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

November 29, 2022

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 – AUTHORIZATION AND SAFETY EVALUATION FOR ALTERNATIVE REQUEST I6R-02 (EPID L-2022-LLR-0038)

LICENSEE INFORMATION

Recipient's Name and Address: Mr. David P. Rhoades
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Licensee: Constellation Energy Generation, LLC

Plant Name(s) and Unit(s): Dresden Nuclear Power Station (Dresden), Units 2 and 3

Docket No(s).: 50-237 and 50-249

APPLICATION INFORMATION

Submittal Date: March 25, 2022

Submittal Agencywide Documents Access and Management System (ADAMS) Accession No.: ML22084A615

Applicable Inservice Inspection (ISI) Program Interval and Interval Start/End Dates: The sixth 10-year ISI interval is scheduled to begin on January 20, 2023, and end on January 19, 2033.

Alternative Provision: The licensee requested an alternative under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2).

ISI Requirement: The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) requirements applicable to this request originate in section XI, IWD-2500. Table IWD-2500-1, Examination Category D-B, item No. D2.10, requires that all Class 3 pressure-retaining components be subjected to a system leakage test according to IWD-5220, a visual examination (VT-2) according to IWA-5240, and acceptance standard of IWD-3000 every

inspection period. IWD-5221(b) states that, for Class 3 components in standby systems (or portions of standby systems) that are not operated routinely except for testing, the system leakage test shall be conducted at the system pressure developed during a test conducted to verify system operability (e.g., to demonstrate system safety function or satisfy technical specification surveillance requirements (TS SRs). If portions of a system are associated with more than one safety function, the VT-2 need only be performed during the test conducted at the higher of the test pressures for the respective system safety function.

Applicable Code Edition and Addenda: The code of record for the sixth 10-year ISI interval is 2017 Edition of the ASME Code, section XI.

Brief Description of the Proposed Alternative: The licensee proposed to perform the ASME Code system leakage test and associated VT-2 of the upper and lower portions of the isolation condenser (IC) shell and piping every 120 months, in conjunction with performing Dresden TS SR 3.5.3.4, "Isolation Condenser System Heat Removal Capability Verification Test." Performance of TS SR 3.5.3.4 is required to verify operability and heat removal capability of the IC system when it is in service performing its normal operating function. The licensee stated that the pressure developed during the performance of TS SR 3.5.3.4 meets the ASME Code, section XI, IWD-5221(b), however, the testing frequency of every 120 months does not meet table IWD-2500-1 frequency of every inspection period which is the subject of this alternative request I6R-02.

During remaining inspection periods of the sixth 10-year ISI interval, the licensee proposed to perform the system leakage test and associated VT-2 of the lower portions of the IC shell and piping at the static head pressure developed from the elevation of IC shell side water level which is maintained at greater than or equal to 6 feet. This test is performed while the IC system is in a standby alignment with its shell side vented to the atmosphere.

In alternative request I6R-02, ASME Code Class 3 IC shell and piping are affected. For purpose of ISI activity, the IC is divided into the IC upper and lower portions. The IC is not normally in service, instead, it is in a standby alignment with its shell side vented to the atmosphere through a non-isolable vent line. The IC is normally aligned with the IC shell side water level greater than or equal to 6 feet in accordance with Dresden's TS.

For additional details on alternative request I6R-02, please refer to the document located at the ADAMS Accession No. identified above.

STAFF EVALUATION

The U.S. Nuclear Regulatory Commission (NRC) staff evaluated alternative request I6R-02 pursuant to 10 CFR 50.55a(z)(2). The NRC staff focused on whether compliance with the specified requirements of 10 CFR 50.55a(g), or portions thereof, would result in hardship or unusual difficulty, without a compensating increase in the level of quality and safety.

Hardship Justification

In its evaluation, the NRC staff assessed whether the licensee provided adequate description and technical information to support the basis for a hardship or unusual difficulty if it were required to comply with the ASME Code required system leakage test. The licensee's bases for hardship are as follows:

- Conducting additional IC system heat removal capability tests solely for the purpose of complying with the ASME Code leakage test necessitate a minimum of a 25 percent reduction in reactor power to perform the testing. This introduces an unnecessary transient on the reactor and a challenge to station operators. During actuation of the IC, one valve is opened to allow condensate in the IC tube bundle to return to the reactor vessel. As a result, a volume of relatively cold water is returned to the reactor resulting in an increase in reactor power.
- Dresden, Unit 3 utilizes reactor water cleanup (RWCU) system return piping for the IC condensate return path which requires the RWCU system to be removed from service prior to performing TS SR 3.5.3.4 and returned to service following the performance of the TS SR. This is necessary to mitigate the thermal transient on the RWCU system piping. Manipulation of the RWCU system presents a small transient to reactor operation and has even resulted in an automatic reactor scram on a low reactor water level signal during restoration of the RWCU system operation on one occasion.
- Radiation dose rates increase up to 100 millirem per hour (mrem/hr) on the IC floor during performance of TS SR 3.5.3.4 and heat capacity testing of the IC as compared to the normal dose rates of less than 5 mrem/hr on the IC floor. This creates challenges to personnel who are performing the VT-2 while the IC system is in service. The total radiation dose personnel receive during performance of the IC system leakage test is typically about 125 mrem.
- During IC heat removal test, the shell side water is used to condense reactor steam in the tube bundle. The shell side water volume boils and is exhausted through the IC vent pipe that extends through the reactor building wall and discharges to the local atmosphere. For the safety of plant personnel, access to the vicinity of the IC vent must be controlled during the performance of the IC heat capacity tests.
- IC shell cannot be isolated and pressurized to meet the ASME Code, Section XI, IWD- 5221(b) pressure requirements when in a standby alignment. It would be an abnormal activity to fill the IC to the top simply to achieve a slight increase in static head for the additional system leakage test. Water added to the IC shell to raise level above the normal standby conditions would subsequently have to be drained and processed as radwaste. This creates additional complication.

Based on above, the NRC staff finds that creating an unnecessary reactor transient which could potentially result in automatic reactor scram, exposing personnel to excessive radiation dose and unnecessary safety hazards, and creating excess radioactive waste if the system leakage test and VT-2 are to be performed according to the ASME Code. Therefore, the NRC staff finds that imposing an unnecessary transient on the reactor, concerns from as low as reasonably achievable (ALARA) radiation exposure for plant personnel, and/or dealing with excess radioactive waste perspective constitute a justifiable hardship or unusual difficulty.

Reasonable Assurance of Structural Integrity and Leak Tightness

In its evaluation, the NRC staff assessed whether the licensee used the highest achievable test pressure to conduct system leakage test and the way in which the licensee adequately preformed the testing and VT-2 of the Dresden's IC shell and piping for leakage. The NRC staff found that the licensee will specifically conduct the system leakage test as follows:

- Every 120 months, during one inspection period of the sixth 10-year ISI interval, the upper and lower portions of the Dresden's IC shell and piping (i.e., Test Blocks 2IC01 and 2IC02 for Dresden, Unit 2, and Test Blocks 3IC01 and 3IC02 for Dresden, Unit 3) will be subjected to a system leakage test at the IWD-5221(b) required test pressure during performance of TS SR 3.5.3.4. According to TS SR 3.5.3.4, the verification of the heat removal capability of the IC system is required every 120 months.
- During the other two inspection periods of the sixth 10-year ISI interval, the lower portion of the Dresden's IC shell and piping will be subjected to a system leakage test using the static head pressure developed from the elevation of at least 6 feet of IC shell side water. This system leakage test is performed while the IC system is in a standby alignment with its shell side vented to the atmosphere through a non-isolable vent line. The upper portions of the IC shell and piping do not experience any pressure since is open to atmosphere.
- As part of the system leakage test, the licensee will perform the VT-2 on the Dresden's IC shell and piping in accordance with IWA-5240 to identify any leak.

Based on the above, the NRC staff determines that the licensee's alternative system leakage test is adequate because the licensee will utilize the highest achievable test pressure to pressurize and the ASME Code VT-2 to identify any evidence of leak.

In addition, the NRC staff considered whether the licensee's proposed alternative provided reasonable assurance of structural integrity and leak tightness of the Dresden's IC shell and piping based on the presence or absence of known active degradation mechanisms and the significance of a leak and/or structural failure. According to Dresden's updated final safety analysis report (UFSAR) (ML21179A042), the IC shell, piping, and fittings are made of carbon steel or stainless steel. The NRC staff notes that fatigue (low cycle fatigue and high cycle fatigue) and/or stress corrosion cracking (SCC) could be potential degradation mechanisms. Field experience has shown that fatigue and SCC under the conditions associated with the IC shell and piping is not expected. Therefore, it is expected that any significant degradation of the Dresden's IC shell and piping would be detected by the alternative leakage test accompanied by the ASME Code VT-2 performed.

Therefore, the NRC staff finds that the alternative system leakage test accompanied with the ASME Code VT-2 is adequate to provide reasonable assurance of structural integrity and leak tightness of the Dresden's IC shell and piping. Complying with the requirement in IWD-5220 would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

CONCLUSION

As set forth above, the NRC staff has determined that complying with the specified requirements described in the licensee's request referenced above would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The proposed alternative provides reasonable assurance of structural integrity and leak tightness of the IC shell and piping. Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(2).

Therefore, the NRC staff authorizes the use of alternative request I6R-02, at Dresden, Units 2 and 3, for the sixth 10-year ISI interval which is scheduled to begin on January 20, 2023, and to end on January 19, 2033.

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

Principal Contributor: A. Rezai, NRR

Date: November 29, 2022

Nancy L. Salgado

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DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 – AUTHORIZATION AND SAFETY EVALUATION FOR ALTERNATIVE REQUEST I6R-02 (EPID L-2019-LLR-0038) DATED NOVEMBER 29, 2022

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