



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

January 17, 2024

Mr. Terry J. Brown
Energy Harbor Nuclear Corp.
c/o Davis-Besse Nuclear Power Station
Mail Stop P-DB-3080
5501 N. State Route 2
Oak Harbor, OH 43449-9760

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1 – AUTHORIZATION
AND SAFETY EVALUATION FOR ALTERNATIVE REQUEST RP-5 FOR THE
FIFTH 10-YEAR INTERVAL INSERVICE TESTING PROGRAM (EPID L-2023-
LLR-0008)

Dear Mr. Brown:

On March 6, 2023 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML23066A001), Energy Harbor Nuclear Corporation (Energy Harbor, the licensee) submitted alternative request RP-5 to the U.S. Nuclear Regulatory Commission (NRC) for an alternative to specific inservice testing (IST) requirements in the 2017 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 the Davis-Besse Nuclear Power Station, Unit No. 1 (Davis-Besse), associated with the fifth 10-year interval IST program, which began on June 8, 2023, and is scheduled to end on September 20, 2032.

Specifically, pursuant to subparagraph (1) in paragraph (z), "Alternatives to codes and standards requirements," of section 55a, "Codes and standards," of Title 10 of the *Code of Federal Regulations* (10 CFR), part 50, "Domestic Licensing of Production and Utilization Facilities," to Title 10, "Energy," (10 CFR 50.55a(z)(2)), the licensee requested to implement alternative request RP-5 for the testing of specific pumps at Davis-Besse on the basis that compliance with specific ASME OM Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

All other ASME OM Code 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 Project Manager, Luke Haeg.

Sincerely,

Jeffrey A. Whited, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:
Safety Evaluation

cc: Listserv

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1 – AUTHORIZATION
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UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ALTERNATIVE REQUEST RP-5

FOR THE FIFTH 10-YEAR INTERVAL INSERVICE TESTING PROGRAM

ENERGY HARBOR NUCLEAR CORPORATION

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

1.0 INTRODUCTION

By letter dated March 6, 2023 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML23066A001), Energy Harbor Nuclear Corporation (Energy Harbor, the licensee) submitted Alternative Request RP-5 to the U.S. Nuclear Regulatory Commission (NRC) for an alternative to specific inservice testing (IST) requirements in the 2017 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 the Davis-Besse Nuclear Power Station, Unit No. 1 (Davis-Besse), associated with the fifth 10-year interval IST program, which began on June 8, 2023, and is scheduled to end on September 20, 2032.

Specifically, pursuant to subparagraph (1) in paragraph (z), "Alternatives to codes and standards requirements," of section 55a, "Codes and standards," of Title 10 of the *Code of Federal Regulations* (10 CFR), part 50, "Domestic Licensing of Production and Utilization Facilities," to Title 10, "Energy," (10 CFR 50.55a(z)(2)), the licensee requested to implement alternative request RP-5 for the testing of specific pumps at Davis-Besse on the basis that compliance with specific ASME OM Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

The NRC regulations in 10 CFR 50.55a(f)(4), "Inservice testing standards requirement for operating units," requires, in part, that throughout the service life of a boiling- pressurized water-cooled nuclear power facility, pumps, and valves, that are within the scope of the ASME OM Code must meet the IST 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.

The NRC regulations in 10 CFR 50.55a(z), "Alternatives to codes and standards requirements," states that:

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Alternatives to the requirements of paragraphs (b) through (h) of [10 CFR 50.55a] or portions thereof may be used when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation. The applicant or licensee must demonstrate that:

- (1) *Acceptable level of quality and safety.* The proposed alternative would provide an acceptable level of quality and safety; or
- (2) *Hardship without a compensating increase in quality and safety.* Compliance with the specified requirements of this section 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 RP-5

The licensee submitted alternative request RP-5 related to specific pump testing requirements in the ASME OM Code in accordance with 10 CFR 50.55a(z)(2).

The information provided by the licensee in support of the request for an alternative to ASME OM Code requirements as incorporated by reference in 10 CFR 50.55a has been evaluated and the bases for disposition are documented below.

Applicable Code Edition

The applicable Code of Record for the fifth 10-year interval IST program at Davis-Besse is the 2017 Edition of the ASME OM Code, as incorporated by reference in 10 CFR 50.55a.

ASME Code Components Affected

The licensee requested the NRC staff to authorize the use of the proposed alternative in lieu of the specific requirements of the ASME OM Code for the pumps listed in Table 1 below.

Table 1

Component ID	Pump Description	ASME Code Class	OM Group
P58-1	High Pressure Injection (HPI) Pump	2	AB
P58-2	High Pressure Injection Pump	2	AB

The HPI system provides emergency core cooling for a small break loss-of-coolant accident (LOCA). In conjunction with the low-pressure injection and core flooding systems, the HPI system will limit reactor core damage for a range of small break LOCAs at Davis-Besse.

Applicable Code Requirements

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

ASME OM Code, subsection ISTB, "Inservice Testing of Pumps in Water-Cooled Reactor

Nuclear Power Plants – Pre-2000 Plants,” paragraph ISTB-1400, “Owner's Responsibility,” subparagraph (d), states the Owner's responsibility includes:

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

Subsection ISTB, table ISTB-3000-1, “Inservice Test Parameters,” specifies the parameters for the Group A test, comprehensive pump test, and the pump periodic verification test, for those pumps identified in Division 1, Mandatory Appendix V.

Subsection ISTB, table ISTB-3400-1, “Inservice Test Parameters,” specifies that the Group A test is required quarterly, the comprehensive pump test is required biennially, and the pump periodic verification test is required biennially for those pumps identified in Division 1, Mandatory Appendix V.

Mandatory Appendix V¹, “Pump Periodic Verification Test Program,” paragraph V-3000, “General Requirements,” states that the Owner shall:

- (a) identify those certain applicable pumps with specific design basis accident flow rates in the Owner's credited safety analysis (e.g., technical specifications, technical requirements program, or updated safety analysis report) for inclusion in this program
- (b) perform the pump periodic verification test at least once every 2 yr [years]
- (c) determine whether the pump periodic verification test is required before declaring the pump operable following replacement, repair, or maintenance on the pump
- (d) declare the pump inoperable if the pump periodic verification test flow rate and associated differential pressure (or discharge pressure for positive displacement pumps) cannot be achieved
- (e) maintain the necessary records for the pump periodic verification tests, including the applicable test parameters (e.g., flow rate and associated differential pressure, or flow rate and associated discharge pressure, and speed for variable speed pumps) and their basis
- (f) account for the pump periodic verification test instrument accuracies in the test acceptance criteria.

Licensee's Proposed Alternative and Basis for Use

Alternative request RP-5 proposed that the ASME OM Code requirements for pump periodic verification testing of the Davis-Besse HPI pumps will be performed each refueling outage (RO) instead of biennially. The licensee stated that the classification for HPI pumps will be changed from Group B to Group A in order to include, in addition to other provisions, vibration test

¹ Mandatory Appendix V, Note 1, states that this Appendix contains requirements to augment the rules of subsection ISTB. The Owner is not required to perform a pump periodic verification test, if the design basis accident flow rate in the Owner's safety analysis is bounded by the comprehensive pump test or Group A test.

requirements of ASME OM Code, subsection ISTB, paragraph ISTB-5121, "Group A Test Procedure," subparagraphs (d) and (e), with vibration acceptance criteria of ASME OM Code, subsection ISTB, table ISTB-5121-1, "Centrifugal Pump Test Acceptance Criteria," during the quarterly pump test. The licensee stated that a Group B pump that is classified as a Group A pump for testing purposes is referred to as a Group AB pump.

The licensee asserted that implementing alternative request RP-5 as an alternative to the requirements of ASME OM Code, subsection ISTB, table ISTB-3400-1, including the performance of comprehensive pump tests and pump periodic verification tests during ROs and Group A pump tests quarterly between ROs, provides reasonable assurance that the HPI pumps are operationally ready. The licensee considers removal of the reactor head solely to perform the comprehensive pump tests and pump periodic verification tests is a hardship because it would substantially increase the scope and duration of a maintenance shutdown and result in associated radiation exposure to plant personnel.

Reason for Request

The licensee stated that it submitted the request pursuant to 10 CFR 50.55a(z)(2) on the basis that the proposed alternative provides an acceptable level of quality and safety, and the current design for the HPI pumps does not allow for Energy Harbor to meet all the requirements of a pump periodic verification test at Davis-Besse.

At Davis-Besse, the HPI pumps inject water into the reactor coolant system (RCS) to mitigate the consequences of a small break LOCA. The licensee stated that these pumps were originally categorized as Group B pumps because they are in a standby system that is not operated routinely except for testing. The ASME OM Code requires testing of these HPI pumps at a quarterly frequency for Group B pump testing, a biennial comprehensive pump test, and a biennial pump periodic verification test. To achieve the necessary flow rate, without creating low temperature overpressure concerns, the HPI pumps are lined up to discharge into the RCS with the reactor head removed and with water in the refueling canal. The licensee stated that these plant conditions are established only during an outage in which a refueling occurs and are not typically established during a maintenance outage. The licensee indicated that these same plant conditions will be used to satisfy the pump periodic verification test requirements of appendix V in the ASME OM Code.

Table ISTB-3400-1 of the ASME OM Code requires the pump periodic verification test to be performed biennially. In that Davis-Besse is on a 24-month operating cycle, the licensee stated that compliance with this requirement is normally achievable. However, if the plant experiences maintenance shutdowns, the licensee indicated that the added time between ROs could jeopardize compliance with this testing requirement. The licensee asserted that removal of the reactor head solely to perform the pump periodic verification test is a hardship because it would substantially increase the scope and duration of a maintenance shutdown and result in associated radiation exposure to plant personnel.

3.2 NRC Staff Evaluation

The ASME OM Code, subsection ISTB, table ISTB-3400-1, as incorporated by reference in 10 CFR 50.55a, requires that Group A and Group B pump tests be performed quarterly, and comprehensive pump tests and pump periodic verification tests be performed biennially. The ASME OM Code, subsection ISTB, paragraph ISTB-1400, subparagraph (d), requires that the Owner's responsibility is to establish a pump periodic verification test program in accordance with Division 1, Mandatory Appendix V. ASME OM Code, Division 1, Mandatory Appendix V, specifies the requirements for implementing a pump periodic verification test that verifies that 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, includes the general requirements for the licensee to perform the pump periodic verification tests.

At Davis-Besse, the HPI pumps inject water into the RCS to mitigate the consequences of a small break LOCA. In alternative request RP-5, the licensee proposes to perform comprehensive pump tests and pump periodic verification tests for the HPI pumps at Davis-Besse with an alternative interval of each RO in lieu of the ASME OM Code-required interval of biennially (24 months), with Group A tests of the HPI pumps to be conducted quarterly. Based on the 24-month operating cycle at Davis-Besse, the licensee states that compliance with the pump test interval requirements in the ASME OM Code are normally achievable. However, the licensee reported that maintenance shutdowns might cause additional time between ROs that could jeopardize compliance with the biennial pump test interval requirements.

The licensee submitted alternative request RP-5 under the process specified in 10 CFR 50.55a(z)(2) as a proposed alternative to specific pump test interval requirements in the ASME OM Code as incorporated by reference in 10 CFR 50.55a. The licensee's basis for alternative request RP-5 is that the biennial testing of the HPI pumps requires Davis-Besse to be in a shutdown condition with the reactor head removed to be able to achieve the necessary flow rate into the RCS. The licensee asserted that removal of the reactor head solely to perform the pump periodic verification test between ROs would be a hardship without a compensating increase in the level of quality and safety. If performed during a limited maintenance shutdown, the licensee stated that the HPI pump testing would substantially increase the scope and duration of a maintenance outage and result in associated radiation exposure to plant personnel. The licensee noted that a similar request was submitted and authorized by the NRC for comprehensive testing of the HPI pumps during the previous fourth 10-year interval IST program on March 31, 2014 (ML14030A574).

Regarding the duration of the proposed alternative, Section 6 of the RP-5 submittal stated that the fifth 10-year interval IST program was scheduled to commence on April 2, 2023. During the NRC staff's review of RP-5, the licensee submitted Davis-Besse's fifth 10-year interval IST program on August 1, 2023 (ML23213A204). In this submittal, the licensee noted that the end date of Davis-Besse's fourth 10-year interval IST program was extended from September 20, 2022, to June 7, 2023, in accordance with ASME OM Code, subsection ISTA, paragraph ISTA-3120(c). Therefore, the NRC noted and acknowledged that with respect to this RP-5 request, Davis-Besse's fifth 10-year interval IST program began on June 8, 2023, and ends on September 20, 2032.

The licensee originally categorized HPI pumps at Davis-Besse as Group B pumps because they are only typically operated for testing during plant operation. The ASME OM Code does not require vibration to be measured during quarterly Group B pump testing. To provide additional test data to monitor the performance of the HPI pumps, the licensee will change the

classification of the HPI pumps to Group A in order to include vibration test data, along with other test data, specified in ASME OM Code, subsection ISTB, paragraph ISTB-5121, subparagraphs (d) and (e), with vibration acceptance criteria of ASME OM Code, subsection ISTB, table ISTB-5121-1, during the quarterly pump test. The classification of the HPI pumps as Group A pumps for testing purposes provides more detailed performance data to monitor potential pump degradation during quarterly testing. The licensee refers to Group B pumps that are classified as Group A pumps for testing purposes as Group AB pumps.

Based on its review, the NRC staff finds that the licensee has justified in alternative request RP-5 that the ASME OM Code requirements for biennial testing of the HPI pumps at Davis-Besse would result in a hardship without a compensating increase in the level of quality and safety. The NRC staff also finds that the provisions of alternative request RP-5 for the HPI pumps to perform Group A pump tests quarterly and to perform comprehensive pump tests and pump periodic verification tests during ROs will provide reasonable assurance that the HPI pumps will be operationally ready to perform their safety functions at Davis-Besse. Therefore, the staff finds that alternative request RP-5 meets the requirements of 10 CFR 50.55a(z)(2) for the HPI pumps at Davis-Besse.

4.0 CONCLUSION

Based on the above, the NRC staff determined that compliance with the biennial pump testing required in ASME OM Code, subsection ISTB, table ISTB-3400-1, as incorporated by reference in 10 CFR 50.55a, for the HPI pumps P58-1 and P58-2 at Davis-Besse, Unit 1, would result in hardship without a compensating increase in the level of quality and safety. The NRC staff also has determined that the testing proposed in alternative request RP-5 provides reasonable assurance that the HPI pumps within the scope of this request will be operationally ready to perform their safety functions. Therefore, the NRC staff authorizes alternative request RP-5 for the specified HPI pumps pursuant to 10 CFR 50.55a(z)(2) for the fifth 10-year interval IST program at Davis-Besse (June 8, 2023, to September 20, 2032).

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, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: T. Scarbrough, NRR
 G. Bedi, NRR

Date: January 17, 2024