

August 22, 2008

Mr. M. R. Blevins
Executive Vice President
& Chief Nuclear Officer
Luminant Generation Company LLC
ATTN: Regulatory Affairs
P. O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 2 – REQUEST FOR
RELIEF B-2 FOR SECOND 10-YEAR INSERVICE INSPECTION INTERVAL
FROM 10 CFR 50.55a INSPECTION REQUIREMENTS DUE TO PHYSICAL
INTERFERENCES (TAC NO. MD7527)

Dear Mr. Blevins:

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed and evaluated the information provided by Luminant Generation Company LLC (the licensee), in its letter dated December 19, 2007, as supplemented by letter dated May 29, 2008. The licensee requested approval of Relief Request B-2, for Comanche Peak Steam Electric Station (CPSES), Unit 2, which involved limited weld examination coverage. Specifically, during ultrasonic examination risk-informed inservice inspection (ISI) activities conducted for the first outage in the first period of the second 10-year ISI interval, 100 percent coverage of the required examination volume could not be obtained because of weld configuration. The licensee proposed alternatives to the volumetric examination coverage requirements specified by American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. The second 10-year ISI interval began on August 3, 2004, and ends on August 2, 2014.

Based on the information provided in the licensee's submittal, the NRC staff determines that the compliance with the ASME Code required volumetric examination coverage in the presence of unfavorable geometry is not practical. The NRC staff also concludes that the proposed alternative is acceptable because it will provide reasonable assurance of structural integrity of the subject weld. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(g)(6)(i), relief is granted for CPSES, Unit 2 for the second 10-year ISI interval. Granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

M. R. Blevins

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The NRC staff's safety evaluation is enclosed.

Sincerely,

/RA/

Jack N. Donohew, Acting Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-446

Enclosure:
Safety Evaluation

cc w/encl: See next page

M. R. Blevins

- 2 -

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Safety Evaluation

cc w/encl: See next page

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ADAMS Accession No. ML082130147

(*) SE transmitted by Memo dated 7/11/08

OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	NRR/CPNB/BC	OGC, NLO	NRR/LPL4/BC(A)	NRR/LPL4/PM
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DATE	8/4/08	8/4/08	7/11/08	8/21/08	8/22/08	8/22/08

OFFICIAL AGENCY RECORD

Comanche Peak Steam Electric Station

(7/7/2008)

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST B-2, INSPECTION REQUIREMENTS DUE TO

PHYSICAL INTERFERENCES

COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 2

LUMINANT GENERATION COMPANY LLC

DOCKET NO. 50-446

1.0 INTRODUCTION

By letter dated December 19, 2007 (Agencywide Documents Access Management System (ADAMS) Accession No. ML073620206, as supplemented by letter dated May 29, 2008 (ADAMS Accession No. ML081580052), Luminant Generation Company LLC (the licensee) requested Nuclear Regulatory Commission (NRC) approval of Relief Request (RR) B-2, which involved limited weld examination coverage at Comanche Peak Steam Electric Station (CPSES), Unit 2. Specifically, during risk-informed inservice inspection (RI-ISI) activities conducted for the first outage in the first period of the second 10-year inservice inspection (ISI) (2RF08), because of weld configuration, 100 percent coverage of the required examination volume could not be obtained. The licensee proposed alternatives to the volumetric examination coverage requirements specified by American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI for the CPSES, Unit 2 second 10-year ISI interval. The CPSES, Unit 2 second 10-year ISI interval began on August 3, 2004, and ends on August 2, 2014.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g) specifies that ISI of nuclear power plant components shall be performed in accordance with the requirements of the ASME Code, Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Paragraph 50.55a(g)(6)(i) of 10 CFR states that the Commission may grant such relief and may impose such alternative requirements as it determines 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 the consideration of the burden upon the licensee. Paragraph 50.55a(a)(3) of 10 CFR states that alternatives to the requirements of paragraph (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. Paragraph 50.55a(g)(5)(iii) of 10 CFR states that if the licensee has determined that conformance with certain code requirements is impractical for its facility,

Enclosure

the licensee shall notify the Commission and submit, as specified in 10 CFR 50.4, information to support the determinations.

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 preservice 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 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 information provided by the licensee in support of the RR has been evaluated by the NRC staff and the bases for disposition are documented below.

3.0 TECHNICAL EVALUATION

3.1 Applicable Code Edition and Addenda

The Code of record for the second 10-year ISI program at CPSES, Unit 2 is the ASME Code, Section XI, 1998 Edition through the 2000 addenda. In addition, as required by 10 CFR 50.55a, ASME Code, Section XI, 1995 Edition, 1996 Addenda is used for Appendix VIII, Performance Demonstration for Ultrasonic Examination System.

3.2 Components for Which Relief is Requested

The affected Class 1 RI-ISI piping weld is:

<u>Code Category, Item No.</u>	<u>Description</u>	<u>Weld No.</u>
R-A, R1.11	3" pipe to valve 2-8379A	TCX-1-4105-6

Since the methodology in Electric Power Research Institute (EPRI) Topical Report (TR) EPRI TR-112657 Revision B-A does not provide item numbers, the format in ASME Code, Case N-578-1 is used for the assignment of this number for the RI-ISI program.

3.3 Applicable Code Requirement

ASME Code, Section XI, as shown in Figure IWB-2500-8(c) for Class 1 components requires a volumetric examination of a minimum volume of the inner 1/3 thickness of the weldment extending into the piping base metal for a distance of 1/4 inch past the edge of the weld crown for nominal pipe size (NPS) 4 inches and larger. Since the subject pipe size NPS is actually 3 inches, Figure IWB-2500-8(b) applies and calls for a surface examination.

In a letter dated October 5, 2006, from the NRC to CPSES, the NRC approved RR A-1 extending the RI-ISI program for ASME Code Class 1 and 2 piping to the second 10-year ISI interval for Unit 2. The methodology of EPRI TR-112657 Revision B-A is used as the

examination method as well as the selection of welds to be examined. The RI-ISI program requires volumetric examination of the subject weld and extends the Code required volume of the inner $1/3 t$ (where t is the pipe wall thickness) to $1/2$ inch past the edge of the weld crown if no counterbore is present or a distance of $1/4$ inch on either side of the weld counterbore.

The CPSES, Unit 2 second 10-year interval ISI Program Plan also implements Code Case N-460, which is endorsed by the NRC in revision 15 of Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability ASME Section XI, Division 1." Code Case N-460 states, in part, when the entire examination volume or area cannot be examined due to interference by another component or part geometry, a reduction in examination coverage on any Class 1 or Class 2 weld may be accepted provided the reduction in coverage for that weld is less than 10 percent. In addition, the NRC regulation also requires that the performance of ultrasonic examination shall meet the performance demonstration requirements in ASME Code, Section XI, Appendix VIII.

3.4 Licensee Proposed Alternative and Basis for Use

The licensee states that due to the geometry of the subject components, the performance of the ultrasonic examination is limited to one side. Volumetric examinations were performed with shear wave search units with nominal angles of 45° and 70° . Coverage obtained was 100 percent in one axial direction, 0 percent in the other axial direction, and 100 percent in the two circumferential directions. Thus, the licensee states, that the coverage that may be claimed is limited to 75 percent of Code-required examination volume.

The licensee further states that when the examination area is limited to one side of the austenitic weld, the examination coverage does not comply with 10 CFR 50.55a(b)(2)(xv)(A) or the ASME Code, Section XI requirements and proficiency demonstrations do not comply with 10 CFR 50.55a(b)(2)(xvi), and full coverage may not be claimed. For austenitic piping, a procedure must be qualified with flaws on the inaccessible side of the weld. Performance Demonstration Initiative (PDI) has not been able to qualify a single-side examination procedure technique that is capable of demonstrating equivalency for a two-sided examination procedure technique on austenitic piping welds.

In lieu of the required examination coverage of essentially 100 percent, the licensee proposed the following alternatives:

1. Due to the design configuration restrictions, ultrasonic testing of the subject welds was performed to the maximum extent practical based on design configuration restrictions. This included a best effort examination to the far side of each component to the extent possible utilizing a 70° shear wave search unit for the subject weld as its thickness is equal to or less than 0.5 inch.
2. VT-2 visual examinations were performed after the pressure test as required by Code Category B-P. No evidence of leakage was identified for the subject component.

The basis for using these alternatives is that they provide the best examination coverage possible within the limitations of the current design configuration. The ultrasonic examination

was performed using a system (procedures, personnel, and equipment) qualified in accordance with the ASME Code, Section XI, Appendix VIII, Supplement 2. In addition, the thinner side of each component, where the degradation typically begins, was fully examined.

4.0 NRC Staff Evaluation

The licensee is unable to perform a full examination from both sides of the subject weld because the examination can only be performed from one side (pipe side) of the weld. This access limitation is due to the presence of unfavorable geometry at the valve side of the weld. The licensee provided a sketch in their submittal to show the configuration of the valve at the far side of the weld that limits the examination to a single side (pipe side). To comply with the Code-required volumetric examination coverage, the licensee needs to redesign and re-install the subject component which is a significant burden to the licensee. The staff notes that at the time of this RR, PDI has not been able to qualify a single-side examination procedure that is capable of demonstrating equivalency for a two-sided examination procedure for welds made of austenitic materials. Therefore, the staff finds that compliance with the Code coverage requirements in the inspection of the subject weld is impractical at this time.

Based on the ultrasonic examinations performed during refueling outage 2RF08, limited examination was performed on the far side of the weld. Ultrasonic examinations were performed with shear wave search units with nominal angles of 45° and 70°. Examination coverage obtained was 100 percent in one axial direction, 0 percent in the other axial direction, and 100 percent in the two circumferential directions. Thus, the licensee states, that the coverage that may be claimed is limited to 75 percent of the required examination volume.

In its letter dated March 12, 2008, the NRC staff requested the licensee to identify the system comprising the subject weld and the potential degradation mechanism that may occur in this weld. By letter dated May 29, 2008, the licensee stated that the subject weld, a valve-to-pipe weld, is considered by the RI-ISI analysis of ASME Code Class 1 and 2 piping welds as part of the charging/alternate charging for the chemical and volume control system since the line is over 270 degrees Fahrenheit (°F) and can have rapid temperature changes as a result of a switchover between charging and alternate charging to the reactor coolant system. The potential degradation mechanism for this weld is thermal transient (TT) based on the joint geometry. Additionally, the licensee states that pipe segments/welds identified as susceptible to thermal stratification, cycling, striping, and thermal transients, such as the subject weld, are grouped together and identified as thermal fatigue, following the EPRI methodology for RI-ISI, which is used at CPSES. Thermal fatigue cracking usually initiates as many small cracks, with one becoming predominant, and propagates from the inner surface of the weld. The licensee further states that this particular type of degradation has been most commonly observed at or near the pipe-to-nozzle weld, where the wall thickness is thinner because of counterbore or previous grinding of the weld on the inside surface. The NRC staff finds that since the licensee was able to achieve 100 percent coverage at the pipe-to-nozzle side with no indications found, if there were to be cracking in this weld, it would have been detected.

The NRC staff reviewed the geometry of the weld from the sketch provided by the licensee. Based on the designed weld configuration as shown by the sketch, the stress level is expected to be higher at the thinner side (pipe side) of the weld where degradation typically would start, as noted above. The NRC staff finds that the examination from the thinner side of the weld that

provided full coverage of the thinner side of the weld, in conjunction with the VT-2 visual examination after the pressure test that did not observe any leakage from the subject weld, provides reasonable assurance of structural integrity.

In an NRC letter dated March 12, 2008, the NRC staff requested the licensee to explain why this weld, rather than a different weld, was selected for this examination. By letter dated May 29, 2008, the licensee stated that this weld was originally selected for examination in the element selection of the RI-ISI process because it was the only weld in segment RCS-007 and had a medium risk ranking assigned, based on the degradation of TT and a medium consequence. Since similar welds had previously been selected for ISI prior to RI-ISI with coverage limitations (less than 90 percent) and were acceptable, selecting another weld was not considered for this examination. The licensee further stated that since that time, the licensee has taken a position that another weld will be selected, based on a similar risk ranking and degradation mechanism, when it is known beforehand that the weld cannot meet the Code requirements for coverage. The staff supports the licensee's position to select other welds when it is known beforehand that the welds will not be able to meet the Code requirements for coverage, as this position is fully supported by the NRC approved RI-ISI methodology contained in EPRI TR-112657 Revision B-A.

Based on the examination coverage achieved, the staff finds that the proposed examination coverage will provide reasonable assurance of structural integrity of the subject weld.

5.0 CONCLUSION

Based on the above review, the NRC staff concludes that compliance with the Code-required volumetric examination coverage in the presence of unfavorable geometry at the valve side of the weld is not practical. The NRC staff also concludes that the proposed alternative is acceptable because it will provide reasonable assurance of structural integrity of the subject weld. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for CPSES, Unit 2 for the second 10-year ISI interval, which began on August 3, 2004, and ends on August 2, 2014. Granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: C. Nove

Date: August 22, 2008