June 18, 2008

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: CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2 – THIRD 10-YEAR INTERVAL INSERVICE INSPECTION (ISI) REQUEST FOR RELIEF NOS. ISI-08 AND ISI-14 (TAC NOS. MD6556 AND MD6559)

Dear Mr. Spina:

By letter dated August 22, 2007, Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) submitted Relief Request (RR) Nos. ISI-08 and ISI-14, related to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI requirements for the Third 10-Year Interval ISI Program for the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2. Subsequently, by letter dated April 30, 2008, RR No. ISI-08 was withdrawn.

RR No. ISI-14 requested relief from performing a system pressure test of the reactor vessel head flange leak detector piping at the Code-required test pressure corresponding to nominal operating pressure during system operation in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii). Under 10 CFR 50.55a(a)(3)(ii), the Nuclear Regulatory Commission (NRC) can authorize a proposed alternative if it is determined that compliance with the specific Code requirements would result in hardship or unusual difficulty without a compensating increase in quality and safety. Alternatively, under 10 CFR 50.55a(g)(6)(i), the NRC can grant relief and impose alternative requirements if it is determined that compliance with Code requirements is impractical. Examples of impracticality include creating excessive plant personnel hazards or having to make major plant or hardware modifications.

Based on the necessity of making a major modification to the reactor vessel flange to meet the Code requirements, the NRC staff evaluated the licensee's proposed alternative in the relief request pursuant to 10 CFR 50.55a(g)(6)(i). The NRC staff concludes that the Code requirements are impractical and would cause significant burden on the licensee due to the major redesign of the reactor vessel flange if the Code-requirements are met. The NRC staff further concludes that the licensee's proposed alternative will provide reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), the NRC staff grants relief and imposes the licensee's proposed alternative as stated in RR No. ISI-14 for the third 10-year ISI interval of Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2. The relief granted is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. 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.

Please contact Douglas Pickett at 301-415-1364 if you have any questions on this matter.

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: See next page

Please contact Douglas Pickett at 301-415-1364 if you have any questions on this matter.

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: See next page
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Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

REQUEST FOR RELIEF NO. ISI-14

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 August 22, 2007 (Agencywide Documents Access and Management Systems (ADAMS) Accession No. ML072360293), Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) submitted Relief Request (RR) Nos. ISI-08 and ISI-14, related to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI requirements for the Third 10-Year Interval Inservice Inspection (ISI) Program for the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2. By letter dated April 30, 2008 (ADAMS Accession No. ML081210673), the licensee withdrew ISI-08.

In RR No. ISI-14, the licensee requested relief from performing a system pressure test of the reactor vessel head flange leak detector piping at the Code-required test pressure corresponding to nominal operating pressure during system operation in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii). The licensee has stated in the request for relief that the configuration of the leak detection piping precludes implementing the Code-required pressure test either with the vessel head installed or while removed. Use of a pneumatic test at reactor operating pressure would pose undue safety risk to personnel. In addition, performance of a system pressure test of the vessel head flange detection piping in accordance with Code requirements would necessitate redesign of the O-ring and its groove in the reactor vessel flange.

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 Section XI of editions of the ASME Boiler and Pressure Vessel Code and Addenda that become effective subsequent to editions specified therein 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 therein.

The ISI Code of Record for the third 10-year ISI interval for Calvert Cliffs Nuclear Power Plant, Unit Nos. 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

Reactor Vessel Head Flange Leak Detector Piping. Lines CC-9-1009 and CC-9-2002

ASME Code Requirements

The 1998 Edition of ASME Code, Section XI, Table IWC-2500-1, Examination Category C-H, Item Number C7.10 requires a system leakage test conducted at a pressure corresponding to nominal operating pressure during system operation (IWC-5221). The contained fluid in the system shall serve as the pressurizing medium (IWC-5210(b)(1)).

Licensee's Request for Relief

Relief is requested from performing the system leakage test at a pressure corresponding to nominal operating pressure during system operation. The licensee proposed an alternative pressure testing requirement in lieu of the system leakage test required under IWC-5221 for the reactor vessel head flange leak detector piping.

The following discussion is taken from the licensee's submittal:

> #### Basis for Alternative
>
> The Reactor Vessel Head Flange Leak Detector Piping is separated from the reactor pressure boundary by one passive membrane, which is an O-ring located on the vessel flange. A second O-ring is located on the opposite side of the tap in the vessel flange (see Figures ISI-14-1 and ISI-14-2). This piping is required during plant operation in order to indicate failure of the inner flange seal O-ring. Failure of the O-ring would result in the annunciation of a High Level Alarm in the Control Room. Failure of the inner O-ring is the only condition under which this line is pressurized.
>
> The configuration of this piping precludes system pressure testing while the vessel head is removed because the odd configuration of the vessel tap (see

Figure ISI-14-2) coupled with the high test pressure requirement prevents the tap in the flange from being temporarily plugged or connected to other piping. The opening in the flange is only 3/16 of an inch in diameter and is smooth walled, making the effectiveness of a temporary seal very limited. Failure of this seal could possibly cause ejection of the device used for plugging or connecting to the vessel.

The configuration also precludes pressure testing with the vessel head installed because the seal prevents complete filling of the piping, which has no vent available. Additionally, a pneumatic test performed with the head installed is precluded due to the configuration of the top head. The top head of the vessel contains two grooves that hold the O-rings. The O-rings are held in place by a series of retainer clips that are housed in recessed cavities in the flange face. If a pressure test was performed with the head on, the inner O-ring would be pressurized in a direction opposite to what it would see in normal operation. This test pressure would result in a net inward force on the inner O-ring that would tend to push it into the recessed cavities that house the retainer clips. The thin O-ring material would very likely be damaged by this inward force.

In addition to the problems associated with the O-ring design that preclude this testing, it is also questionable whether a pneumatic test is appropriate for this piping. The use of a pneumatic test performed at RPV [reactor pressure vessel] nominal operating pressure would represent an unnecessary safety risk to personnel in the unlikely event of a test failure, due to the large amount of stored energy contained in pressurized air.

Operational testing of this piping is precluded, because it will only be pressurized in the event of a failure of the inner O-ring. It is extremely impracticable to purposely fail the inner O-ring in order to perform a pressure test.

Proposed Alternative Examination

A VT-2 visual examination will be performed on the Reactor Vessel Head Flange Leak Detector Piping during flood-up of [the] refueling pool during a refueling outage. The hydrostatic head developed due to the water above the vessel flange during flood-up will allow for the detection of any gross indications in the piping. This examination will be performed with the frequency specified by Table IWC-2500-1 for an IWC-5220 test (once each inspection period).

4.0 STAFF EVALUATION

The ASME Code, Section XI of Record requires that all Class 2 components undergo a system leakage test once each inspection period (i.e., 40 months). In RR No. ISI-14, the licensee requested relief from performing a system leakage test of the reactor vessel head flange leak detector piping at the Code required test pressure corresponding to the nominal operating pressure during system operation.

The piping is located between the inner and the outer O-ring seals of the vessel flange and is required during plant operation in order to detect failure of the inner flange seal O-ring. The design of this line makes the Code-required system pressure test impractical because of the possibility of damage to the O-ring seals. To perform the system pressure test in accordance with the Code requirements, the reactor vessel head flange leak detector piping would have to be redesigned, fabricated, and installed. This would impose a severe burden on the licensee.

The licensee has proposed to perform a VT-2 visual examination of the reactor vessel head flange leak detector piping. This examination would be performed during a refueling outage with the reactor cavity flooded with water. Under these conditions, a hydrostatic head would be developed due to the water leg that would extend from the top of the vessel flange to the surface of the refueling cavity. If a significant flaw exists in the piping, the hydrostatic head would be sufficient to induce water seepage. A qualified VT-2 inspector would readily identify this condition. Due to the radiological conditions that would exist during power operation, the NRC staff agrees that a VT-2 examination can only be conducted during a refueling outage.

RR No. ISI-14 requested relief from performing a system pressure test of the reactor vessel head flange leak detector piping at the Code-required test pressure corresponding to nominal operating pressure during system operation in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii). Under 10 CFR 50.55a(a)(3)(ii), the Nuclear Regulatory Commission (NRC) can authorize a proposed alternative if it is determined that compliance with the specific Code requirements would result in hardship or unusual difficulty without a compensating increase in quality and safety. Examples of hardship include creating significant hazards to plant personnel or having to replace equipment or in-line components. Alternatively, under 10 CFR 50.55a(g)(6)(i), the NRC can grant relief and impose alternative requirements if it is determined that compliance with Code requirements is impractical. Examples of impracticality include creating excessive plant personnel hazards or having to make major plant or hardware modifications.

In order to meet Code requirements, the licensee would need to redesign the reactor vessel flange. The staff considers this to represent a major plant modification and not simply a hardship or unusual difficulty. Thus, the NRC staff has evaluated the licensee's proposed alternative in the relief request pursuant to 10 CFR 50.55a(g)(6)(i). The NRC staff concludes that the Code requirements are impractical and would cause significant burden on the licensee due to the need for a major redesign of the reactor vessel flange if the Code-requirements are followed. The NRC staff further concludes that the licensee's proposed alternative will provide reasonable assurance of structural integrity because a significant flaw would be readily identified..

5.0 CONCLUSION

Based on the NRC staff's evaluation of the request for relief, the Code requirement to perform a system leakage test of the Reactor Vessel Head Flange Leak Detector Piping at the Code required test pressure corresponding to the nominal operating pressure during system operation is impractical and would cause severe burden on the licensee if the requirement is imposed. The licensee's proposed alternative provides reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), the NRC staff grants relief and imposes the

licensee's proposed alternative as stated in RR No. ISI-14 for the third 10-year ISI interval of Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2.

The relief granted is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. 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: P. Patnaik, NRR

Date: June 18, 2008