



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

February 19, 2014

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Nuclear Connecticut, Inc.
Innsbrook Technical Center
500 Dominion Boulevard
Glen Allen, VA 23060-6700

SUBJECT: MILLSTONE POWER STATION, UNIT 2 - AUDIT REPORT REGARDING FLOODING WALKDOWNS TO SUPPORT IMPLEMENTATION OF NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT (TAC NO. MF0246)

Dear Mr. Heacock:

On March 12, 2012, the U.S. Nuclear Regulatory Commission staff (NRC or the staff) issued a request for information letter per Title 10 of the *Code of Federal Regulations*, Section 50.54(f) (50.54(f) letter). The 50.54(f) letter was issued to power reactor licensees and holders of construction permits requesting addressees to provide further information to support the NRC staff's evaluation of regulatory actions to be taken in response to lessons learned from Japan's March 11, 2011, Great Tōhoku Earthquake and subsequent tsunami. The request addressed the methods and procedures for plants to conduct seismic and flooding hazard walkdowns to identify and address degraded, nonconforming, or unanalyzed conditions through the corrective action program, and to verify the adequacy of the monitoring and maintenance procedures.

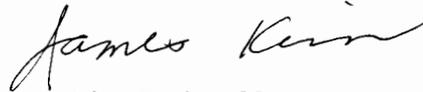
By letter dated November 27, 2012, Dominion Nuclear Connecticut, Inc. (Dominion) submitted a Flooding Walkdown Report as requested per Enclosure 4 of the 50.54(f) letter for Millstone Power Station, Unit 2. On July 17, 2013, an NRC audit team completed the on-site audit to gain a better understanding of the methods and procedures used by Dominion to conduct the flooding walkdowns. The information gained during the audit will facilitate the NRC staff review of the walkdown report and allow for more concise requests for information. The NRC staff appreciates your support of the audit. The final audit report has been included as an enclosure to this letter.

D. Heacock

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If you have any questions, please contact Mr. James Kim at 301-415-4125 or by e-mail at James.Kim@nrc.gov.

Sincerely,

A handwritten signature in cursive script that reads "James Kim".

James Kim, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure:
Audit Report

cc w/encl: Distribution via Listserv

REPORT OF REGULATORY AUDIT ON JULY 15 TO JULY 17, 2013

FLOODING WALKDOWNS

DOMINION NUCLEAR CONNECTICUT, INC.

MILLSTONE POWER STATION, UNIT 2

DOCKET NO. 50-336

1. Introduction

This document provides a summary of the United States Nuclear Regulatory Commission (NRC) audit of the flooding walkdowns performed at Millstone Power Station, Unit 2. The walkdowns were performed in response to NRC's request for information contained in its March 12, 2012 50.54(f) letter, Enclosure 4.

1.1 Background

By letter dated March 12, 2012, the United States Nuclear Regulatory Commission issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.54(f)¹ (referred to as the 50.54(f) letter). The request was issued as a part of implementing lessons-learned from the accident at the Fukushima Dai-ichi, Japan, nuclear power plant. Enclosure 4 of the 50.54(f) letter requested that licensees plan and perform flooding walkdowns to identify degraded, nonconforming, or unanalyzed conditions related to the licensing bases of structures, systems, and components (SSCs) important to safety and to verify the adequacy of monitoring and maintenance procedures.

By letter dated November 27, 2012, Dominion Nuclear Connecticut, Inc. (Dominion) submitted a report² documenting the flooding walkdowns as requested per Enclosure 4 of the 50.54(f) letter for Millstone Power Station, Unit 2.

1.2 Regulatory Audit Basis

The NRC staff conducted a regulatory audit to gain a better understanding of the methods and associated procedures used by Dominion to conduct the flooding walkdowns at Millstone Power Station, Unit 2 and facilitate NRC staff assessment of the report documenting the site walkdowns.

The Nuclear Energy Institute (NEI) developed guidance for performing the flooding walkdowns with extensive review and input from NRC staff in numerous public meetings, webinars, and public conference calls. The NEI submitted NEI 12-07, "Guidelines for Performing Verification

¹ The 50.54(f) letter is available in the Agencywide Documents Access and Management System (ADAMS) under Accession No. ML12053A340.

² The licensee's walkdown report is available in ADAMS under Accession No. ML12334A445.

Walkdowns of Plant Flood Protection Features"³ for endorsement. NRC staff subsequently endorsed the walkdown guidance by letter dated May 31, 2012.⁴ By letter dated June 11, 2012, Dominion indicated that they would follow the NRC endorsed guidance for the flooding walkdowns at Millstone Power Station, Unit 2.⁵

1.3 Audit Logistics

An audit plan was issued to Dominion on May 21, 2013.⁶ The audit plan included a proposed audit schedule and a list of information that NRC requested that the licensee make available for review during the audit. The audit plan also requested the personnel (licensee staff and contractors) who performed the walkdowns be available for interviews.

The NRC staff performed an audit of Millstone Power Station, Unit 2 on July 15-17, 2013. The audit was performed in accordance with the Office of Nuclear Reactor Regulation Office Instruction LIC-111, "Regulatory Audits."⁷ The NRC staff and contractor participating in the audit are listed in Table 1. An entrance meeting was held on July 15, 2013 to convey to the licensee background information and the audit purpose. An exit meeting was held on July 17, 2013 to convey to the licensee observations from the audit, including: (1) observations related to whether the walkdowns were performed in accordance with NEI 12-07 and (2) observations forwarded to the resident inspectors for additional action, if appropriate.

Table 1: NRC audit team

Auditor	Affiliation	Audit Role
Stephen Campbell	NRC/NRR/DIRS/IRIB	Audit lead
Michelle Bensi	NRC/NRO/DSEA/RHMB	Technical lead
James Krafty	NRC/R-I/DRP/PB5/MRO2&3	Resident Inspector
George Wilson	NRC/NRR/JLD	Management Support
Ken Erwin	NRC/NRO/DSEA/RHMB/RMOT	Regulatory Support
Pete Chaput	NRC/NRO/DSEA/RHMB	Flooding Technical Support
Lance Vail	Pacific Northwest National Laboratory	Flooding Technical Support

2. Audit Scope

The audit provides support for the ongoing NRC staff assessment of the licensee submitted walkdown report. To support the staff assessment, the audit scope included review of information and documents available onsite, and interview of licensee staff and contractors to aid NRC staff understanding of:

1. How the licensee performed the flooding hazard walkdowns, and
2. Whether the walkdowns were performed in accordance with NEI 12-07.

³ NEI 12-07 is available in ADAMS under Accession No. ML12144A401.

⁴ The NRC endorsement of NEI 12-07 is available in ADAMS under Accession No. ML12144A142.

⁵ The licensee's letter is available in ADAMS under Accession No. ML12171A006.

⁶ The audit plan is available in ADAMS under Accession No. ML13127A143.

⁷ LIC-111 is available in ADAMS under Accession No. ML082900195.

The audit also helped to identify additional information that will require docketing to support the staff conclusions related to the staff assessment. Observations made by the audit team that were not within the scope of the audit were transferred to the resident inspector for additional action, if appropriate.

3. Audit Activities and remarks

The audit team reviewed documents related to the licensee's performance of the flooding walkdowns, including:

- Walkdown record packages generated by the licensee to document observations associated with the walkdowns
- Fleet-wide guidance developed to support the performance of the walkdowns in accordance with NEI 12-07 (GRAD, CM-AA-BDB-1002, "Beyond Design Basis Project – Walkdowns of Flood Protection and Mitigation Features")
- Listing of entries into the corrective action program resulting from the performance of the flooding walkdowns.
- Flood-specific procedures that are part of flood protection and mitigation strategies or hazardous weather response that were reviewed or used by the licensee as part of the flooding walkdowns, including:
 - Abnormal Operating Procedure (AOP) 2560, "Storms, High Winds and High Tides"
 - Procedure 929, which is associated with shutting floodgates around the auxiliary building
 - Procedure MP2721C, which is associated with installation of a portable canister over the service water pump to provide protection from water level inside the intake structure
 - Procedure MP 2701 E, which is associated with installation and removal of floodgates

The audit team also interviewed site personnel and walkdown participants to inquire about how visual inspections were performed (e.g., criteria used to determine feature acceptability), calculation of available physical margin (APM), and estimation of time required to perform manual actions. As necessary, the audit team observed areas of the site that are associated with plant flood response or were examined by the licensee as part of flooding walkdowns. For example, the audit team visited the Unit 2 intake structure and observed the device used to secure the service water pump during a hurricane event as well as several other features of the building. The audit team also performed field visits to review external walls and floodgates that are credited as flooding protection throughout the site.

Audit review responsibilities associated with review of documentation of the walkdowns performed for flood protection features were generally divided among audit team members based on plant building or area. In addition, one audit team member focused on review of reasonable simulations performed as part of the walkdowns and another audit team member focused on review of walkdown packages associated with floodgates.

Section 4.1 of this audit summary describes observations made by the audit team, based on the information described above, regarding whether the licensee performed the walkdowns in accordance with NEI 12-07. Additional details of the documents reviewed as part of the walkdown as well as remarks by the audit team are included below:

The audit team reviewed a sample of walkdown packages (Packages 1-7, 18, 33, 34, 36-38) associated with the auxiliary building and noted the following:

- Walkdown packages 1-7 (floodgates): The audit team noted that the licensee documented gaps above the 22-ft elevation between the door and building for doors 2 and 5 as well as several degraded seals around doors. The licensee generated condition reports (CRs) for seal degradation. The CRs were listed in the walkdown record forms for the identified gaps but, upon further review and discussion with the licensee, the audit team learned that the licensee took no actions in response to the identified gaps because they were in excess of the elevation associated with the probable maximum hurricane (elevation 21.3 ft). The audit team member confirmed this conclusion based on the location of the features on the site. In addition, while the documentation contained in Packages 1-7 was generally thorough, the audit team noted that APM was only correctly calculated in some cases and marked as "N/A" (not applicable) in other cases.
- Walkdown Packages 34, 36, 37, and 38 (auxiliary building external and internal walls, including above and below grade seals and penetrations): Walkdown documentation noted several areas where seals for conduit penetrations either did not exist or were degraded. In addition, groundwater seepage was documented. The audit team verified that CRs were submitted by licensee for these areas. The audit team also verified the evaluation of APM and found it acceptable.

The audit team reviewed a sample of walkdown packages associated with the intake structure and noted the following for several of the packages:

- Walkdown Package 16 (Floodgate 17): The walkdown documentation indicated that the feature was reviewed against a flood elevation of 21.3 ft, rather than the expected elevation of 26.5ft (i.e., the flood elevation due to standing wave height as listed in the Millstone Final Safety Analysis Report (FSAR)). The audit team asked about this discrepancy and the licensee indicated that an elevation of 26.5 ft should have been used and documented as part of the walkdown package. However, the licensee noted that failure of this feature has no impact on safety related equipment or ability to safely shutdown the plant. The audit team performed a field visit and further questioned the licensee on this topic and did not identify any further issues beyond the documentation error.
- Walkdown Package 29 (service water pump portable canister): The walkdown documentation indicated this feature was reviewed against a flood elevation of 21.3 ft, rather than the expected elevation of 26.5ft. APM was documented as "not applicable" for the feature. The audit team performed a field visit and further questioned the licensee on this topic and did not identify any further issues beyond the documentation error.

- Walkdown Package 46 associated with the intake structure (inside and outside of exterior intake structure walls): The walkdown documentation indicated this feature was reviewed against a flood elevation of 21.3 ft, rather than the expected elevation of 26.5 ft. The walkdown documentation indicates the licensee found the feature to be in acceptable condition and the feature is included within the scope of a PM program (CEN 104, "Condition Monitoring of Structures"). Consistent with NEI 12-07, APM was documented as small and an evaluation of potential safety consequences was performed.

The audit team reviewed a sample of walkdown packages associated with floodgates as well as the floodgate surveillance procedure SP 2665 (Rev. 005-09) and noted the following:

- Walkdown Package 83 (procedure for installation and removal of floodgates, MP2701E): The procedure was last implemented in August, 2011. The audit team reviewed CR 486573 in conjunction with the walkdown package. The CR is associated with the licensee's observation of a lack of centralized tool storage and several floodgates that were not included in the scope of the flood gate installation/removal procedure.
- Walkdown Package 18 (Floodgate 2): The APM for this flood protection feature was documented as "N/A." In response to questions from the audit team, the licensee indicated that APM was documented as "N/A" because the flood gates seal the entire door area as opposed to being "partial flood gates" that cover a portion of the opening created by the door.

The audit team reviewed a sample of walkdown packages associated with the Enclosure Building and Building 110. The audit team noted that APM was not evaluated for penetration seals in the Enclosure Building. Similarly, based on a review of a walkdown package for building 110 (walkdown package associated with the wall between Units 1 and 2), the audit team noted that APM was evaluated incorrectly (and, as a result, Question 27 of the walkdown record form was not correctly completed). The audit team reviewed CR 485766 in conjunction with this issue.

An audit team reviewed a sample of walkdown record packages associated with the Turbine Building and noted the following:

- Walkdown packages for Cable Pit 5: The licensee issued CR 518834 requesting a work order to inspect the penetrations in Cable Pit 5 to determine if they had qualified flood seals installed. The licensee discovered 24 conduits were not sealed in the cable pit. The discovery was made after the walkdowns had already been completed as part of an unrelated effort. The audit team interviewed plant staff regarding the issue and discovered that a walkdown of the pit where the penetrations were located was originally within the scope of the walkdown but the pit was removed from the scope and no walkdown was performed. Additional discussion of this observation is contained in section 4.1 of this audit summary. The licensee initiated condition CR 520414 to request a work order, in part, to install qualified flood seals. During the resolution of the CR, licensee concluded that the unsealed conduit openings do not meet the current licensing basis associated with the integrity of external flooding boundary. However, the licensee determined that the openings pose a risk to equipment operability only during the Probable Maximum Hurricane scenarios. The licensee recommended a high priority work order to facilitate repairs.

- Walkdown packages associated with Turbine and Enclosure Buildings metal siding and caulking: Metal siding and caulking are installed on the Turbine and Enclosure Buildings above the 22-foot elevation to protect these structures from a wave run-up scenario that may occur on the building walls. Walkdown documentation indicated that a walkdown of the siding above elevation 22 ft for wave run-up effects was not explicitly included in the scope of the walkdowns or documented in the walkdown record forms. Additional discussion of this observation is contained in Section 4.1 of this audit summary.
- Walkdown Package 81 (floor of Turbine Building): APM for this feature was documented as "N/A." The audit team asked the licensee to explain this documentation. The licensee indicated that a comparison of floor height against flood height does not provide a value for APM. The licensee further indicated that a meaningful measure of APM would involve a comparison of pressures exerted on the floor by a design basis flood against the capacity of the floor. The licensee considered this type of evaluation outside the scope of the walkdowns. The audit team found this conclusion reasonable.
- Walkdown Package 55: The audit team noted that the licensee documented the overall condition of this feature as "acceptable" under Question 28 on the walkdown record form, despite the licensee's documentation of an unacceptable condition for the feature in Questions 9 and 10 of the same form. The licensee indicated that this was a documentation error.
- Walkdown Package 79: The licensee documented that conduit seals were degraded and there was evidence of groundwater intrusion through the floor near the SW pipe support #329026. The walkdown record form further indicates that the seals are part of a PM program (CEN 104). In light of the seal condition, the audit team asked the licensee about the appropriateness of the overall PM program frequency and whether CR or work orders were generated in response to the observed seal condition. The licensee indicated that the PM program is primarily for structural integrity of steel and concrete and that, depending on the personnel performing the inspection, it is possible that they would not recognize conduit seals as potential flood boundaries. Additional discussion of this observation is contained in Section 4.1 of this audit summary. The licensee indicated that no CR or work order was generated in response to the observation of seal condition because the qualified flood seals are located upstream in Manhole 3A.

The audit team noted that the licensee's FSAR credits roof scuppers as a design feature in the event that roof drains are blocked during a precipitation event. The audit team asked the licensee whether scuppers were included within the scope of the walkdowns. The licensee indicated that, based on the answer to a "frequently asked question" provided by NEI, the licensee considered roofs, roof drains, and scuppers to be out of the scope of the walkdowns. The audit viewed that all flood protection features credited in the plant's licensing basis are within the scope of the walkdowns. However, the licensee indicated that the installation of the scuppers can be confirmed through visual observation of the scupper outlets, which can be seen from ground level.

As part of the review of reasonable simulations, the audit team reviewed the reasonable simulations of AOP 2560. The licensee credited implementation of AOP 2560 during previous flood events and did not perform a physical simulation during the walkdowns. As a result, the audit team reviewed documentation of implementation of AOP 2560 during August 2011 for Storm Sandy. However, the audit team observed that only a portion of the procedure was

performed for previous events. Additional discussion of this observation is contained in Section 4.1 of this audit summary. The audit team also reviewed training credited for implementation of flood-specific procedures (job performance measure, JPM-234, "Install Fire Pump House Flood Protection Devices").

4. Audit Summary

As described in Section 2, the goal of the audit was to support the development of the staff assessment of the licensee's flooding walkdown report. The observations described below, which were compiled by the audit team during the audit, were conveyed to the licensee during the exit meeting. These observations are neither findings nor violations; however they will be used to inform the NRC staff's assessment of the licensee's walkdown report.

4.1 Observations related to NEI 12-07

The audit team made observations during the audit directly related to the scope of the audit (see Section 2), particularly with regard to whether the licensee performed the walkdowns in accordance with NEI 12-07. These observations are described below.

Section 4.2 (Item 4) of NEI 12-07 discusses identification of penetrations through barriers that provide a path for flood water to enter buildings. The licensee identified up to 24 potentially unsealed penetrations in Cable Pit 5 as a result of an unrelated effort several months after the completion of the walkdowns. The audit team learned that a walkdown of the pit where the unsealed penetrations were located was originally within the scope of the site flooding walkdowns but the licensee subsequently removed it from the scope. Consequently, no walkdown was performed of the area and the unsealed penetrations were not identified until later. As a result of this change in scope, the audit team had questions regarding whether there are other areas that were missed or removed from the scope of the walkdowns. The licensee generated CR520886 to follow up on this observation and to address the extent of condition.

Section 4.2 (Item 3) of NEI 12-07 describes the identification of barriers that are important to resisting the effects of external flooding. The audit team considered the metal siding and caulking on the turbine and enclosure buildings to be features that protect against wave run-up on the building walls. However, available documentation indicates that a walkdown of the siding above elevation 22 ft for wave run-up effects was not explicitly included in the scope of the walkdowns or documented in the walkdown record forms as would be expected in accordance with NEI 12-07. However, the licensee observed these features for the purposes of evaluating APM. In addition, NRC audit team members walked around the site to observe the siding and look for obvious large penetrations. None were identified. The licensee generated CR520888 to follow up on this observation.

Section 5.5.6 of NEI 12-07 indicates that the walkdowns should include a walk-through to verify a procedure or activity can be executed as specified or written. Physical simulation of these activities is not required if: (a) the activities have been previously performed and documented, or (b) the activities are periodically demonstrated and documented. The licensee credited implementation of the flood response procedure AP 2560 during previous a flood event and did not perform a physical simulation of the procedure during the walkdowns. However, the audit team observed that the licensee performed only a portion of the procedure for a previous event

which meant several of the actions were not simulated as part of the walkdowns. Moreover, documentation was unclear with respect to how the licensee evaluated the remaining portions of the procedure and associated actions as part of the walkdowns. Upon further discussion with licensee staff, the audit team was able to understand that the licensee chose not to perform several of the actions during the walkdowns because they are routinely performed during normal plant evolutions, which the audit team viewed as a reasonable explanation. The licensee generated CR520890 to follow up on this observation.

Section 5.6 of NEI 12-07 indicates that the walkdowns should ensure that: (1) a flood protection feature is included in a PM or inspection program; and (2) that the PM or inspection is being performed. The licensee credited CEN 104 in the walkdown records as a PM program for verifying flood protection integrity of walls and seals. However, the audit team observed that the walkdown record forms indicate that a number of seals were missing or degraded. The audit team discussed this issue with the licensee staff who indicated that they typically do not perform seal inspections for non-fire seals under the procedure. Moreover, implementation of the procedure did not include use of ladders, or similar equipment, to facilitate inspection of inaccessible seals at higher elevations. Consequently, the licensee staff indicated that implementation of the procedure would not identify missing or degraded flood protection seals at higher elevations. The licensee generated CR520892 to follow up on this observation.

The walkdown record form example in Appendix B of NEI 12-07 includes a line item to define the flood height at the location of a flood protection feature. The licensee's walkdown record forms for the intake structure specifies a flood height of 21.3 ft for features interior to the intake structure. However, the FSAR indicates that the flood height interior to the intake structure is elevation 26.5 ft. The audit team observed that documentation is not accurate with respect to the flood height applicable to these features. The licensee generated CR520893 to follow up on this observation.

4.2 Observations communicated to resident inspectors

The audit team made observations related to the plant response to flooding hazards that were not directly related to the scope of the audit. These observations were forwarded to the site resident inspectors for additional action, if appropriate.

The audit team observed that the licensee did not confirm that the seal or caulking between the metal siding and concrete flood wall of the turbine and enclosure buildings is in place. Moreover, licensee staff indicated that the flood seal material is not within the scope of building inspections, which are limited to structural integrity issues. The audit team viewed this as an observation related to the condition monitoring of structures. As a result, in addition to considering this issue within the scope of the walkdowns (as described in Section 4.1 of this audit report), the audit team also passed this observation on to the resident inspectors for additional regulatory action, if appropriate.

5. Potential requests for additional information

To support the staff's assessment of the licensee walkdown report, NRC staff may require additional information from the licensee regarding the methodology used to evaluate APM for flood protection features.

6. Conclusions

The conduct of this audit provided NRC staff and NRC contractors with information that is relevant to the staff's assessment of the licensee's walkdown report. This audit summary will be used as an input to the staff assessment.

D. Heacock

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If you have any questions, please contact Mr. James Kim at 301-415-4125 or by e-mail at James.Kim@nrc.gov.

Sincerely,

/ra/

James Kim, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

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