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

March 19, 2013

Mr. Rafael Flores
Senior Vice President and
Chief Nuclear Officer
Attention: Regulatory Affairs
Luminant Generation Company LLC
P.O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNIT 1 – REQUEST FOR RELIEF FROM PRESSURE TEST REQUIREMENTS ON REACTOR PRESSURE VESSEL FLANGE LEAK-OFF PIPING FOR THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NO. ME9409)

Dear Mr. Flores:

By letter dated August 23, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12250A670), as supplemented by letter dated January 9, 2013 (ADAMS Accession No. ML130250339), Luminant Generation Company LLC (the licensee) submitted Relief Request No. C-2 for Comanche Peak Nuclear Power Plant (CPNPP), Unit 1, for relief from certain pressure test requirements for the reactor pressure vessel flange leak-off piping. The licensee requested relief for the third 10-year inservice inspection (ISI) interval, which began on August 13, 2010, and ends on August 12, 2020.

The licensee has proposed to perform a VT-2 visual examination of the accessible areas each period on the piping subjected to the static pressure head when the reactor cavity is filled, in lieu of the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Paragraph IWC-5200 for the pressure test. In its letter dated August 23, 2012, the licensee inaccurately identified the test as IWC-5222.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the request and concluded that the proposed alternative provides reasonable assurance of structural integrity and leak tightness of the reactor pressure vessel flange leak-off lines and that complying with the specified ASME Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(a)(3)(ii). Therefore, the NRC authorizes the use of proposed alternative at CPNPP, Unit 1, for the third 10-year ISI interval.

All other ASME Code, Section XI, requirements for which relief has not been specifically requested, remain applicable, including a third-party review by the Authorized Nuclear Inservice Inspector.

The NRC staff's safety evaluation is enclosed. If you have any questions, please contact Balwant K. Singal at 301-415-3016 or by e-mail at Balwant.Singal@nrc.gov.

Sincerely,

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

Docket No. 50-445

Enclosure:
As stated

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF NO. C-2

THIRD 10-YEAR INSERVICE INSPECTION INTERVAL PROGRAM

LUMINANT GENERATION COMPANY LLC

COMANCHE PEAK NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-445

1.0 INTRODUCTION

By letter dated August 23, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12250A670), as supplemented by letter dated January 9, 2013 (ADAMS Accession No. ML130250339), Luminant Generation Company LLC (the licensee), submitted Relief Request No. C-2 for U.S. Nuclear Regulatory Commission (NRC) review and authorization. Specifically, the licensee requests relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, system leakage test requirements for the reactor pressure vessel (RPV) flange leak-off piping at Comanche Peak Nuclear Power Plant (CPNPP), Unit 1. The licensee has proposed to perform a VT-2 visual examination of the accessible areas each period on the piping subjected to the static pressure head when the reactor cavity is filled, in lieu of the requirements of ASME Code, Section XI, Paragraph IWC-5200 for the pressure test. In its letter dated August 23, 2012, the licensee inaccurately identified the test as IWC-5222. The licensee requested relief for the third 10-year inservice inspection (ISI) interval, which began on August 13, 2010, and ends on August 12, 2020.

The licensee's request for alternative has been submitted pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(a)(3)(ii), on the basis that conformance to the requirements would result in hardship without a compensating increase in the level of quality or safety.

2.0 REGULATORY EVALUATION

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 pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection 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 inservice examination of components and system pressure tests conducted during the first 10-year inspection interval and subsequent 10-year inspection 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 inspection interval, subject to the conditions listed therein.

Paragraph 55a(a)(3) of 10 CFR 50 states, in part, that alternatives to the requirements of 10 CFR 50.55a(g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety; or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on analysis of the regulatory requirements, the NRC has the regulatory authority to authorize the proposed alternative under 10 CFR 50.55a(a)(3)(ii) and the NRC staff has reviewed and evaluated the licensee's request accordingly.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Request for Alternative

3.1.1 Components Affected

RPV Flange Leak-Off Piping, 3/4" Nominal Pipe Size (NPS) and 3/8" tubing

Line Numbers 3/4-RC-1-080-2501R-2, 3/4-RC-1-081-2501R-2, 3/4-RC-1-082-2501R-2, and 3/8-2505-2 (tubing)

ASME Code Class: Code Class 2

3.1.2 Code Requirements

The Code of record for the CPNPP, Unit 1, third 10-year ISI interval, which began on August 13, 2010, and is scheduled to end on August 12, 2020, is the 1998 Edition through the 2000 Addenda of Section XI of the ASME Code. The NRC staff notes that CPNPP, Unit 1, is authorized to use the 1998 Edition through the 2000 Addenda of Section XI of the ASME Code until the CPNPP, Unit 2, Code of record update in 2014 (ADAMS Accession No. ML100850122).

Table IWC-2500-1, Examination Category C-H, Item Number C7.10 of ASME Code, Section XI, requires that all pressure retaining components are subject to a system leakage test in accordance with IWC-5220 with a visual VT-2 examination once each inspection period. The system leakage test is performed at the pressure obtained while the subject portion of the system is performing its normal operating function or during a comparable test. In accordance with IWC-5222(a), the pressure retaining boundary includes the portion of the system required to operate or support the safety function up to and including the first normally closed valve.

3.1.3 Licensee's Reason for Request (as stated by the licensee)

The Reactor Pressure Vessel (RPV) head flange seal leak detection piping is separated from the reactor coolant pressure boundary by one passive membrane, which is an O-ring located on the inner vessel flange as shown in Attachment 2 to TXX-12129 [the licensee's letter dated August 23, 2012]. A second O-ring is located on the outside of the tap in the vessel flange. Failure of the inner O-ring is the only condition under which this line is pressurized. Therefore, the line is not expected to be pressurized during the system pressure test following a refueling outage.

The configuration of this piping precludes system pressure testing while the vessel head is removed because the time required by personnel for the installation and removal of a threaded plug in the flange face to act as a pressure boundary for the test would incur significant dose (estimated 20-40 mRem/min [milli roentgen equivalent man per minute]), which would be an ALARA [as low as reasonably achievable] concern. This activity would also present a Foreign Material Exclusion issue for the 1/8" plug that would be required to be installed to complete a leakage test at pressure.

The configuration also precludes pressurizing the line externally with the head installed. 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 were to be performed with the head on, the inner O-ring would be pressurized in a direction opposite to its design function. This test pressure would result in a net inward force on the inner O-ring that would tend to push it into the recessed cavity that houses the retainer clips. The thin O-ring material would likely be damaged by the inward force.

3.1.4 Licensee's Proposed Alternative and Basis for Use (as stated by the licensee)

In lieu of the requirements of IWC-5222(b) [correct reference is IWC-5222(a)], a visual VT-2 examination of the accessible areas will be performed each period on the piping subjected to the static pressure head when the reactor cavity is filled. This test will be part of the reactor coolant Class 2 leakage test.

If the inner O-ring should leak during the operating cycle it will be identified by an increase in temperature of the leak-off line above ambient temperature. This high temperature would actuate an alarm in the Control Room, which would be closely monitored by procedurally controlled operator actions allowing identification of any further compensatory actions required. This leakage would be collected in the Reactor Coolant Drain Tank.

Additionally, the flange seal leak-off line is essentially a leakage collection/ detection system and the line would only function as a Class 2 pressure boundary if the inner O-ring fails, thereby pressurizing the line. If any significant leakage does occur in the leak-off line piping itself during this time of pressurization then it would clearly exhibit boric acid accumulation and be

discernable during the proposed visual VT-2 examination that will be performed unpressurized as proposed in this request.

3.2 NRC Staff Evaluation

The components and piping being addressed are associated with the RPV closure head flange leakage detection system. The RPV closure head flange is designed with two concentric O-rings that act as flange seals to enable the vessel to be pressurized during normal operation, with the inner O-ring acting as the primary pressure seal for the RPV. The area between the O-rings, the secondary outer O-ring, and subject piping segments downstream are designed to support leakage detection should the primary inner O-ring seal leak. These components are not pressurized by primary system water during normal reactor operation, and can only be tested using an external pressure source. The seal leak-off lines are essentially a leakage collection and detection system. Inner O-ring leakage during the operating cycle will be identified by an increase in the line temperature above ambient, actuating an alarm in the Control Room, which would be monitored by procedurally controlled operator actions allowing identification of any further compensatory actions required.

The NRC staff recognizes three possible methods for external pressurization of the subject lines to perform the ASME Code-compliant examination: 1) pressurizing the leak-off lines upon entering the refueling outage prior to removing the RPV head; 2) pressurizing the leak-off lines at the end of the outage after installing new O-rings; and 3) installing a threaded plug in the flange face during the outage to act as a pressure boundary, and removing it after the examination. In response to the NRC staff's request for additional information (RAI) dated December 10, 2012 (ADAMS Accession No. ML12345A188), by letter dated January 9, 2013, the licensee stated, in part, that

> ...pressurizing the leak-off lines with an external source with the head installed would cause the inner o-ring to be put in a condition opposite of design likely causing damage, and o-ring failure. This inner o-ring failure would prevent pressure build-up in the leak-off lines by allowing water to pass by and enter the reactor vessel. To ensure that it was in fact an o-ring failure and not a leak in the leak-off line piping, the portion of piping in [three of the eight] reactor vessel nozzle inspection areas ("sandboxes") would have to be inspected. The conditions inside the "sandboxes" at the beginning of the outage prior to removing the head would be considered unsafe with extremely high temperatures and dose rates ranging from 150 to 250 mRem per hour.

The NRC staff concludes that performing the examination at the beginning of an outage would result in a relatively high radiation dose to personnel which would constitute an ALARA concern and would present a hardship. Since O-rings cannot be reused, pressurizing the subject lines and performing the visual VT-2 examination at the end of an outage would require removal of the RPV head after the examination to replace the newly installed O-rings. The NRC staff concludes that ALARA considerations and the heavy lift evolution associated with replacing the O-rings would present a hardship.

The NRC staff concludes that the third method of performing an ASME Code-compliant examination, installing a 1/8" plug to complete a leakage test with externally supplied pressure,

would also present an ALARA consideration, as well as a foreign material exclusion issue, either of which would present a hardship.

The licensee proposes to pressurize the subject lines each period using the static pressure when the reactor cavity is filled, and performing a visual VT-2 examination of the accessible areas of the piping while subjected to the static pressure head. In response to the NRC staff's RAI, by letter dated January 9, 2013, the licensee stated that the subject lines are not insulated and the pressure at the opening of the flange leak-off line when the examination is performed is 10.6 pounds per square (psi). The licensee also stated that when performing system leakage tests, in accordance with ASME Code, Section XI, IWA-5213(a), a minimum of 10-minutes hold time after test pressure has been reached will be observed before performing the visual VT-2 examination.

In response to the NRC staff's RAI, the licensee provided Final Safety Analysis Report (FSAR) Figure 5.1-1, which shows that the subject lines are 3/4" nominal pipe size (NPS), schedule 160 seamless stainless steel, SA-376, Type 304 or Type 316. These lines run parallel with one line having a normally closed valve and the other having a normally open valve. The lines join downstream of the valves and the common line is instrumented with a strap-on resistance temperature detector (RTD) temperature element mounted on the bottom of the pipe. This line is open to the reactor coolant drain tank. The subject lines would only be expected to contain relatively low pressure when performing their function of passing the potential O-ring leakage to the RTD temperature element.

During plant operation, the O-ring leak-off lines are not normally exposed to reactor coolant or internal pressure. The O-ring leak-off lines will be exposed to the reactor coolant only during O-ring leakage. In response to the NRC staff's RAI, the licensee stated that there has been no known evidence of corrosion, stress-corrosion cracking, fatigue, or other degradation in the subject O-ring leak-off piping at CPNPP. Furthermore, the lines are heavy walled (0.219 inches) and open to the reactor coolant drain tank and, thus, would not be challenged by the pressures anticipated in performance of their function.

Based on the above, the NRC staff concludes that the proposed visual VT-2 examination of the subject leak-off lines after the reactor cavity is filled provides reasonable assurance of structural integrity and leak tightness, and demonstrates that the leak-off lines can perform their intended function. The NRC staff also concludes that requiring compliance with the IWC-5200 system leakage test requirements would result in a hardship without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff concludes that the proposed alternative provides reasonable assurance of structural integrity and leak tightness of the reactor vessel O-ring leak-off lines and that complying with the specified ASME Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii). Therefore, the NRC authorizes the use of proposed alternative at CPNPP, Unit 1, for the third 10-year ISI interval which began on August 13, 2010, and is scheduled to end on August 12, 2020.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Jay Wallace, NRR/DE/EPNB

Date: March 19, 2013

The NRC staff's safety evaluation is enclosed. If you have any questions, please contact Balwant K. Singal at 301-415-3016 or by e-mail at Balwant.Singal@nrc.gov.

Sincerely,

/RA/

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

Docket No. 50-445

Enclosure:
As stated

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ADAMS Accession No. ML13046A385 ***Memo dated 2/7/13**

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