



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

December 21, 2022

Mr. David P. Rhoades
Senior Vice President
Constellation Energy Generation, LLC
President and Chief Nuclear Officer
Constellation Nuclear
4300 Winfield Rd
Warrenville, IL 60555

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT 1 - RELIEF REQUEST
ASSOCIATED WITH PUMP PERIODIC VERIFICATION TESTS OF CORE
SPRAY SYSTEM PUMPS (EPID L-2022-LLR-0029)

Dear Mr. Rhoades:

By letter dated March 2, 2022 (Agencywide Documents and Access Management System (ADAMS) Accession Number ML22061A057), as supplemented by letter dated August 5, 2022, and docketed email dated November 10, 2022 (ML22217A004 and ML22314A226, respectively), Constellation Energy Generation, LLC (the licensee) submitted Alternative Request CS-PR-02 to the U.S. Nuclear Regulatory Commission (NRC) proposing a testing approach for specified pumps as an alternative to certain Inservice Testing (IST) requirements in the 2012 Edition of the American Society of Mechanical Engineers (ASME) *Operation and Maintenance of Nuclear Power Plants*, Division 1, OM Code: Section IST (OM Code) for the fifth 10-year IST program interval at Nine Mile Point Nuclear Station, Unit 1 (NMP1).

Specifically, pursuant to subparagraph (1) in paragraph (z) in Part 50 to Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a(z)(1)), the licensee requested to use the proposed alternative in CS-PR-02 related to the core spray system (CSS) pumps at NMP1 on the basis that the alternative provides an acceptable level of quality and safety.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1) for Alternative Request CS-PR-02. Therefore, the NRC staff authorizes the use of Alternative Request CS-PR-02, as supplemented, for the fifth 10-year IST program interval at NMP1, which began on January 1, 2019, and is currently scheduled to end on December 31, 2028.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the Nine Mile Point Project Manager, Richard V. Guzman, at (301) 415-1030 or Richard.Guzman@nrc.gov.

Sincerely,

Hipólito J. González, Chief
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-220

Enclosure:
Safety Evaluation

cc: ListServ



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NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ALTERNATIVE REQUEST CS-PR-02

FIFTH 10-YEAR INTERVAL INSERVICE TESTING PROGRAM

CONSTELLATION ENERGY GENERATION, LLC

NINE MILE POINT NUCLEAR STATION, UNIT 1

DOCKET NO. 50-220

1.0 INTRODUCTION

By letter dated March 2, 2022 (Agencywide Documents and Access Management System (ADAMS) Accession Number ML22061A057), as supplemented by letter dated August 5, 2022, and docketed email dated November 10, 2022 (ML22217A004 and ML22314A226, respectively), Constellation Energy Generation, LLC (Constellation, the licensee) submitted Alternative Request CS-PR-02 to the U.S. Nuclear Regulatory Commission (NRC) proposing a testing approach for specified pumps as an alternative to certain Inservice Testing (IST) requirements in the 2012 Edition of the American Society of Mechanical Engineers (ASME) *Operation and Maintenance of Nuclear Power Plants*, Division 1, OM Code: Section IST (OM Code) at Nine Mile Point Nuclear Station, Unit 1 (NMP1).

Specifically, pursuant to subparagraph (1) in paragraph (z) in Part 50 to Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a(z)(1)), the licensee requested to use the proposed alternative in CS-PR-02 related to the core spray system (CSS) pumps at NMP1 on the basis that the alternative provides an acceptable level of quality and safety. The NRC staff describes its review of the proposed alternative in CS-PR-02 for NMP1 in this safety evaluation (SE).

The NMP1 fifth 10-Year IST program interval began on January 1, 2019, and is currently scheduled to end on December 31, 2028.

2.0 REGULATORY EVALUATION

The NRC regulations in 10 CFR 50.55a(f)(4), "Inservice testing standards requirement for operating plants," state, in part, that throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the ASME OM Code must meet the inservice test requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in 10 CFR 50.55a(f)(2) and (3) and that are incorporated by reference in 10 CFR 50.55a(a)(1)(iv), to the extent practical within the limitations of design, geometry, and materials of construction of the components.

Enclosure

The NRC regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements of 10 CFR 50.55a(f) may be used, when authorized by the NRC, if the licensee demonstrates (1) the proposed alternatives would provide an acceptable level of quality and safety or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Alternative Request CS-PR-02

Applicable Code Edition and Addenda

The applicable Code of Record for the NMP1 fifth 10-Year IST program interval is the 2012 Edition of the ASME OM Code, which is incorporated by reference in 10 CFR 50.55a.

ASME Code Components Affected

In its submittal, the licensee proposed alternative testing for the following CSS pumps:

Table 1: Alternative Request CS-PR-02 - CSS Pumps Affected

Pump ID	Description	Type of Pump	Class	Group
PMP-81-04	CSS Pump #122	Vertical Line Shaft Centrifugal	2	B
PMP-81-24	CSS Pump #112	Vertical Line Shaft Centrifugal	2	B
PMP-81-49	CSS Topping Pump #112	Centrifugal	2	B
PMP-81-52	CSS Topping Pump #122	Centrifugal	2	B

Applicable Code Requirement

The IST requirements in the ASME OM Code, as incorporated by reference in 10 CFR 50.55a, related to this alternative request are as follows:

ASME OM Code, Division 1, Subsection ISTB, "Inservice Testing of Pumps in Light-Water Reactor Nuclear Power Plants - Pre-2000 Plants."

Paragraph ISTB-1400, "Owner's Responsibility," subparagraph (d), specifies that the Owner's responsibility includes:

establishing a pump periodic verification test program in accordance with Division 1, Mandatory Appendix V.

ASME OM Code, Division 1, Mandatory Appendix V, "Pump Periodic Verification Test Program," paragraph V-2000, "Definitions," provides the following definition of a pump periodic verification test (PPVT):

a test that verifies a pump can meet the required (differential or discharge) pressure as applicable, at its highest design basis accident flow rate.

ASME OM Code, Division 1, Mandatory Appendix V, paragraph V-3000, "General Requirements," subparagraph (b), requires the Owner to perform a PPVT at least once every 2 years.

ASME OM Code, Subsection ISTB, paragraph ISTB-3000, "General Testing Requirements," and Table ISTB-3000-1, "Inservice Test Parameters," define and compare parameters (e.g., pressure, flow rate, and vibration) measured during Group A tests, Group B tests, and comprehensive pump tests (CPTs).

Paragraph ISTB-3510, "General," subparagraph (a), "Accuracy," states, in part, that instrument accuracy shall be within the limits of Table ISTB-3510-1, "Required Instrument Accuracy." Table ISTB-3510-1 requires that comprehensive and preservice test pressure instrument accuracy be within ± 0.5 percent.

Paragraph ISTB-5100, "Centrifugal Pumps (Except Vertical Line Shaft Centrifugal Pumps)," specifies the requirements for Group A test, Group B test, and CPT procedures for those pump types.

Table ISTB-5121-1, "Centrifugal Pump Test Acceptance Criteria," provides Group A test, Group B test, and CPT acceptable range, alert range, and required action range for various parameters (i.e., flow, differential pressure, and vibration) when testing centrifugal pumps.

Paragraph ISTB-5200, "Vertical Line Shaft Centrifugal Pumps," specifies the requirements for Group A test, Group B test, and CPT procedures for those pump types.

Table ISTB-5221-1, "Vertical Line Shaft Centrifugal Pump Test Acceptance Criteria," provides Group A test, Group B test, and CPT acceptable range, alert range, and required action range for various parameters (i.e., flow, differential pressure, and vibration) when testing vertical line shaft centrifugal pumps

Reason for Request

In Alternative Request CS-PR-02 (as supplemented), the licensee states that the 2012 Edition of the ASME OM Code requires that a PPVT for the CSS pumps at NMP1 be performed every 2 years at the pump's highest design basis accident flow rate. The two sets of pumps (CSS pump and CSS topping pump) specified in table 1 of this SE have the capability to pump demineralized water from the condensate storage tanks into the reactor pressure vessel at the design basis accident flow rate. The licensee proposes to perform the PPVTs of these two pump sets at an extended interval of 48 months on a staggered basis (one train tested each outage) instead of every 24 months (2 years) specified in the ASME OM Code. The licensee states that the basis of their proposed alternative request is the good performance of the CSS pumps over a period of time. In particular, the licensee reported that testing of the CSS pumps over the last 12 years has shown no signs of mechanical or hydraulic degradation as indicated by consistent performance of the CSS pumps within ASME OM Code acceptance criteria and only needing minor routine maintenance. In its supplement dated August 5, 2022, the licensee provided CPT results for the CSS pumps. In the August 5, 2022, supplement, the licensee also described the testing and acceptance criteria used to demonstrate the operational readiness of the CSS pumps during quarterly tests performed in accordance with Technical Specification (TS) Surveillance Requirement (SR) 4.1.4, and the IST Program at NMP1. The licensee notes that the implementation of a division-based outage strategy will allow testing of a single division per outage.

Proposed Alternative

In Alternative Request CS-PR-02 (as supplemented), the licensee proposes to perform the PPVTs to meet ASME OM Code, Mandatory Appendix V, for the CSS pumps (CSS pumps and CSS topping pumps) at NMP1 listed in Table 1 at an alternate interval of 48 months in lieu of the Code-required interval of 24 months. In its supplement dated August 5, 2022, the licensee states that one pump train will be tested each outage under the staggered approach specified in Alternative Request CS-PR-02, as supplemented. The CSS pump sets will continue to be tested quarterly in accordance with the ASME OM Code, Subsection ISTB, paragraph ISTB- 5200 for the CSS pumps, and paragraph ISTB-5100 for the CSS topping pumps (as stated in the docketed email dated November 10, 2022). As indicated in the supplement dated August 5, 2022, the CPTs for the CSS pumps will continue to be performed every 2 years. The CSS pump operability and performance testing is performed in accordance with the NMP1 TS SR 4.1.4 and the IST Program.

3.2 NRC Staff Evaluation

Mandatory Appendix V, paragraph V-3000(a), of the ASME OM Code requires that pumps with specific design-basis accident flow rates in the licensee's credited safety analysis be included in the PPVT program. If the pump's CPT or Group A flow rates do not bound the design-basis accident flow rate, the PPVT must be performed to verify that the pump can meet the required (differential or discharge) pressure as applicable, at its highest design basis accident flow rate. Mandatory Appendix V, paragraph V-3000(b), requires that PPVT tests shall be performed once every 2 years (24 months).

In Alternative Request CS-PR-02 (as supplemented), the licensee proposes to perform the PPVTs for the CSS pumps at NMP1 with an alternate interval of 48 months in lieu of the Code-required interval of 24 months. In its supplement dated August 5, 2022, the licensee states that one pump train will be tested each outage under a staggered approach. The licensee states that each CSS loop (CSS pump and CSS topping pump) was designed for full flow rated conditions. Data on flows and pressures at various points in the flow lines for each CSS pump are obtained during testing and are used to create the field validated pump performance curves. The licensee states that these tests for each CSS pump set meet the design-basis accident flow conditions.

As stated by the licensee in its docketed email dated November 10, 2022, the CSS pump sets will continue to be tested quarterly in accordance with the ASME OM Code, Subsection ISTB, paragraph ISTB-5200 for the CSS pumps, and paragraph ISTB-5100 for the CSS topping pumps. The CSS pump operability and performance testing is performed in accordance with the NMP1 TS SR 4.1.4 and the IST Program.

The CPTs for the CSS pumps are performed biennially to meet the ASME OM Code requirements as specified in Subsection ISTB, paragraphs ISTB-5100 and ISTB-5200. At NMP1, each CSS loop (i.e., the CSS pump and CSS topping pump) is designed for full flow rated conditions to meet the design-basis accident flow. In its supplemental letter dated August 5, 2022, the licensee provided CPT results for the CSS pumps at NMP1 in support of the pumps' good performance.

The licensee obtains test data for the pump set flow rates and pressures for each CSS loop for comparison with the previously established normal conditions in accordance with the IST Program at NMP1. Testing and baselining of the pump performance test acceptance criteria are

reperformed following major maintenance of the CSS pumps in accordance with ISTB-3300, "Reference Values." Testing of the CSS pumps at a flow rate of approximately 2900 gallon per minute utilizing the existing test return line flow path provides for substantial flow testing in a stable region of the pump curve. Testing over the last 12 years has shown no signs of mechanical or hydraulic degradation as indicated by consistent performance of the CSS pumps within the ASME OM Code acceptance criteria.

The licensee stated that the completed maintenance and the IST results for the CSS pumps and CSS topping pumps have identified the need for only minor maintenance. As a result, the pumps have retained their operational readiness with no signs of mechanical or hydraulic degradation. In its supplemental letter dated August 5, 2022, the licensee stated that minor maintenance includes re-painting and oil changes performed as part of preventative maintenance.

The licensee reported that performance monitoring conducted for the CSS pumps includes pump-motor bearing housing temperatures, vibration monitoring, and periodic sampling of the lube oil. Performance monitoring indicates that the CSS pumps remain capable of meeting their design function without degradation. The licensee will implement actions to address pump performance if measured parameters are found to be outside the normal operating range or determined to be trending toward an unacceptable degraded condition. These actions include monitoring additional parameters, review of specific information to identify the cause of the degradation, and potential removal of the pump from service to perform necessary maintenance. Continued testing in a stable flow range combined with the additional pump performance monitoring provides overall reliable performance monitoring beyond the requirements prescribed in the Code that validates the ability of each pump to meet the design-basis accident flow rates. The testing is effective for detecting mechanical and hydraulic degradation as required by ASME OM Code, Subsection ISTB.

Based on its review, the NRC staff finds the licensee's proposal in Alternative Request CS-PR-02 to extend the required PPVT interval on a staggered basis for the CSS pumps listed in table 1 of this SE from 24 months to 48 months (with one pump train tested each outage) provides an acceptable level of quality and safety in providing reasonable assurance of the operational readiness of the CSS pumps within the scope of this request in accordance with 10 CFR 50.55a(z)(1) for the fifth 10-Year IST program interval at NMP1.

4.0 CONCLUSIONS

As described above, the NRC staff finds that the licensee's proposed testing approach described in Alternative Request CS-PR-02, as supplemented, to extend the required PPVT interval for the CSS pumps at NMP1 listed in table 1 of this SE from 24 months to 48 months on a staggered basis (i.e., one pump train tested each outage) will provide an acceptable level of quality and safety in achieving reasonable assurance of the operational readiness of the CSS pumps within the scope of this request. Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1) for Alternative Request CS-PR-02, as supplemented. Therefore, the NRC staff authorizes the use of Alternative Request CS-PR-02, as supplemented, for the fifth 10-Year IST program interval at NMP1, which began on January 1, 2019, and is currently scheduled to end on December 31, 2028.

All other ASME OM Code requirements as incorporated by reference in 10 CFR 50.55a for which relief or an alternative was not specifically requested, and granted or authorized (as appropriate), in the subject request remain applicable.

Principal Contributors: G. Bedi
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Date: December 21, 2022

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ASSOCIATED WITH PUMP PERIODIC VERIFICATION TESTS OF CORE
SPRAY SYSTEM PUMPS (EPID L-2022-LLR-0029) DATED
DECEMBER 21, 2022

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