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

February 12, 2009

Mr. James A. Spina, Vice President
Calvert Cliffs Nuclear Power Plant, Inc.
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: RELIEF REQUEST PT-3-01 ON END-OF-INTERVAL SYSTEM PRESSURE TEST FOR CLASS 1 COMPONENTS - CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2 (TAC NOS. ME0112 AND ME0113)

Dear Mr. Spina:

By letter dated November 12, 2008, Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) submitted Relief Request No. PT-3-01 relating to system pressure tests applicable to the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, for the third 10-year inservice inspection (ISI) interval. The relief request pertains to system leakage tests conducted at or near the end of the inspection interval. In lieu of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) requirement to pressurize all Class 1 pressure retaining components within the system boundary, the licensee has proposed an alternative to pressurize up to the inboard isolation valve which would exclude a small segment of the Class 1 pressure boundary from attaining test pressure. The visual examination during pressurization would include all components within the system boundary.

The Nuclear Regulatory Commission staff finds that the licensee's proposed alternative provides reasonable assurance of structural integrity and is, therefore, acceptable. Furthermore, the staff concludes that the licensee's compliance to Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations,* 50.55a(a)(3)(ii), the staff authorizes the ISI program alternative proposed in PT-3-01 for the third 10-year ISI interval of the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2.

Our safety evaluation is enclosed.

Sincerely,

Mark G. Kowal, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION PROGRAM RELIEF REQUEST NO. PT-3-01

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2

CALVERT CLIFFS NUCLEAR POWER PLANT, INC.

DOCKET NOS. 50-317 AND 50-318

1.0 INTRODUCTION

By letter dated November 12, 2008 (Agencywide Documents Access and Management System Accession No. ML083170365), Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) submitted Relief Request No. PT-3-01 relating to system pressure tests applicable to the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, for the third 10-year inservice inspection (ISI) interval. The relief request pertains to system leakage tests conducted at or near the end of the inspection interval. In lieu of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) requirement to pressurize all Class 1 pressure retaining components within the system boundary, the licensee has proposed an alternative to pressurize up to the inboard isolation valve which would exclude a small segment of the Class 1 pressure boundary from attaining test pressure. The visual examination during pressurization would include all components within the system boundary. The relief request pertains to portions of the safety injection (SI) system, shutdown cooling system, and drain lines in the reactor coolant system (RCS).

The Nuclear Regulatory Commission (NRC) staff has evaluated the licensee's request for relief pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii) that compliance to the requirement of the Code of Record would result in hardship without a compensating increase in the level of quality and safety.

2.0 REGULATORY REQUIREMENTS

10 CFR 50.55a(g) requires that ISI of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the NRC, if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval subject to the limitations and modifications listed in paragraph (b) of this section. The ISI Code of Record for the third 10-year ISI inspection interval of Calvert Cliffs Units 1 and 2 is the 1998 Edition of the ASME Code, Section XI.

3.0 TECHNICAL EVALUATION

System/Component(s) for Which Relief is Requested

All ASME Code Class 1 components in the system pressure boundary between isolation valves in the RCS vent and drain lines, shutdown cooling suction and SI header segments.

ASME Code Requirements

Table IWB-2500-1, Examination Category B-P, Item Numbers B15.50 (Piping) and B15.70 (Valves) requires that a system leakage test be conducted once each 10-year inspection interval in accordance with the requirements of IWB-5222. The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 components within the system boundary.

Licensee's Request for Relief

Relief is requested from the specific ASME Code, Section XI, Subparagraph IWB-5222(b) requirement to extend the pressure boundary to all Class 1 pressure retaining components during the system leakage tests conducted at or near the end of inspection interval. The segment of Class 1 piping between an inboard and an outboard isolation valve including the valves in the system boundary for the shutdown cooling system, SI system, and RCS will be visually examined for evidence of past leakage and/or leakage during the system leakage test conducted with the isolation valves in the position required for normal reactor startup.

Licensee's Basis for Requesting Relief

The Class 1 piping and connections are equipped with isolation valves (including check valves) which provide double isolation of the reactor coolant pressure boundary (RCPB). These valves are generally maintained in the closed position during normal plant operation. The piping outboard of the first isolation valve is not normally pressurized. Under normal operating conditions, the piping and connections are subject to RCS pressure and temperature only if leakage through the inboard valves occurs. To perform the Code required pressure test, it would be necessary to manually open the inboard valves or install temporary jumper hoses around check valves to pressurize the piping and connections between the two isolation valves.

The components and piping connected to the RCS, such as loop drain lines, the SI system, and the shutdown cooling system for which relief is requested are the portion of piping between an inboard and an outboard isolation valve including the valves.

The following specific lines are included in the request for relief.

(i) Small Size Class 1 RCS vent and drain lines.

(ii) Piping segment consisting of piping between two shutdown cooling suction valves MOV-651 and MOV-652.

(iii) Piping segments in the SI system that provide flow path for the SI tank, high pressure and low pressure safety injection, and shutdown cooling supply to the RCS. Associated fill, vent, drain, and instrument lines are also included within these segments. In pressurizing the piping segments including the valves to the Code-required test pressure, the licensee would be subject to hardship or unusual difficulty without a compensating increase in the level of quality and safety as stated below.

- The affected components are located inside containment. Tests performed inside the radiologically restricted area increase the total exposure to plant personnel while modifying and restoring system lineups, as well as contamination of test equipment.

- Use of single valve isolation from systems with lower design pressures could result in over-pressurization of these systems and damage to permanent plant equipment.

- Use of single valve isolation is a significant personnel safety hazard.

- There are no test connections for testing the piping between the motor operated valves in the shutdown cooling system and between the check valve and the motor operated valve in the SI system, and thus, pressurization using an external source would require significant modification to the piping segments.

The licensee proposes an alternative method for the pressurization boundary for specified Class 1 piping. The proposed method will leave the barriers intact for the visual examination rather than opening or bypassing the first isolation barrier prior to the examination. This modified approach will result in significant personnel exposure savings as well as minimizing the risk of personnel injury or contamination associated with opening or bypassing these normally closed isolation devices. Since these pressure tests are performed at the end of a refueling outage, elimination of the requirement to open or bypass these isolation devices will also minimize the impact on the outage duration.

Licensee's Proposed Alternative

Calvert Cliffs will conduct the required end of interval system pressure tests as prescribed by Table IWB-2500-1, Examination Category B-P, using the boundary conditions and full examination coverage of IWB-5222(a) of ASME Code, Section XI. In addition, those Class 1 pressure boundary portions of the systems described above that are statically pressurized during normal operation and/or pressurized during the high-pressure safety injection system functional pressure test will be visually examined during both the RCS system leakage test and the functional pressure test conditions.

4.0 STAFF EVALUATION

The Code of Record, 1998 Edition to the ASME Code, Section XI, Table IWB-2500-1, Category B-P, Item numbers B15.50 (Piping) and B15.70 (Valves) requires system leakage tests of Class 1 pressure retaining piping and valves once per 10-year interval conducted at or near the end of each inspection interval. The system leakage test is required to be performed at a test pressure not less than the nominal operating pressure of the RCS corresponding to 100% rated reactor power and shall include all Class 1 components within the RCS boundary. However, in Relief Request PT-3-01, the licensee proposed an alternative to the boundary subject to test pressurization required under the Code of Record for the RCS drain lines, and the piping segments in SI and shutdown cooling systems between an inboard and an outboard isolation valve in the system boundary. The line configuration, as outlined, provides double-isolation of the RCS. Under normal plant operating conditions, the subject pipe segments would see RCS temperature and pressure only if leakage through an inboard isolation valve occurs. As requested in PT-3-01, with the inboard isolation valve closed during the system leakage test, the segment of piping between an inboard and an outboard isolation valve would not get pressurized to the required test pressure during a system leakage test. In order to perform the ASME Code-required test, it would be necessary to manually open each inboard isolation valve to pressurize the corresponding pipe segment. Pressurization by this method would preclude double valve isolation of the RCS and may cause safety concerns for the personnel performing the examination. Alternatively, the line segments between the isolation valves could be separately pressurized to the required test pressure by a hydrostatic pump but there are no test connections between the isolation valves to attach a pump.

One factor that supports the acceptability of the licensee's proposal is that, the segments of Class 1 pressure boundary between the inboard and outboard isolation valves in shutdown cooling and SI systems that are not tested to the Code-required test pressure, would be pressure tested at the associated system's operating pressure during the shutdown cooling system inservice test and the SI system functional test during the refueling outage. Another mitigating factor in accepting the test pressure at system operating pressure in lieu of the Code-required test pressure is based on the fact that there is no known degradation mechanism, such as intergranular stress-corrosion cracking, primary water stress-corrosion cracking, or thermal fatigue, that is likely to affect the welds in the subject segments.

The subject isolation valves are located inside the containment, and any manual actuation (opening and closing) of these valves would expose plant personnel to undue radiation exposure during modification and restoration of system lineups. The NRC staff concurs with the licensee's finding that compliance with the Code requirement would result in hardship without a compensating increase in the level of quality and safety. The licensee, however, has proposed

an alternative to visually examine (VT-2) for leaks in the isolated portion of the subject segments of piping with the inboard and outboard isolation valves in the normally closed position which would indicate any evidence of past leakage during the operating cycle as well as any active leakage during the system leakage test if the inboard isolation valve leaks. The staff believes that the licensee's proposed alternative will provide reasonable assurance of structural integrity for the RCS drain lines and the piping segments in SI and shutdown cooling systems between an inboard and an outboard isolation valve including the valves while maintaining personnel radiation exposure to as low as reasonably achievable.

5.0 CONCLUSION

It is concluded that test pressurization during system leakage tests of Class 1 pressure retaining components within the system boundary of RCS drain lines and piping segments in SI and shutdown cooling systems between an inboard and an outboard isolation valve including the valves as required by the Code of Record would result in hardship to the licensee without a compensating increase in the level of quality and safety. The licensee's proposed alternative in PT-3-01 provides a reasonable assurance of structural integrity for the subject piping segments. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in PT-3-01 is authorized for the third 10-year ISI interval for Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector

Principal Contributor: Prakash Patnaik

Date: February 12, 2009

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Mr. James A. Spina, Vice President
Calvert Cliffs Nuclear Power Plant, Inc.
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Dear Mr. Spina:

By letter dated November 12, 2008, Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) submitted Relief Request No. PT-3-01 relating to system pressure tests applicable to the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, for the third 10-year inservice inspection (ISI) interval. The relief request pertains to system leakage tests conducted at or near the end of the inspection interval. In lieu of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ADME Code) requirement to pressurize all Class 1 pressure retaining components within the system boundary, the licensee has proposed an alternative to pressurize up to the inboard isolation valve which would exclude a small segment of the Class 1 pressure boundary from attaining test pressure. The visual examination during pressurization would include all components within the system boundary.

The Nuclear Regulatory Commission staff finds that the licensee's proposed alternative provides reasonable assurance of structural integrity and is, therefore, acceptable. Furthermore, the staff concludes that the licensee's compliance to Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations,* 50.55a(a)(3)(ii), the staff authorizes the ISI program alternative proposed in PT-3-01 for the third 10-year ISI interval of the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2.

Our safety evaluation is enclosed.

Sincerely,
/RA/
Mark G. Kowal, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318
Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

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