UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 7, 2020

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

SUBJECT: MILLSTONE POWER STATION, UNIT NO. 2 – ISSUANCE OF AMENDMENT NO. 340 RE: REVISED TECHNICAL SPECIFICATION LIMITS FOR PRIMARY AND SECONDARY COOLANT ACTIVITY (EPID L-2019-LLA-0164)

Dear Mr. Stoddard:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 340 to Renewed Facility Operating License No. DPR-65 for the Millstone Power Station, Unit No. 2 (Millstone 2), in response to your application dated July 30, 2019.

The amendment revises the Millstone 2 Technical Specifications (TSs) by reducing the reactor coolant system and secondary side specific activity by 50 percent. The TS changes are based on evaluations that were conducted to assess the radiological consequences following postulated design-basis main steam line break and steam generator tube rupture accidents to address analysis deficiencies documented in the Millstone 2 corrective action program. A reduction in the TS reactor coolant system and secondary side specific activity is necessary to meet the control room dose regulatory limits and also provides inherent source term margin.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Richard V. Guzman, Senior Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosures:
1. Amendment No. 340 to DPR-65
2. Safety Evaluation

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DOMINION ENERGY NUCLEAR CONNECTICUT, INC.

DOCKET NO. 50-336

MILLSTONE POWER STATION, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 340
Renewed License No. DPR-65

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Dominion Energy Nuclear Connecticut, Inc. (the licensee) dated July 31, 2019, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-65 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 340 are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

James G. Danna

Digitally signed by James G. Danna
Date: 2020.08.07 14:50:12 -04'00'

James G. Danna, Chief
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility Operating License and Technical Specifications

Date of Issuance: August 7, 2020

ATTACHMENT TO LICENSE AMENDMENT NO. 340

MILLSTONE POWER STATION, UNIT NO. 2

RENEWED FACILITY OPERATING LICENSE NO. DPR-65

DOCKET NO. 50-336

Replace the following page of the Renewed Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove	Insert
3	3

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain a marginal line indicating the area of change.

Remove	Insert
3/4 4-13	3/4 4-13
3/4 4-14	3/4 4-14
3/4 7-7	3/4 7-7

Connecticut, in accordance with the procedures and limitations set forth in this renewed operating license;

(2) Pursuant to the Act and 10 CFR Part 70, to receive, possess and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

(3) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(4) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form for sample analysis or instrument and equipment calibration or associated with radioactive apparatus or components;

(5) Pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter 1: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Section 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady-state reactor core power levels not in excess of 2700 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 340 are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

SPECIFIC ACTIVITY

LIMITING CONDITION FOR OPERATION

3.4.8 The specific activity of the primary coolant shall be limited to:

a. ≤ 0.5 μCi/gram DOSE EQUIVALENT I-131, and

b. ≤ 550 μCi/gram DOSE EQUIVALENT XE-133.

APPLICABILITY: MODES 1, 2, 3, 4.

ACTION:

a. With the specific activity of the primary coolant > 0.5 μCi/gram DOSE EQUIVALENT I-131, verify DOSE EQUIVALENT I-131 ≤ 30 μCi/gram once per 4 hours.

b. With the specific activity of the primary coolant > 0.5 μCi/gram DOSE EQUIVALENT I-131 but ≤ 30 μCi/gram, operation may continue for up to 48 hours while efforts are made to restore DOSE EQUIVALENT I-131 to within the 0.5 μCi/gram limit. Specification 3.0.4 is not applicable.

c. With the specific activity of the primary coolant > 0.5 μCi/gram DOSE EQUIVALENT I-131 for more than 48 hours during one continuous time interval, or > 30 μCi/gram DOSE EQUIVALENT I-131, be in HOT STANDBY within 6 hours and in COLD SHUTDOWN within 36 hours.

d. With the specific activity of the primary coolant > 550 μCi/gram DOSE EQUIVALENT XE-133, operation may continue for up to 48 hours while efforts are made to restore DOSE EQUIVALENT XE-133 to within the 550 μCi/gram limit. Specification 3.0.4 is not applicable.

e. With the specific activity of the primary coolant > 550 μCi/gram DOSE EQUIVALENT XE-133 for more than 48 hours during one continuous time interval, be in HOT STANDBY within 6 hours and in COLD SHUTDOWN within 36 hours.

SURVEILLANCE REQUIREMENTS

4.4.8.1 Verify the specific activity of the primary coolant ≤ 550 μCi/gram DOSE EQUIVALENT XE-133 at the frequency specified in the Surveillance Frequency Control Program.*

4.4.8.2 Verify the specific activity of the primary coolant ≤ 0.5 μCi/gram DOSE EQUIVALENT I-131 at the frequency specified in the Surveillance Frequency Control Program,* and between 2 and 6 hours after a THERMAL POWER change of ≥ 15% RATED THERMAL POWER within a one hour period.

* Surveillance only required to be performed for MODE 1 operation, consistent with the provisions of Specification 4.0.1.

ACTIVITY

LIMITING CONDITION FOR OPERATION

3.7.1.4 The specific activity of the secondary coolant system shall be ≤ 0.05 μCi/gram DOSE EQUIVALENT I-131.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the specific activity of the secondary coolant system > 0.05 μCi/gram DOSE EQUIVALENT I-131, be in COLD SHUTDOWN within 36 hours after detection.

SURVEILLANCE REQUIREMENTS

4.7.1.4 The specific activity of the secondary coolant system shall be determined to be within the limit by performance of the sampling and analysis of Table 4.7-2.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 340

TO RENEWED FACILITY OPERATING LICENSE NO. DPR-65

DOMINION ENERGY NUCLEAR CONNECTICUT, INC.

MILLSTONE POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

1.0 INTRODUCTION

By letter dated July 30, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19218A177), Dominion Energy Nuclear Connecticut, Inc. (the licensee) submitted a license amendment request (LAR or application) for the Millstone Power Station, Unit No. 2 (MPS2). The LAR proposed to revise the MPS2 Technical Specifications (TS) by reducing the TS reactor coolant system (RCS) and secondary side specific activity by 50 percent. The proposed TS 3.4.8 limits for RCS concentration are 0.5 microcuries per gram (µCi/gm) dose equivalent (DE) Iodine-131 (I-131) and 550 µCi/gm DE Xenon-133 (Xe-133), and the proposed maximum iodine concentration allowed by the TS as the result of an iodine spike is 30 µCi/gm DE I-131. In addition, the secondary side radionuclide concentrations are reduced based on the proposed TS 3.7.1.4 limit of 0.05 µCi/gm DE I-131.

Because of analysis deficiencies that were documented in its corrective action program, the licensee conducted evaluations assessing the radiological consequences for the main steam line break (MSLB) and steam generator tube rupture (SGTR) design-basis accidents (DBAs). As a result of these evaluations, the licensee determined that the TS coolant specific activity limits would require the proposed revisions noted above.

2.0 REGULATORY EVALUATION

2.1 Description of the Proposed Design and Licensing Basis Changes

The current design-basis radiological analyses in the MPS2 Final Safety Analysis Report (FSAR) consist of assessments of the following events: (1) MSLB, (2) control rod ejection accident, (3) SGTR, (4) loss-of-coolant accident, (5) fuel handling accident, (6) spent fuel cask drop accident, and (7) waste gas system failure.

The LAR involves the reanalysis of the design-basis radiological analyses for the MSLB and SGTR events. The existing analyses for these radiological events were performed as part of the MPS2 alternative source term (AST) LAR dated June 13, 2006 (ADAMS Accession No. ML061940105), and approved in License Amendment No. 298 dated May 31, 2007 (ADAMS Accession No. ML071450053).

Specifically, a non-conservatism was identified for the MPS2 FSAR Section 14.6.3 SGTR radiological consequence analysis and for the MPS2 FSAR Section 14.1.5 MSLB. The SGTR and MSLB analyses deficiencies are documented in the corrective action program.

The licensee submitted the application because the changes to the MSLB and SGTR analyses result in more than a minimal increase in dose consequences. A reduction in the TS RCS and secondary side specific activity is required to meet the control room dose analysis of record.

2.2. Licensee's Proposed Changes

In order to provide inherent source term margin, the licensee proposes that TS RCS and secondary side specific activity be reduced to 50 percent of the current licensing basis (CLB). The proposed change impacts the primary and secondary liquid source terms. Table 2.2-1 of the LAR provides the CLB values and the proposed values for TS specific activity. As stated by the licensee:

> RCS radionuclide concentrations are based on the proposed TS 3.4.8 limits of 0.5 µCi/gm DE I-131 and 550 µCi/gm DE Xe-133. The maximum iodine concentration allowed by the proposed Technical Specification as the result of an iodine spike is 30 µCi/gm DE I-131. This value is treated as the pre-accident iodine spike. The concurrent iodine spike appearance rates are based on either 500 times (MSLB) or 335 times (SGTR) the appearance rates required to maintain the coolant activity at the proposed 0.5 µCi/gm DE I-131 concentration. Secondary side concentrations are based on the proposed TS 3.7.1.4 limit of 0.05 µCi/gm DE I-131. The proposed limits are reflected throughout the Limiting Condition for Operation and Actions for TS 3.4.8 and TS 3.7.1.4, as well as the Surveillance Requirements for TS 3.4.8.

2.3 Regulatory Review

The proposed license amendment involves a change to the content of the TSs. The U.S. Nuclear Regulatory Commission (NRC or the Commission) staff reviewed the proposed TS changes for compliance with applicable regulations and conformance with associated regulatory guidance. This safety evaluation (SE) addresses the impact of the proposed changes on previously analyzed DBA radiological consequences and the acceptability of the revised analysis results. The NRC staff's evaluation is based on the following regulations, regulatory guides, and standards:

The staff evaluated the radiological consequences of the revised DBAs as proposed by the licensee against the dose criteria specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.67(b)(2). These criteria are:

(1) 25 roentgen equivalent man (rem) total effective dose equivalent (TEDE) at the exclusion area boundary (EAB) for any 2-hour period following the onset of the postulated fission product release,

(2) 25 rem TEDE at the outer boundary of the low population zone (LPZ) for the duration of the postulated fission product release, and

(3) 5 rem TEDE in the control room (CR) for the duration of the postulated fission product release.

The regulation at 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 19, "Control room," states, in part:

> … holders of operating licenses using an alternative source term under § 50.67, shall meet the requirements of this criterion, except that with regard to control room access and occupancy, adequate radiation protection shall be provided to ensure that radiation exposures shall not exceed 0.05 Sv (5 rem) total effective dose equivalent (TEDE) as defined in § 50.2 for the duration of the accident.

Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dated July 2000 (ADAMS Accession No. ML003716792), provides guidance to licensees on performing evaluations and reanalyses in support of the implementation of an AST.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP), Section 15.0.1, "Radiological Consequence Analyses Using Alternative Source Terms," dated July 2000, provides guidance for an application for the initial implementation of an AST at operating power reactors and subsequent LARs from these plants.

The NRC's regulatory requirements related to the content of the TSs are contained in 10 CFR 50.36. Specifically, 10 CFR 50.36(b) states, in part, "The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to § 50.34." The regulations in 10 CFR 50.36 require that the TSs include items in the following categories: (1) safety limits, limiting safety systems settings, and limiting control settings; (2) limiting conditions for operation (LCOs); (3) SRs; (4) design features; and (5) administrative controls. SRs are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met.

Section 182a of the Atomic Energy Act, as amended, requires applicants for nuclear power plant operating licenses to include TSs as part of the license application. The TSs, among other things, help to ensure the operational capability of structures, systems, and components that are required to protect the health and safety of the public. The regulation at 10 CFR 50.36(c)(2)(i) states, in part:

> Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.

3.0 TECHNICAL EVALUATION

3.1 Radiological Consequences of Affected DBAs

To reflect the changes described in the LAR, the licensee revised the dose consequence analyses for the following accidents, employing the AST as described in RG 1.183:

1. MSLB accident
2. SGTR accident

The licensee performed dose calculations to estimate the TEDE at the EAB for the worst 2-hour period following the onset of the accident. The integrated doses at the outer boundary of the LPZ and the integrated dose to an MPS2 CR operator were evaluated for the duration of the accident. The results of the evaluations performed by the licensee, as well as the applicable dose acceptance criteria from RG 1.183, are shown in Table 1 of this SE.

3.1.1 MSLB Accident

The licensee reevaluated the radiological consequences of an MSLB accident to address deficiencies that were documented in its corrective action program. The MSLB accident that is considered is the complete severance of a main steam line. The licensee evaluated (1) an MSLB occurring inside the containment and (2) an MSLB occurring outside the containment. The steam generator (SG) that experiences a secondary side depressurization from the MSLB is referred to as being in a faulted condition. The MSLB accident is analyzed assuming a coincident loss-of-offsite power (LOOP). With a LOOP, the condenser is not available for cooldown. Therefore, the primary system is cooled by releasing steam to the environment through the unaffected or intact SG. Based on these evaluations, the licensee determined that a reduction in the TS RCS and secondary side specific activity would be required to meet the CR dose regulatory acceptance criteria.

3.1.1.1 MSLB Outside Containment

The licensee's evaluation indicates that no fuel damage is predicted for an MSLB occurring outside containment. Therefore, consistent with RG 1.183, the licensee performed the MSLB accident outside containment analysis, assuming the accident occurs with both the primary and secondary coolant concentrations at the proposed TS limits for operation. The licensee's MSLB outside containment evaluation includes the effects of primary system iodine spiking for both the pre-accident iodine spike case and the concurrent iodine spike case.

The licensee evaluated the pre-accident iodine spike case using the proposed short-term TS value of 30 µCi/gm DE I-131. The concurrent iodine spike is estimated using a spiking model that assumes that the iodine release rate from the fuel rods to the primary coolant increases to a value 500 times greater than the release rate corresponding to the iodine concentration at the TS limit for normal operation. The licensee based the RCS concentrations on the proposed TS 3.4.8 long-term limits of 0.5 µCi/gm DE I-131 and 550 µCi/gm DE Xe-133, and the secondary side concentrations on the proposed TS 3.7.1.4 limit of 0.05 µCi/gm DE I-131. The duration of the concurrent iodine spike is assumed to be 8 hours maintaining consistency with the CLB.

The MSLB outside containment assumes a break in one of the main steam lines downstream of the main steam isolation valve (MSIV). The licensee assigned the single active failure for this scenario as a failure of the MSIV to isolate the faulted SG. The faulted SG is assumed to release steam directly to the environment as a result of over-pressurization of the turbine building blowout panels. The licensee assumed that the faulted SG steams dry in 750 seconds, releasing all the nuclides in the secondary coolant that were initially contained in the SG. To ensure that the initial iodine inventory is removed from the faulted SG, the licensee modeled the calculated steam flow rate at 600 seconds (10 minutes) to continue until 18,000 seconds (5 hours). In addition, the licensee assumed an accident induced primary to secondary leakage of 150 gallons per day (gpd) (0.87 pound per mass/minute (lbm/min)) occurs and that all this leakage flashes to steam and is released to the environment without mitigation. The release from the faulted SG is assumed to continue for 36 hours. The 36-hour steaming period is based

on the time necessary to cool down the RCS to 212 degrees Fahrenheit (°F), after which the release from this pathway terminates.

The licensee evaluated the MSLB outside containment assuming a concurrent LOOP. Due to the assumption of a LOOP, the condenser is unavailable and cooldown of the primary system is accomplished through the release of steam from the intact SG atmospheric dump valves (ADVs) or the main steam safety valves (MSSVs). The licensee assumed that an accident-induced primary to secondary leakage of 150 gpd (0.87 lbm/min) continues from the intact SG for approximately 17 hours through the ADVs/MSSVs until the shutdown cooling system can remove 100 percent of the decay heat without relying on steaming to augment cooldown.

The licensee refined the modeling used to evaluate the releases from the intact SG by modifying the release points, values for moisture carryover (MCO), and the iodine partition coefficient (PC) for the first 20 seconds prior to MSIV closure. These refinements were made to account for an evaluation of the intact SG release, indicating that initial flow rates prior to MSIV closure would be sufficiently high to entrain a larger amount of activity than was accounted for in the CLB evaluation. Therefore, for the first 20 seconds of the evaluation, the licensee assumed a conservative PC of 1 and a conservative MCO of 100 percent. After the MSIV closure at 20 seconds post-MSLB, the value for PC increases to 100, and the value for MCO is reduced to 1 percent. In addition, for the first 20 seconds of the MSLB outside containment, the release point is assumed to be the turbine building blowout panels. In contrast, for the first 20 seconds of the MSLB inside containment, the licensee modeled the release as a ground level release from the enclosure building. After MSIV closure, releases from the intact SG are modeled as ADV releases for both MSLB cases. These refinements are conservative, and therefore, acceptable to the NRC staff.

3.1.1.2 MSLB Inside Containment

Consistent with the CLB for the MSLB inside containment, the licensee assumed a 3.7 percent fuel clad failure as a result of the prediction of a departure from nucleate boiling. This source term is used in conjunction with a 1.79 fuel peaking factor. The licensee increased the CLB peaking factor of 1.69 by 6 percent to account for uncertainty. An increased peaking factor results in a more conservative dose consequence analysis, and is, therefore, acceptable to the NRC staff.

The licensee assumed during the first 750 seconds of the accident that the faulted SG will steam dry, releasing all the nuclides in the secondary coolant that were initially contained in the SG. The licensee assumed during the first 36 hours that primary coolant leaks into the faulted SG at the rate of 150 gpd, directly releasing RCS activity into the containment. After 36 hours, the RCS will have cooled to below 212 °F, and the primary to secondary release to the containment terminates. In the revised analysis, the licensee did not credit the enclosure building filtration, and therefore, all containment leakage is assumed to be released directly to the environment at the TS limit of 0.5 percent containment air weight per 24 hours. After 24 hours, consistent with RG 1.183 assumptions, the licensee reduced the containment leakage by 50 percent. The licensee did not credit any activity mitigation from the containment spray system.

The licensee modeled releases from the intact SG for the MSLB inside containment almost the same way as in the MSLB outside containment. The only exceptions are the fuel damage of 3.7 percent assumed for the MSLB inside containment, and the release point prior to MSIV

leakage for the first 20 seconds is modeled as a ground level release from the enclosure building.

3.1.1.3 MSLB Analysis Results

The licensee evaluated the radiological consequences resulting from the postulated MSLB accident occurring inside and outside of the containment, and concluded that the radiological consequences at the EAB, LPZ, and CR are within the dose requirements provided in 10 CFR 50.67 and accident dose acceptance criteria specified in SRP 15.0.1. The NRC staff finds that the licensee used analysis assumptions and inputs consistent with applicable regulatory guidance identified in Section 2.3 of this SE. The CR assumptions are provided in Table 4 of this SE, and the MSLB assumptions are presented in Table 5. The licensee's calculated dose results are given in Table 1. The NRC staff concludes that the results of the revised MSLB dose consequence analysis meet the applicable accident dose acceptance criteria, and therefore, the revised analysis is acceptable.

3.1.2 SGTR Accident

In an SGTR accident, it is assumed that there is a complete severance of a single SG tube. The postulated SG tube break allows primary coolant liquid to leak to the secondary side of the ruptured SG with an assumed release to the environment through the SG ADVs or MSSVs. For this accident scenario, the licensee assumed a LOOP occurs concurrently with the tube rupture. Since the licensee assumed a LOOP, the main condenser is unavailable, and cooldown is accomplished by releasing steam to the environment. The ADV/MSSV on the ruptured SG is assumed to open to control SG pressure at the beginning of the event. The ruptured SG is assumed to discharge steam directly to the environment for 1 hour until the SG is isolated.

Appendix F of RG 1.183 identifies acceptable radiological analysis assumptions for an SGTR accident. Based on the licensee's evaluation that the SGTR accident will not result in fuel damage, the activity released is postulated to be the maximum coolant activity allowed by the TS. Two radioiodine spiking cases are considered. The first case is referred to as a pre-accident iodine spike and assumes that a reactor transient has occurred prior to the postulated SGTR that has raised the primary coolant iodine concentration to the maximum value permitted by the TS for a spiking condition. The licensee assumed the maximum iodine spike concentration allowed by the proposed TS of 30 μCi/gm DE I-131.

The second case assumes that the primary system transient associated with the SGTR causes an iodine spike in the primary system. This case is referred to as a concurrent iodine spike. The increase in primary coolant iodine concentration for the concurrent iodine spike case is estimated using a spiking model that assumes that the iodine release rate from the fuel rods to the primary coolant increases to a value 335 times greater than the release rate corresponding to the iodine concentration at the TS limit for normal operation. The licensee assumed the maximum iodine concentration allowed by the proposed TS for long-term operation, which is 0.5 μCi/gm DE I-131.

The licensee's evaluation indicates that no fuel damage is predicted as a result of an SGTR accident. Therefore, consistent with the CLB analysis and regulatory guidance, the licensee performed the SGTR accident analyses for the pre-accident iodine spike case and the concurrent accident iodine spike case.

3.1.2.1 Releases from the Ruptured SG

The licensee assumed that the radionuclides in the primary system coolant, including the contribution from iodine spiking, are transported to the ruptured SG by the break flow. A portion of the break flow is assumed to flash to steam because of the higher enthalpy in the RCS. The noble gas and iodine in the flashed portion of the break flow will ascend to the steam space of the ruptured SG and be available for release, with no credit taken for scrubbing by the SG liquid. The radionuclides entering the steam space as the result of flashing pass directly to the environment through the SG ADVs/MSSVs. The iodine and other non-noble gas isotopes in the non-flashed portion of the break flow are assumed to mix uniformly with the SG liquid mass and then are released to the environment in direct proportion to the steaming rate and in inverse proportion to the applicable PC.

Consistent with the guidance from RG 1.183, the licensee's evaluation of the releases from the steaming of the liquid in the SG credits a PC of 100 for iodines and particulates. To correct a self-identified non-conservatism in the CLB dose consequence analysis, the licensee reduced the partitioning coefficient from 250 to 100 for the primary to secondary leak that does not flash to steam in the ruptured SG. Following the applicable regulatory guidance, the licensee assumed that all noble gas radionuclides released from the primary system are released to the environment without reduction or mitigation.

3.1.2.2 Releases from the Intact SG

The licensee evaluated the dose consequences from discharges of steam from the intact SG for a period of 17 hours, until the primary system has cooled sufficiently to allow placing the shutdown cooling system in service. After a period of 17 hours, shutdown cooling is capable of removing 100 percent of the decay heat. At this point in the accident sequence, steaming is no longer required for cooldown, and release from the intact SG is terminated.

The licensee assumed that the source term resulting from the radionuclides in the primary system coolant, including the contribution from iodine spiking, is transported to the intact SG by the accident-induced leak rate of 150 gpd, which is equivalent to 0.87 lbm/min. All radionuclides in the primary coolant leaking into the intact SG are assumed to enter the SG liquid. Radionuclides initially in the SG liquid, and those entering the SG liquid from the leakage flow, are released as a result of secondary liquid boiling/steaming, with a PC of 100 for iodines and particulates. The licensee assumed that all noble gases that are released from the primary system to the intact SG are released to the environment without reduction or mitigation. Releases were assumed to continue from the intact SG for a period of 17 hours until the shutdown cooling can remove 100 percent of decay heat with no requirement for steaming to augment cooldown.

3.1.2.3 SGTR Analysis Results

The licensee evaluated the radiological consequences resulting from both cases for the postulated SGTR accident and concluded that the radiological consequences at the EAB, LPZ, and CR are within the dose requirements provided in 10 CFR 50.67 and accident dose criteria specified in SRP 15.0.1. As discussed above, the NRC staff finds that the licensee used analysis assumptions and inputs consistent with applicable regulatory guidance identified in Section 2.3 of this SE. The CR assumptions are provided in Table 4, and the SGTR assumptions are presented in Table 6 of this SE. The licensee's calculated dose results are given in Table 1. The NRC staff concludes that the results of the revised SGTR dose

consequence analysis meet the applicable accident dose acceptance criteria, and therefore, the revised analysis is acceptable.

3.2 Atmospheric Dispersion Factors

The licensee made no changes to the previously approved control room and offsite atmospheric dispersion factors (X/Qs) as documented in the SE for MPS2 AST License Amendment No. 298. These atmospheric dispersion factors are shown in Tables 2 and 3 of this SE.

3.3 TS Changes – Reduction of RCS Specific Activity

As described in Attachment 4 of the LAR, the licensee proposed to reduce the TS limits for both primary and secondary coolant I-131 DE by 50 percent. In addition, the licensee proposed to reduce the short-term RCS I-131 DE spiking limit by 50 percent. The licensee based its revised dose consequence analyses on these reduced values. The NRC staff finds that the reduced values in accordance with the revised TSs will ensure that the dose consequences from the impacted DBAs are within the regulatory requirements and consistent with the applicable regulatory guidance. Therefore, the staff concludes that the TS changes are acceptable.

3.4 Technical Conclusion

As described above, the staff reviewed the assumptions, inputs, and methods used by the licensee to assess the radiological consequences of the MSLB and SGTR accidents at MPS2. The staff finds that the licensee used analysis methods and assumptions consistent with the regulatory requirements and guidance identified in Section 2.3 of this SE. The staff compared the doses estimated by the licensee to the applicable criteria identified in Section 2.3.

The staff finds there is reasonable assurance that the licensee's estimates of the EAB, LPZ, and CR doses will comply with these criteria. In addition, the staff finds that the DBA radiological consequences analysis for MPS2, as modified by this license amendment, will continue to provide sufficient safety margins with adequate defense in depth to address unanticipated events and to compensate for uncertainties in accident progression and analysis assumptions and parameters. Therefore, the NRC staff concludes the proposed license amendment is acceptable with respect to the radiological consequences of DBAs.

Table 1
Radiological Consequences Expressed as TEDE (1) (rem)

Design-Basis Accidents	EAB (2)	LPZ (3)	CR
MSLB outside containment(4)	0.1	0.1	3.0
Dose acceptance criteria	2.5	2.5	5
MSLB outside containment(5)	0.1	0.1	2.2
MSLB inside containment (6)	0.2	0.1	1.7
Dose acceptance criteria	25	25	5
SGTR(4)	0.8	0.2	3.1
Dose acceptance criteria	2.5	2.5	5

Design-Basis Accidents	EAB (2)	LPZ (3)	CR
SGTR(5)	1.0	0.2	3.4
Dose acceptance criteria	25	25	5

(1) Total effective dose equivalent
(2) Exclusion area boundary
(3) Low population zone
(4) Concurrent iodine spike
(5) Pre-accident iodine spike
(6) The MSLB inside containment is predicted to result 3.7% fuel cladding damage

Table 2
MPS2 Control Room Atmospheric Dispersion Factors (sec/m^3)

Source Location/Duration		χ/Q (sec/m^3)
Atmospheric dump valves		
	0 - 2 hours	7.40×10^{-3}
	2 - 8 hours	5.71×10^{-3}
	8 - 24 hours	2.13×10^{-3}
	24 - 96 hours	1.74×10^{-3}
	96 - 720 hours	1.43×10^{-3}
Turbine building blowout panels		
	0 - 2 hours	1.22×10^{-2}
	2 - 8 hours	8.67×10^{-3}
	8 - 24 hours	3.77×10^{-3}
	24 - 96 hours	2.92×10^{-3}
	96 - 720 hours	2.23×10^{-3}
Enclosure building – ground level		
	0 - 2 hours	3.00×10^{-3}
	2 - 8 hours	1.87×10^{-3}
	8 - 24 hours	6.64×10^{-4}
	24 - 96 hours	5.83×10^{-4}
	96 - 720 hours	4.97×10^{-4}

Table 3
MPS2 Offsite Atmospheric Dispersion Factors (sec/m^3)

Source Location/Duration		χ/Q (sec/m^3)
Exclusion area boundary (0 - 720 hours)		
	Enclosure building – ground level	3.66×10^{-4}
Low population zone		
	Enclosure building – ground level	
	0 - 4 hours	4.80×10^{-5}
	4 - 8 hours	2.31×10^{-5}
	8 - 24 hours	1.60×10^{-5}

Source Location/Duration		χ/Q (sec/m^3)
	24 - 96 hours	7.25 x 10^{-6}
	96 - 720 hours	2.32 x 10^{-6}

Table 4
MPS2 Control Room Data and Assumptions

CR effective volume		35,650 ft^3
Normal CR intake flow rate prior to isolation		800 cfm
Unfiltered inleakage		250 cfm
CREVS recirculation flow rate		2,250 cfm
Response time to isolate on CR radiation or safety injection signal Time delay for damper operation		20 seconds
Time for manual operator action to align CREVS to recirculation mode		60 minutes
Filter efficiencies for CREVS		
	Elemental	90%
	Organic	70%
	Particulate	90%
CR wall and ceiling concrete thickness		≥2 feet
CR occupancy factors		
	0 - 24 hours	1.0
	24 - 96 hours	0.6
	96 - 720 hours	0.4
Breathing rate for CR dose analysis		3.5 x10^{-4} m^3/sec
Breathing rate for EAB dose analysis		
	0 - 720 hours	3.5 x 10^{-4} m^3/sec
Breathing rate for LPZ dose analysis		
	0 - 8 hours	3.5 x 10^{-4} m^3/sec
	8 - 24 hours	1.8 x 10^{-4} m^3/sec
	24 - 720 hours	2.3 x 10^{-4} m^3/sec

Table 5 (Part 1 of 2)
MPS2 Data and Assumptions for the MSLB Accident

Rated thermal power		2,754 MWt (2,700 MWt plus 2% uncertainty)
Loss-of-offsite power		Assumed to occur at accident initiation
RCS mass		423,000 lbm
Accident-induced primary to secondary leak rate		150 gpd
		0.87 lbm/min
SG liquid volume/mass		
	Faulted SG	248,891 lbm
	Intact SG	91,092 lbm
Accident-induced primary to secondary leak rate		150 gpd
		0.87 lbm/min
Radial peaking factor used to compute release from 3.7% fuel clad damage for MSLB inside containment		1.79 core operating limit report value of 1.69 plus 6% uncertainty

RCS TS activity limits for normal operation		
	Noble Gas	550 µCi/gm DE Xe-133
	Iodine	0.5 µCi/gm DE I-131
Secondary iodine TS limit		0.05 µCi/gm DE I-131
RCS TS limit for pre-accident spike		30 µCi/gm DE I-131
Concurrent spike appearance rate multiplier		500
Concurrent spike duration		8 hours
Release point for all MSLB offsite dose analyses		Enclosure building ground level
MSLB release points for CR dose analysis		
MSLB outside containment		
	Faulted SG	Turbine building blowout panels
	Intact SG first 20 seconds	Turbine building blowout panels
	Intact SG after 20 seconds	Atmospheric dump valves
MSLB inside containment		
	Faulted SG	Enclosure building ground level
	Intact SG first 20 seconds	Enclosure building ground level
	Intact SG after 20 seconds	Atmospheric dump valves
Iodine PC for intact SG		
	Prior to MSIV closure	1 for T < 20 seconds
	After MSIV closure	100 for T ≥ 20 seconds
Moisture carryover in intact SG		
	Prior to MSIV closure	100% for T < 20 seconds
	After MSIV closure	1% for T ≥ 20 seconds
SG liquid mass		80,000 lbm
Release duration		
	Faulted SG	36 hours for RCS to cool < 212 °F
	Intact SG	Approximately 17 hours after which decay heat is removed by the shutdown cooling system

Table 5 (Part 2 of 2)
MPS2 Data and Assumptions for the MSLB Accident

Faulted SG mass steam flow rates		LAR Table 3.1-5
Intact SG mass steam flow rates		LAR Tables 3.1-6 and 3.1-7
Enclosure building filtration system		Not credited
Containment volume		1,899,000 ft^3
Containment leak rate (L_a)		
	0 - 24 hours	0.5% per day
	24 - 720 hours	0.25% per day
Chemical form of iodine released		
	Elemental	97%
	Organic	3%
Control room ventilation timing		
MSLB outside containment		
	T = 0	Start of MSLB
	T = 4 hours	CR isolation on operator action
	T = 5 hours	CR on filtered recirculation

	MSLB inside containment	
	T = 0	Start of MSLB
	T = 140 seconds	CR isolation on safety injection signal on high containment pressure
	T = I hour + 140 seconds	CR on filtered recirculation (1-hour operator
		Action following safety injection signal)

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Connecticut State official was notified of the proposed issuance of the amendment on June 23, 2020. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 or changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding, which was published in the *Federal Register* on October 8, 2019 (84 FR 53769), that the amendment involves no significant hazards consideration, and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: J. Parillo

Date: August 7, 2020

SUBJECT: MILLSTONE POWER STATION, UNIT NO. 2 – ISSUANCE OF AMENDMENT NO. 340 RE: REVISED TECHNICAL SPECIFICATION LIMITS FOR PRIMARY AND SECONDARY COOLANT ACTIVITY (EPID L-2019-LLA-0164) DATED AUGUST 7, 2020

DISTRIBUTION:
PUBLIC
PM File Copy
RidsACRS_MailCTR Resource
RidsNrrDorlLpl1 Resource
RidsNrrDraArcb Resource
RidsNrrDssStsb Resource
RidsNrrPMMillstone Resource
RidsNrrLALRonewicz Resource
RidsRgn1MailCenter Resource
JParillo, NRR
SSun, NRR
SSmith, NRR

ADAMS Accession No.: ML20191A004

OFFICE	NRR/DORL/LPL1/PM	NRR/DORL/LPL1/LA	NRR/DRA/ARCB/BC
NAME	RGuzman	LRonewicz	KHsueh
DATE	07/15/2020	07/14/2020	03/30/2020
OFFICE	NRR/DSS/STSB/BC	OGC – NLO	NRR/DORL/LPL1/BC
NAME	VCusumano	AGhosh-Naber	JDanna
DATE	07/10/2020	07/28/2020	08/07/2020
OFFICE	NRR/DORL/LPL1/PM		
NAME	RGuzman		
DATE	08/07/2020		

OFFICIAL RECORD COPY