACCEPTANCE CRITERIA

Inspection criteria are as stated for each of the specific program.

- ISI Program – Acceptance criteria is in accordance with ASME Section XI requirements.
- S/G Structural Integrity Program – Acceptance criteria is in accordance with the requirements of MPS2 technical specifications, the guidance of NEI 97-06 Steam Generator Program Guidelines and the EPRI Steam Generator Guidelines (refer to the steam generator structural integrity program AMP for a detailed list of industry references).
- Boric Acid Corrosion Control Program – Acceptance criteria meets the requirements of GL 88-05 (reference 6.15) and EPRI guidelines (refer to the boric acid corrosion AMP or detailed list of industry references).
- Chemistry Control for Primary Systems – Action level criteria with site specific optimization are based on the EPRI Pressurized Water Reactor primary water chemistry guideline (reference 6.34).

3.7 CORRECTIVE ACTIONS

The Plan credits four programs for managing the effect of cracking due to PWSCC. Each program initiates corrective action by entering a condition report into the central reporting system (CRS) as follows:

- For ISI program unresolved relevant indications (URIs) and S/G program visual inspection URIs, condition reports are entered into CRS in accordance with ER-AA-NDE-140 (reference 6.35).
- S/G eddy current tube degradation condition reports are submitted in accordance ER-AP-SGP-102 (reference 6.30).
- The boric acid corrosion control program completed evaluations are entered into CRS by means of a condition report (reference 6.32).

- Primary system chemistry procedure CY-AP-PRI-100 corrective actions section (reference 6.8) directs submittal of a condition report if parameters are outside the limit values.

If evaluations determine ASME Section XI Class 1, 2, 3 components and their supports require repair or replacement; then such repairs/replacements are performed according to the Dominion nuclear fleet ASME Section XI repair/replacement program (reference 6.23).

3.8 CONFIRMATION PROCESS

Site quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B.

Each of the four credited programs is implemented in accordance with the requirements of the Dominion Nuclear Facility Quality Assurance Program (reference 6.13).

3.9 ADMINISTRATIVE CONTROLS

Administrative and implementation procedures are reviewed, approved, and maintained as controlled documents in accordance with the procedure control process and the QA Program.

3.10 OPERATING EXPERIENCE

At the time the MPS2 and MPS3 renewed licenses were issued in 2005, Alloy 600 aging management was included in the ISI Program: Systems, Components, and Supports aging management program. The program stated that MPS would follow industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in alloy base metal and Alloy 82/182 weld metals), identify the appropriate aging management activities, and implement the appropriate recommendations resulting from this guidance. Based on MPS and industry operating experience, the MPS2 RV head has been replaced and the pressurizer has been replaced. Full structural weld overlays and half nozzle repairs have also been made on the RCS piping. With these activities, MPS2 has removed or mitigated a majority of the Alloy 600 components and welds in the RCS pressure boundary.

Internal and industry operating experience subsequent to the mitigation activities indicates that the inspection methodologies employed by the Alloy 600 inspections program have been effective in identifying cracking due to PWSCC.

Reactor Coolant System/Code Class I Alloy 600 Piping & Vessel Nozzle Welds:

Inservice inspection of these code Class I Alloy 600 welds was initially performed in accordance with ASME Section XI, IWB-2500, Examination Categories B-F and B-J. An alternative to the ASME Section XI requirements for the inservice inspection of Class I piping category B-F and B-J welds was implemented during the third 10-year ISI interval based on the risk-informed technology developed in accordance with the Westinghouse Owners Group Topical Report "WCAP-14572, Revision 1-NP-A" (reference 6.7).

MPS2 incorporated augmented inspections of Alloy 600 code Class I piping and vessel nozzle welds into the risk informed ISI program in January 2004 based on materials reliability program recommendations. These augmented inspections included additional bare metal inspections of the Alloy 82/182 butt weld locations in the RCS pressure boundary over a two outage period. In conjunction with the bare metal visual examinations, MPS2 also conducted examinations of these weld joint configurations in preparation for additional volumetric examinations. These augmented inspections occurred as an application of industry operating experience, which included RCS hot leg piping cracking at V. C. Summer described in NRC Information Notice 2000-17 with supplements 1 & 2 (reference 6.36), as well as the industry guidance in MRP-139 (reference 6.25).

During refueling outage (RFO) RFO 18 (spring 2008) and RFO 19 (fall 2009), MPS2 proactively applied full structural weld overlays (FSWOLs) to 13 of the RCS primary loop hot and cold leg nozzles listed in Section 3.1. Two of the three hot leg nozzles were mitigated. The two inch NPS hot leg drain line nozzle was ultrasonically (UT) examined in RFO 19 (fall 2009) and will be re-examined in RFO 22 (spring 2014). The inspection results will determine if a FSWOL is required. Eleven of the listed cold leg nozzles were mitigated. The two inch NPS letdown nozzle was UT inspected in RFO 19 (fall 2009) and will be re-examined in RFO 22 (spring 2014). The inspection results will determine if a FSWOL is required. The eight – 36" NPS RCP suction and discharge nozzles were UT inspected in RFO 18 – (spring 2008). No relevant indications were found in any of the inspected welds.

During RFO 17 (fall 2006), MPS2 proactively performed half nozzle repairs to the 19 of the RCS hot leg instrumentation nozzle penetrations. Ten, new one inch and nine, new 0.75 inch nominal pipe diameter schedule 160 Alloy 690 penetrations were installed. The technical basis for the installation is detailed in relief request RR-89-54 (reference 6.20). The half nozzle repairs are permanent repairs designed for an additional 40 years of service life after installation. In support of the relief request, conservative crack growth calculations were performed that demonstrated that any potential flaws in the Alloy 600 material

would not grow to an unacceptable size in the carbon steel hot leg piping material over the remaining life of the plant including the license renewal period. Therefore, no augmented inspections are required to be performed for these locations.

Twelve RCS cold leg instrumentation nozzle penetrations and eight S/G cold leg side instrumentation nozzle penetrations are included in the MPS2 fourth 10-year ISI interval program and will be inspected in accordance with Code Case N-722-1 examination requirements, (bare metal visual inspection once per interval).

During RFO 18 (spring 2008), ultrasonic examinations of the eight RCP nozzles were performed using manual ultrasonic techniques qualified in accordance with ASME Section XI, Appendix VIII, Supplement 10 for dissimilar metal (DM) welds, as modified by the performance demonstration initiative (PDI) program. Details of the configurations of these nozzles and the examination techniques utilized are contained in relief request RR-89-64 (reference 6.21). The results of the inspections and actual examination coverage were transmitted to the NRC in reference 6.22. No flaw indications were found in these eight DM welds during the examinations. These nozzles are subject to the inspection requirements of Code Case N-770-1 and are included in the fourth 10-year ISI interval program. A relief request similar to RR-89-64 will be required during the fourth 10-year ISI interval to address the coverage limitations of the one-side inspection. The requirement to prepare and submit this relief request to the NRC has been entered into the Corrective Action Program (CA227895) with schedule milestones that will support the implementation requirements of Code Case N-770-1.

The two-inch NPS hot leg drain line and the two-inch NPS cold leg letdown lines were both UT examined in RFO 19 (fall 2009) and no flaw indications were identified. Inspections of these two inch lines will be performed during RFO 22 (spring 2014) per the requirements of ASME Code Cases N-722-1 and N-770-1. The MPS2 ISI program requires performance of visual inspections of the two-inch hot leg drain line each refueling outage and volumetric inspections every five years until the weld is mitigated. Similarly, the program requires performance of visual inspections of the two-inch cold leg letdown line weld once during the interval and volumetric inspections every second inspection period, not to exceed seven years until mitigated.

DNC has actively participated in industry associations and groups at multiple levels to ensure knowledge of the best guidance from industry sponsored projects and research regarding Alloy 600 materials issues. Continued participation in this area is driven by compliance with the requirements of NEI 03-08, "Guideline for the Management of Materials Issues" which is

mandated by ER-AA-MAT-10, "Dominion Nuclear Fleet Reactor Coolant System Materials Degradation Management Program" (reference 6.10).

4.0 AGING MANAGEMENT PROGRAM COMPARISON: MPS PROGRAM AND NUREG-1801 (GALL REPORT)

The Plan as discussed in Section 3.0 is consistent with the nickel alloy nozzles and penetrations aging management program described in chapter XI of NUREG-1801, Rev. 0 (reference 6.1) with two enhancements:

1. The program scope has been enhanced according to industry guidelines to include all Alloy 600/82/182 components in the primary system.
2. The inspection requirements have been updated to the requirements of ASME Section XI Code Cases N-722-1, N-729-1, and N-770-1.

5.0 SUMMARY

MPS2 license renewal commitment # 14 (per FSAR Table 15.6-1) states:

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 aging in nickel-based components per 10 CFR 54.21(a)(3).

The completion of this commitment is being tracked by licensee follow-up action item (FAI) FAI-159. This FAI can be closed as complete when this aging management plan is transmitted to the NRC. The due date of Commitment # 14 is July 31, 2013.

The approval and issuance of this ETE completes the revision and update of the MPS2 Alloy 600 aging management program. The program has been removed from the ISI Program: Systems, Components, and Supports AMP and made a separate AMP that is consistent with the GALL Report, Initial Issue (Rev. 0) with two enhancements as demonstrated in Section 4.0.

The Plan, as demonstrated, ensures that the effects of aging associated with the in-scope components will be adequately managed so that there is reasonable assurance that their intended functions will be maintained consistent with the current licensing basis throughout the period of extended operation.

6.0 REFERENCES

6.1 NUREG-1801, Generic Aging Lessons Learned (GALL) Report, U. S. Nuclear Regulatory Commission, July, 2001.

6.2 NUREG-1838, Safety Evaluation Report Related to the License Renewal of the MPS2 and MPS3, Docket Nos. 50-336 and 50-423, U. S. Nuclear Regulatory Commission, October, 2005.

6.3 ASME Boiler and Pressure Vessel Code Case N-722-1, "Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated With Alloy 600/82/182," January 26, 2009.

6.4 ASME Boiler and Pressure Vessel Code Case N-729-1 "Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds," March 28, 2006.

6.5 EPRI Report 1009561, "Materials Reliability Program: Generic Guidance for Alloy 600 Management (MRP-126)," Electric Power Research Institute, Palo Alto, CA, November 2004.

6.6 ASME Boiler and Pressure Vessel Code Case N-770-1, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated With UNS N06082 or UNS W86182 Weld filler Metal With or Without Application of Listed Mitigation Activities," December 25, 2009.

6.7 WCAP-14572, Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report, Westinghouse Owners Group Topical Report, Revision 1-NP-A, February 1999.

6.8 CY-AP-PRI-100, Primary System Chemistry, Dominion Nuclear Fleet Administrative Procedure.

6.9 NRC Regulatory Information Summary 2008-25, "Regulatory Approach for Primary Water Stress Corrosion Cracking of Dissimilar Metal Butt Welds in Pressurized Water Reactor Primary Coolant System Piping," U.S. Nuclear Regulatory Commission, October 22, 2008.

6.10 ER-AA-MAT-10, Reactor Coolant System Materials Degradation Management Program, Dominion Nuclear Fleet Program Description.

6.11 ER-AA-MAT-11, Alloy 600 Management Program Plan, Dominion Nuclear Fleet Program Description.

6.12 MPS2, "Fourth 10 – Year Interval Inservice Inspection (ISI) Program 2010 – 2020, Revision 3."

6.13 Topical Report DOM-QA-1 Dominion Nuclear Facility Quality Assurance Program Description.

6.14 ETE-MP-2013-1046, Steam Generator Structural Integrity Program, License Renewal Aging Management Program (MP-LR-3714/MP-LR-4714), MPS Engineering Technical Evaluation.

6.15 Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," U.S. Nuclear Regulatory Commission, March 17, 1988.

6.16 NRC Order EA-03-009, "Issuance Of First Revised Order Establishing Interim Inspection Requirements For Reactor Pressure Vessel Heads At Pressurized Water Reactors," US Nuclear Regulatory Commission, 2004.

6.17 ETE-MP-2013-1043, Boric Acid Corrosion, License Renewal Aging Management Program (MP-LR-3705/MP-LR-4705, MPS Engineering Technical Evaluation.

6.18 ETE-MP-2013-1040, Inservice Inspection Program: Systems, Components & Supports, License Renewal Aging Management Program (MP-LR-3701/MP-LR-4701), MPS Engineering Technical Evaluation.

6.19 ETE-MP-2013-1041, Chemistry Control for Primary Systems, License Renewal Aging Management Program (MP-LR-3702/MP-LR-4702), MPS Engineering Technical Evaluation.

6.20 Letter S/N 04-675, Third Ten Year Inservice Inspection (ISI) Interval, Relief Request RR-89-54, Use of Alternative Acceptance Standards Requirements Without Flaw Removal In Alloy 600 Small Bore Nozzles, from Leslie N. Hartz, Dominion Nuclear Connecticut, February 10, 2005.

6.21 Letter S/N 07-0533, Alternative Request RR-89-64 For Use Of A Limited One-Sided Ultrasonic Examination Technique LBDCR 07-MPS2-034, from Gerald T. Bischof, Dominion Nuclear Connecticut, September 27, 2007.

6.22 Letter S/N 08-0047B, Summary of Reactor Coolant Pump Dissimilar Metal Weld Examinations, from Gerald T. Bischof, Dominion Nuclear Connecticut, June 13, 2008.

6.23 ER-AA-RRM-100, Revision 5, ASME Section XI Repair/Replacement Program Fleet Implementation Requirements, Dominion Nuclear Fleet Administrative Procedure.

6.24 ER-AA-ISI-100, Revision 5, Dominion Inservice Inspection Program, Dominion Nuclear Fleet Administrative Procedure.

6.25 EPRI Report 1010087, "Materials Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline (MRP-139)," Electric Power Research Institute, Palo Alto, CA, July 2005.

6.26 Letter S/N 04-140, Request RR-89-35, Rev. 1, Use of an Alternative to ASME Code Section XI for Installation of Mechanical Nozzle Seal Assemblies (MNASs) on Pressurizer Heater Penetration Nozzles, From Ms. Leslie N. Hartz, Dominion Nuclear Connecticut, June 3, 2004.

6.27 ETE-CEP-2012-1002, Identification and Evaluation of RCS Alloy 600 Locations – Pressure Boundary Locations & Reactor Internals, Dominion Engineering Technical Evaluation, February, 2012.

6.28 ETE-CEP-2012-1003, Identification and Evaluation of RCS Alloy 600 Locations – Steam Generator Locations, Dominion Engineering Technical Evaluation, February, 2012.

6.29 ER-AP-SGP-101, Revision 7, Steam Generator Program, Dominion Nuclear Fleet Administrative Procedure.

6.30 ER-AP-SGP-102, Revision 4, Steam Generator Degradation Assessment, Dominion Nuclear Fleet Administrative Procedure.

6.31 ER-AP-BAC-101, Revision 8, Boric Acid Corrosion Control Program (BACCP) Inspections, Dominion Nuclear Administrative Procedure.

6.32 ER-AP-BAC-102, Revision 9, Boric Acid Corrosion Control Program (BACCP) Evaluations, Dominion Nuclear Fleet Administrative Procedure.

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