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

February 23, 2022

Mr. Steven M. Snider
Vice President, Oconee Nuclear Station
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672-0752

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 – RELIEF FROM ASME CODE PARAGRAPH ISTB-3540(b) RELATED TO HIGH PRESSURE INJECTION PUMPS VIBRATION MEASUREMENTS (EPID L-2021-LLR-0055)

Dear Mr. Snider:

By letter dated July 29, 2021, as supplemented by letter dated August 19, 2021, Duke Energy Carolinas, LLC (Duke Energy, the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for relief request to certain American Society of Mechanical Engineers (ASME) *Operation and Maintenance of Nuclear Power Plants* (OM Code) requirements at Oconee Nuclear Station (ONS), Units 1, 2, and 3, during the sixth 10-year inservice testing (IST) program interval.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(f)(5)(iii), the licensee requested relief and to use alternative requirements for inservice testing items on the basis that the code requirement is impractical.

All other ASME OM Code requirements for which relief or an alternative was not specifically requested and approved remain applicable.

If you have any questions, please email Shawn.Williams@nrc.gov.

Sincerely,

Michael T. Markley

Digitally signed by Michael T. Markley
Date: 2022.02.23 14:13:13 -05'00'

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure:
Safety Evaluation

cc: Listserv

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE REQUEST ON-SRP-HPI-03

RELATED TO THE INSERVICE TESTING PROGRAM SIXTH 10-YEAR INTERVAL

DUKE ENERGY CAROLINAS, LLC

OCONEE NUCLEAR STATION, UNITS NO. 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, AND 50-287

1.0 INTRODUCTION

By letter dated July 29, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21210A341), as supplemented by letter dated August 19, 2021 (ADAMS Accession No. ML21231A069), Duke Energy Carolinas, LLC (Duke Energy, the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for relief to certain American Society of Mechanical Engineers (ASME) *Operation and Maintenance of Nuclear Power Plants* (OM Code) requirements at Oconee Nuclear Station (ONS), Units 1, 2, and 3, during the sixth 10-year inservice testing (IST) program interval.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a(f)(5)(iii), the licensee requested relief and to use alternative IST requirements regarding vibration measurements for specified high pressure injection (HPI) pumps on the basis that the code requirement is impractical.

2.0 REGULATORY EVALUATION

The NRC regulations in 10 CFR 50.55a(f)(4), "Inservice testing standards requirement for operating plants," states, in part, "The inservice test requirements for pumps and valves that are within the scope of the ASME OM Code but are not classified as ASME B&PV [Boiler & Pressure Vessel] Code Class 1, Class 2, or Class 3 may be satisfied as an augmented IST program in accordance with paragraph (f)(6)(ii) of this section without requesting relief under paragraph (f)(5) of this section or alternatives under paragraph (z) of this section. This use of an augmented IST program may be acceptable provided the basis for deviations from the ASME OM Code, as incorporated by reference in this section, demonstrates an acceptable level of quality and safety, or that implementing the Code provisions would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety …"

The NRC regulations in 10 CFR 50.55a(f)(5)(iii) require that if a licensee has determined that conformance with certain Code requirements is impractical for its facility, the licensee shall notify the Commission and submit information to support the determination.

The NRC regulations in 10 CFR 50.55a(f)(6)(i) state, in part, that the Commission will evaluate determinations, under paragraph 10 CFR 50.55a(f)(5), that Code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines are authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

3.0 TECHNICAL EVALUATION

3.1 Applicable ASME OM Code

The applicable ASME OM Code for the IST Programs at ONS Units 1, 2, and 3, for the sixth 10-year IST program interval, is the 2017 Edition, which is currently scheduled to commence on July 1, 2022, and end on June 30, 2032.

3.2 ASME Code Components Affected

The licensee requested the NRC staff to grant the use of the proposed alternative described below for the pumps listed in Table 1

Table 1: ASME Code Components Applicable to ON-SRP-HPI-03

Component Identification	**OM Code Group**
1HPI-PU-001, 1A HPI Pump	A
1HPI-PU-002, 1B HPI Pump	A
1HPI-PU-003, 1C HPI Pump	A
2HPI-PU-001, 2A HPI Pump	A
2HPI-PU-002, 2B HPI Pump	A
2HPI-PU-003, 2C HPI Pump	A
3HPI-PU-001, 3A HPI Pump	A
3HPI-PU-002, 3B HPI Pump	A
3HPI-PU-003, 3C HPI Pump	A

3.3 Reason for Request

The licensee stated that performing the ASME OM Code-required vibration measurements on the upper bearing housing for the pumps listed in Table 1 of this SE is impractical due to the location and design features of the motors. The plant would need to be modified to provide a permanent ladder and platform to access the upper bearing on each pump. Also, the upper motor bearing housing is contained within a cone shaped fiberglass protective shroud which would need to be redesigned so that it could be removed in order to perform the required vibration measurements. The removal of the shroud would subject the component to potential damage from foreign material intrusion. The licensee stated that vibration measurements taken on the fiberglass shroud would not provide meaningful information. The licensee considered obtaining axial vibration data at the bottom of the motor near the pump/motor coupling area but determined that the data would be significantly attenuated due to the distance from the thrust bearing.

3.4 Proposed Relief Request

The licensee submitted relief request ON-SRP-HPI-03 related to the pump testing requirements in the ASME OM Code, Subsection ISTB, "Inservice Testing of Pumps in Light-Water Reactor Nuclear Power Plants – Pre-2000 Plants," in accordance with 10 CFR 50.55a(f)(5)(iii). Subparagraph (b) in paragraph ISTB-3450, "Vibration", states, "On vertical line shaft pumps, measurements shall be taken on the upper motor-bearing housing in three approximately orthogonal directions, one of which is the axial direction."

The licensee proposed to take vibration readings at the motor inboard bearing and approximately midway on the motor housing, and at the pump inboard bearing and on the pump stand. At each location, vibration measurements would be recorded in two approximately orthogonal directions perpendicular to the rotating shaft. The licensee stated that these locations were chosen in an effort to identify specific failure modes, and they have proven to provide early indication of abnormal pump and motor performance. Therefore, measuring vibrations at these locations will ensure that the health of the pumps is sufficiently examined.

3.5 NRC Staff Evaluation

As incorporated by reference in 10 CFR 50.55a, ASME OM Code (2017 Edition), Subsection ISTB, paragraph ISTB-3450(b), states that "On vertical line shaft pumps, measurements shall be taken on the upper motor-bearing housing in three approximately orthogonal directions, one of which is the axial direction." In lieu of ISTB-3450(b) requirement, the licensee proposed to take vibration readings at the motor inboard bearing and approximately midway on the motor housing, and at the pump inboard bearing and on the pump stand.

The ASME OM Code recognizes the value of implementing a vibration analysis strategy for monitoring vertical line shaft pumps by requiring measurements to be taken on the upper motor bearing housing in three orthogonal directions, one of which is the axial direction. The licensee proposes to obtain vibration measurements on the nine HPI vertical line shaft pumps listed in Table 1 of this SE at two locations on the motor and two locations on the pump. The locations on the motor are at the motor inboard bearing housing area and approximately midway on the motor housing. The pump locations are at the pump inboard bearing and on the pump stand. Vibration measurements will be recorded in two orthogonal directions at the stated locations. The vibration measurements will be tracked and trended along with the hydraulic performance test data. Axial vibration data will not be obtained. The licensee stated that axial measurement at the upper motor bearing is impractical due to an obstruction from a fiberglass protective shield which protects the upper motor from the elements. Accessing the upper motor bearing housing would require fabrication of scaffolding and a redesign of the protective fiberglass shield so that it could be removed.

Obtaining vibration measurements in two orthogonal directions at the inboard motor bearing area and midway on the motor housing as well as two orthogonal directions at the pump inboard bearing and on the pump stand will provide performance data on the upper and lower bearings and overall pump and motor assembly. The NRC staff notes that parameters such as bearing health, pump/motor unbalance, pump/motor looseness, electrical faults, and resonance issues can be monitored using these measurement points. The licensee has obtained vibration measurements at these locations for these pumps and motors in the current IST interval. The NRC staff finds that the collected data at two orthogonal locations on the motor and two orthogonal locations on the pump, coupled with the trending of pump hydraulic performance data, provides an acceptable alternative for monitoring component health.

The NRC staff finds that requiring the licensee to meet the ASME OM Code requirements for vibration measurement locations for these pumps is impractical. Based on the prior acceptance by the NRC staff of these vibration measurement locations for these pumps and similar pump and motor vibration measurement locations for other licensees, the NRC staff finds that measuring vibrations at the locations requested for these pumps and motors is acceptable. Allowing vibration measurements at the requested locations provides reasonable assurance of operational readiness of the pumps listed in Table 1 of this SE.

4.0 CONCLUSION

As described above, the NRC staff has determined that it is impractical for the licensee to comply with certain pump testing requirements of the ASME OM Code. The NRC staff has further determined that granting relief request ON-SRP-HPI-03 for the pumps listed in Table 1 of this SE, in accordance with 10 CFR 50.55a(f)(6)(i), is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(f)(5)(iii) and is in compliance with the requirements of 10 CFR 50.55a with the granting of this relief request.

Therefore, the NRC staff grants relief, pursuant to 10 CFR 50.55a(f)(6)(i), for the testing alternative contained in relief request ON-SRP-HPI-03, for ONS Units 1, 2, and 3 for the sixth 10-year IST program interval.

All other ASME OM Code requirements for which relief or an alternative was not specifically requested and approved as part of these requests remain applicable.

Principal Contributor: Robert Wolfgang, NRR

Date: February 23, 2022

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