



Callaway Plant

May 2, 2013

ULNRC-05986

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

10 CFR 50.55a

Ladies and Gentlemen:

**DOCKET NUMBER 50-483  
CALLAWAY PLANT UNIT 1  
UNION ELECTRIC CO.  
FACILITY OPERATING LICENSE NPF-30  
10 CFR 50.55a REQUEST: PROPOSED ALTERNATIVE  
TO ASME SECTION XI REQUIREMENTS FOR  
LEAKAGE TESTING OF REACTOR PRESSURE VESSEL HEAD  
FLANGE LEAKOFF LINES (RELIEF REQUEST I3R-14)**

Pursuant to 10 CFR 50.55a(a)(3)(ii), Union Electric Company (Ameren Missouri) hereby requests NRC approval of attached Relief Request I3R-14 regarding the pressure at which leakage testing of the reactor pressure vessel flange leakoff lines must be tested, as specified per Paragraph IWC-5221 of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI. Relief is requested on the basis that compliance with the Code-specified pressure requirement to test the leakoff lines at system operating pressure is impractical and would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. A proposed alternative approach to the required testing is described in the attached relief request.

Justification for the requested relief is provided in the Relief Request document itself which is provided as Attachment 1. Also provided, as Attachment 2, are two drawings, one of which is a Piping and Instrumentation drawing (P&ID) with the subject pipe lines marked in red. The second drawing is an isometric drawing that shows in red the sections of piping that are inaccessible for examination, as well as the sections that are accessible for direct examination, in green.

The Code Edition applicable to this request and to the current (third) 10-year Inservice Inspection (ISI) interval for Callaway Plant is the 1998 Edition (up to and including the 2000 Addenda).

It should be noted that, at present, a refueling outage is ongoing at Callaway, i.e., Refuel 19. Due to an issue identified with the subject leakage test for the previous ISI period at Callaway, it is a corrective

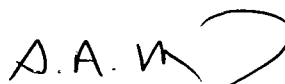
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action (under the Corrective Action Program at Callaway) that this test be performed in the current refueling outage. Consequently, NRC approval of the attached Relief Request is needed during the current outage. Please be advised, therefore, that Ameren Missouri expects to promptly request verbal approval of the enclosed Relief Request following submittal of this written request (i.e., during the current refueling outage).

No new regulatory commitments have been made or identified in this letter or its attachments. For any questions you may have regarding this request, please contact me at 573-676-8719 or Tom Elwood at 314-225-1905.

Sincerely,

A handwritten signature in black ink, appearing to read 'S. A. Maglio', with a large, sweeping flourish extending from the end of the signature.

S. A. Maglio  
Regulatory Affairs Manager

TBE/JAD/nls

Attachments

- 1) 10 CFR 50.55a Request I3R-14
- 2) P&ID and Isometric Drawings

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cc: Mr. Arthur T. Howell  
Regional Administrator  
U.S. Nuclear Regulatory Commission  
Region IV  
612 E. Lamar Blvd., Suite 400  
Arlington, TX 76011-4125

Senior Resident Inspector  
Callaway Resident Office  
U.S. Nuclear Regulatory Commission  
8201 NRC Road  
Steedman, MO 65077

Mr. Fred Lyon  
Project Manager, Callaway Plant  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Mail Stop O-8G14  
Washington, DC 20555-2738

Mr. James T. Polickoski  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Mail Stop O-8B1A  
Washington, DC 20555-2738

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Fort Worth, TX 76109  
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A. C. Heflin  
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S. A. Maglio  
L. H. Kanuckel  
G. S. Kremer  
NSRB Secretary  
R. Holmes-Bobo  
T. B. Elwood  
J. A. Doughty  
M. G. Hoehn  
STARS Regulatory Affairs  
Mr. John O'Neill (Pillsbury Winthrop Shaw Pittman LLP)  
Missouri Public Service Commission

10 CFR 50.55a Request I3R-14

Proposed Alternative  
In Accordance with 10 CFR 50.55a(a)(3)(ii)

—Hardship or Unusual Difficulty  
without Compensating Increase in Level of Quality or Safety—

1. ASME Code Component(s) Affected

- Component: Reactor Pressure Vessel (RPV)
- Description: RPV Head Flange O-Ring Leakoff Lines
- Component number:
  - The following Class 2 lines are within the scope of this request: BB-075-BCB-3/4", BB- 075-BCB-1", BB- 075-BCB-2", BB-076-BCB-3/4", BB-076-BCB-1", BB-076-BCB-2", BB-077-BCB-3/8"
  - The following Class 2 valves are within the scope of this request: BBV0079, BBV0080, BBV0081, BBHV8032
- Piping is ASME III Class 2, SA-312, TP-304, Schedule 160
- Plant design pressure: 2486 psig.

2. Applicable Code Edition and Addenda

American Society of Mechanical Engineers (ASME) Section XI, 1998 Edition with 2000 Addenda.

3. Applicable Code Requirement

IWC-2500 (Table IWC-2500-1) includes requirements for subjecting Class 2 pressure retaining components to a system leakage test with a visual (VT-2) examination each inspection period. IWC-5221, "Pressure," requires the system leakage test to be conducted at the system pressure obtained while the system, or portion of the system, is in service performing its normal operating function or 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).

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(continued)

4. Reason for Request

In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), Callaway requests relief from the Section XI code requirement for system leakage tests of the RPV head flange O-ring leakoff lines on the basis that compliance with the Code-specified pressure requirement to test the leakoff lines at system operating pressure is impractical and would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The RPV head flange O-ring leakoff lines direct leakage, if any, from the RPV head flange to the Reactor Coolant Drain Tank (RCDT) and provide alarms to alert the Control Room of leakage. These lines are separated from the reactor coolant system operating pressure by an inner and outer RPV flange O-ring. The inner O-ring, in conjunction with the reactor vessel and reactor vessel head flange surfaces, functions to isolate the inner and outer RPV head flange leakoff lines from reactor coolant system (RCS) pressure. The outer O-ring functions as a back-up in the event of the inner O-ring failing to perform its intended function. Because of this, the affected leakoff lines are not expected to experience RCS pressure during normal operation. During normal operation, the lines are typically pressurized to RCDT pressure (approximately 4 psig).

With the RPV head flange O-rings installed and performing their intended function, the leakoff lines are not expected to be pressurized above RCDT pressure during the system pressure test following a refueling outage. Applying system pressure to the leakoff lines for the purpose of leakage testing is not practical with the RPV head installed after refueling, since it would require either intentionally failing the O-rings or pressurizing the line with a hydrostatic test pump in the direction opposite to the intended design function of the O-rings, which could unseat the installed O-rings resulting in the need for additional maintenance which would require depressurizing and removal of the reactor vessel head or could damage O-ring sealing material with debris. Performing a leakage test during shutdown prior to the removal of the head for refueling activities would delay the shutdown, requiring the plant to be maintained in Mode 3 at normal operating temperature and pressure at higher decay heat loads, resulting in an incremental increase in core damage frequency. This would be contrary to site efforts to reduce the outage sequence/time to cold shutdown in order to minimize shutdown risk. Performing such a test also may potentially introduce damaging debris to the flange surfaces which would result in the additional radiation exposure if subsequent repairs are required.

With the RPV head removed, the configuration of the leakoff piping would require the lines to be plugged at the RPV flange to establish a boundary for leakage testing at system operating pressure. This would require a design modification to install mechanical threads into each leakoff line at the location of

Relief Request I3R-14  
(continued)

the reactor vessel flange. Threaded plugs would then have to be installed prior to the pressure test and removed after the test was complete. Failure of either plug during the test would result in a personnel safety hazard, in addition to creating a foreign material exclusion (FME) issue. Performing the modification, as well as installation and removal of the plugs for each pressure test, would result in significant dose, which would be contrary to keeping dose as low as reasonably achievable (ALARA), and would again present FME issues.

Purposely failing the O-rings to perform the Code-required pressure test would require purchase of a new set of O-rings and additional time and radiation exposure to remove the RPV head, install new O-rings, and reinstall the head.

5. Proposed Alternative and Basis for Use

In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), Callaway proposes to examine the Class 2 portions of the leak detection system consisting of the accessible portions of the RPV head flange O-ring leakoff lines. The leakoff lines shall be examined using the VT-2 visual examination method. The test shall be conducted at ambient conditions after the refueling cavity has been filled to its normal refueling water level for at least four (4) hours when the piping is subjected to the static pressure head that exists when the reactor cavity is filled.

The Class 2 portions from the reactor vessel flange to the Class 2 boundaries are required to be examined. For segments of the line that are inaccessible for direct VT-2 visual inspection, examination will include inspection of the surrounding areas below the line for evidence of leakage as permitted by ASME Section XI Code, 1998 Edition, 2000 Addenda IWA-5241(b). The sections of the leakoff line to be inspected per the proposed alternative are the same as what would be required by IWC-5000. Only the system conditions are different.

The flange seal leakoff lines are essentially a leakage collection/detection system and would only function as a Class 2 pressure boundary in the event of failure of the O-rings that separate the lines from reactor coolant system operating pressure. Any significant leakage due to this condition would be expected to clearly exhibit boric acid accumulation that would be discernible during the proposed alternate VT-2 visual examination that will be performed. The static head developed with the leak detection line filled with water will allow for the detection of any gross indications in the line.

6. Duration of Proposed Alternative

This Proposed Alternative is requested for the remainder of the current (third) 10-year ISI Interval, which is currently scheduled to end December 18, 2014.

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(continued)

7. Precedents

Similar relief requests have been previously approved by the NRC for the following (with ADAMS Accession No. references):

- (1) STP Nuclear Operating Company (STPNOC) Units 1 and 2, Third Inspection Interval Relief Request RR-ENG-3-10, "Request for Relief from ASME Section XI Code Requirements for Reactor Pressure Vessel Head Flange O-Ring Leakoff Lines Non-Destructive Examination," as approved by NRC letter dated March 12, 2013 (ML12312A234).
- (2) Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3, "Request for Relief from the American Society of Mechanical Engineers (ASME) Code, Section XI, Reactor Vessel Head Flange Seal Leak Detection Piping - Relief Request No. 49," as approved by the NRC letter dated April 4, 2013 (ML13085A254).
- (3) Comanche Peak Nuclear Power Plant, Second Inspection Interval Relief Request C-9, "Alternative Pressure Testing Requirements for the Reactor Pressure Vessel Flange Leak-off Piping," as approved by NRC letter dated December 19, 2011 (ML1 13110092).
- (4) LaSalle County Station, Third Inspection Interval Relief Request 13R-08, "Request for Relief for Inservice Inspection Impracticability of Pressure Testing the RPV Head Flange Seal Leak Detection System," as approved by NRC letter dated January 30, 2008 (ML073610587).
- (5) Susquehanna Steam Electric Station, Third 10-Year Inservice Inspection (ISI) Interval Program Plan Request for Relief 3RR-07, "Exemption from Pressure Testing Reactor Pressure Vessel Head Flange Seal Leak Detection System," as approved by NRC letter dated September 24, 2004 (ML042680078).

Note: The following precedents were for similar lines designated Class 1:

- (6) Millstone Power Station Unit 3, Relief Request IR-3-1 1, "Alternative Pressure Testing Requirements for the RPV Flange Leak-Off Piping," approved by NRC letter dated April 29, 2010 (ML101040042).
- (7) North Anna, Relief Request SPT-013, "Examination Category B-P Pressure Retaining Components in the Reactor Coolant System," approved by NRC letter dated February 9, 2006 (ML060450517).



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(continued)

- (8) Limerick, Second Interval Relief Request RR-33, "Relief for Pressure Testing the RPV Head Flange Seal Leak Detection System," as approved by NRC letter dated January 27, 2009 (ML090060218).

8. References

Code Case N-805, *Alternative to Class 1 Extended Boundary End of Interval or Class 2 System Leakage Testing of Reactor Vessel Head Flange O-ring Leak Detection System*, was issued to the 2010 Edition of the ASME Section XI Code and is listed in Supplement 6 for Code Cases. Code Case N-805 has not been approved by the NRC and is not identified in Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1*.

Attachment 2  
to ULNRC-05986

**Attachment 2**  
**P&ID and Isometric Drawings**  
(2 pages)