



South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

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U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project
Unit 2
Docket No. STN 50-499
Request for Relief from ASME Boiler and Pressure Vessel Code,
Section XI Requirements (Relief Request RR-ENG-19)

In accordance with the provisions of 10 CFR 50.55a(g), the South Texas Project requests relief from IWA 5250 of Section XI of the ASME Boiler and Pressure Vessel Code (ASME XI) in order to defer code repair of a flaw recently identified in the Essential Cooling Water System class 3 piping. In accordance with the guidance provided in Generic Letter 90-05 and subject to the approval of this request, code repairs will be implemented during the next Unit 2 refueling outage scheduled to begin in October, 1998.

The flaw is a discoloration on the exterior of a 10-inch by 10-inch by 10-inch cast aluminum-bronze pipe tee located in the Unit 2 Mechanical Auxiliary Building. The tee is part of the Essential Cooling Water Train 2A to Train 2B Chiller supply cross-tie isolation valve. The discoloration is due to dealloying propagating from an interior weld or casting defect. There is currently no visible leakage. Engineering has analyzed this condition and determined operability and functionality of the system have been maintained, and deferring repair of the flaw will not affect the health and safety of the public.

The attached relief request includes an evaluation of the present condition of the pipe, compensatory actions, and opportunities for effecting code repairs in accordance with the guidelines provided in Generic Letter 90-05.

If there are any questions, please contact Mr. P. L. Walker at (512) 972-8392 or me at (512) 972-7162.

S. E. Thomas
Manager,
Design Engineering

PLW/

Attachment: Request for Relief from ASME Boiler and Pressure Vessel Code Section XI
Requirements (Relief Request RR-ENG-19)

Project Manager on Behalf of the Participants in the South Texas Project

9804160106 980408
PDR ADDCK 05000499
P PDR

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A047

Ellis W. Merschhoff
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Thomas W. Alexion
Project Manager, Mail Code 13H3
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

David P. Loveless
Sr. Resident Inspector
c/o U. S. Nuclear Regulatory Commission
P. O. Box 910
Bay City, TX 77404-0910

J. R. Newman, Esquire
Morgan, Lewis & Bockius
1800 M. Street, N.W.
Washington, DC 20036-5869

M. T. Hardt/W. C. Gunst
City Public Service
P. O. Box 1771
San Antonio, TX 78296

A. Ramirez/C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

Jon C. Wood
Matthews & Branscomb
One Alamo Center
106 S. St. Mary's Street, Suite 700
San Antonio, TX 78205-3692

Institute of Nuclear Power
Operations - Records Center
700 Galleria Parkway
Atlanta, GA 30339-5957

Richard A. Ratliff
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756-3189

D. G. Tees/R. L. Balcom
Houston Lighting & Power Co.
P. O. Box 1700
Houston, TX 77251

Central Power and Light Company
ATTN: G. E. Vaughn/C. A. Johnson
P. O. Box 289, Mail Code: N5012
Wadsworth, TX 77483

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

**SOUTH TEXAS PROJECT UNIT 2
REQUEST FOR RELIEF FROM ASME BOILER AND PRESSURE VESSEL
CODE SECTION XI REQUIREMENTS (RELIEF REQUEST RR-ENG-19)**

References:

1. Letter to NRC dated November 1, 1988, with attached Bechtel National/Aptech Report 8804-06FA, Revision 3, (ST-HL-AE-2748)
 2. Engineering Report # 91-201-12, Revision 0, "ECW System Failures and Their Analysis"
 3. Bechtel Calculation RC9890, Revision 0, "Stress Summary for Large Bore ECW Piping (2.5" and above)"
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Reference Code: ASME Boiler and Pressure Vessel Code, Section XI
1983 Edition through Summer 1983 Addenda

A. Introduction:

A1. Component for Which Exemption is Requested:

- (a) Name and Identification Number: Class 3, Moderate Energy Piping in the Essential Cooling Water System, Unit 2 cast 10"x10"x10" tee upstream of 2-EW-2065 Train 2A and Train 2B Chiller Supply Cross-Tie Isolation Valve, Spool # EW-2183A.
- (b) Function: The Essential Cooling Water System is designed to supply cooling water to various safety-related systems for normal plant operation as well as normal shutdown and during and after postulated design basis accidents. See Section 9.2.1.2 of the South Texas Project Updated Final Safety Analysis Report for additional information. The subject tee provides a cross-tie between Essential Cooling Water trains for redundant cooling water supply to the Chiller Condensers. During normal operations, train A is isolated from trains B and C by locked valves.
- (c) Class: ASME Code Class 3
- (d) Description of the flaw: A reoccurring discoloration about 0.5 inches in diameter has been identified at the welded tee connection, weld # FW-4282. There is currently no leakage or surface accumulation of moisture at this location. However, the discoloration does reappear within a few months after cleaning the area with a wire brush. Ultrasonic testing (UT) performed at the flaw site revealed no cracks or linear indications. South Texas Project experience with reoccurring discoloration of aluminum-bronze cast components is that this indicates a through-wall dealloyed

defect. The small size of the discolored area also indicates the dealloying is relatively minor.

A2. Code Requirements From Which Relief is Requested:

Relief is requested from IWA-5250 of ASME Section XI in order to defer code repair of Essential Cooling Water System piping containing a through-wall flaw.

A3. Basis for Relief Request:

The South Texas Project has analyzed the effect of through-wall flaws in Essential Cooling Water piping and found that degradation develops slowly. Rapid or catastrophic failure due to dealloying defects is not a consideration. Dealloying produces detectable leakage before the flaw reaches a limiting size that would affect the operability of the Essential Cooling Water System. A monitoring and inspection program provides confidence in the ability to detect leakage. Compensatory action taken following discovery of this condition provides assurance that changes in the condition will be monitored and analyzed as needed.

Additional discussion is provided in South Texas Project Updated Final Safety Analysis Report Appendix 9A, "Assessment of the Potential Effects of Through-Wall Cracks in ECWS Piping".

B. Scope, Limitations, and Specific Considerations:

B1. Scope:

The scope of this relief request includes a dealloyed spot on a Unit 2 10"x10"x10" cast tee at one of the welded connections. The tee is located just upstream of 2-EW-0265 Train 2A and Train 2B Chiller Supply Cross-Tie Isolation Valve. The tee material is aluminum-bronze, ASME SB 148 CA952. Volumetric ultrasonic examination of the affected area revealed no linear indications or cracking. The discovered through-wall flaw is the result of a previously analyzed dealloying process affecting aluminum-bronze cast components.

The process of dealloying of aluminum-bronze castings has been described in previous communications with the NRC (Reference 1). The South Texas Project has also performed laboratory analyses, calculations, and proof testing on cast aluminum-bronze material to address dealloying and cracking in dealloyed aluminum-bronze castings. The flaw evaluation is addressed in paragraph C3.

B2. Limitations:

The flaw addressed here was discovered during the monthly examination of Essential Cooling Water large bore piping. Pursuant to this relief request, repairs of the defect will be deferred until adequate time is available for the repair but no later than the next Unit 2

refueling outage, provided the condition meets the acceptance criteria of Generic Letter 90-05 and is enveloped by previous studies as described in C3 of this relief request. Compensatory action has been implemented to detect any changes. A code repair by replacing the tee with an aluminum-bronze alloy tee less susceptible to dealloying will be made no later than the next scheduled Unit 2 refueling outage. The Unit 2 refueling outage is currently scheduled for October 1998.

B3. Specific Considerations:

System interactions including consequences of flooding, spray on equipment, and the potential significance of loss of flow to the system have been evaluated and are bounded by Appendix 9A of the South Texas Project Updated Final Safety Analysis Report.

The structural integrity of piping with dealloying has been evaluated for all design loading conditions including dead weight, pressure, thermal expansion, and seismic loads. Flaw evaluation is addressed in paragraph C3.

The structural integrity is monitored by the following methods:

- Weekly monitoring for qualitative assessment of leakage (quantitative if measurable leaks are observed). Currently there is no measurable leakage.
- Continuation of Essential Cooling Water System large bore piping periodic walkdowns. This walkdown is a regularly scheduled VT-2 examination. The inspection technique has proven to be an effective means of identifying dealloyed/cracked components prior to deterioration of structural integrity margins below ASME Section XI requirements (Reference 2).

Significant changes found during this monitoring will be followed by a reevaluation of structural integrity and the monitoring frequency.

The corrective action is to repair the identified flaw when the system can be taken out of service for an adequate time but no later than the next Unit 2 refueling outage currently scheduled for October 1998, while subject to augmented monitoring, and subject to meeting the criteria for consequences and for structural integrity.

C. Evaluation:

C1. Flaw Detection During Plant Operation and Impracticality Determination

The flaw was identified on February 23, 1998, during normal Unit 2 plant operations. Implementation of code repairs is proposed no later than the next Unit 2 refueling outage scheduled during October 1998. Performance of code repairs prior to an extended allowable outage time or refueling outage as permitted by the limiting condition for operation may not be practical due to the potential for fit-up problems during repair. The

South Texas Project prefers to perform the code repair under controlled conditions during a scheduled outage longer than allowed by a limiting condition of operation as long as the specific considerations listed above are met.

C2. Root Cause Determination and Flaw Characterization:

The root cause of dealloying has been studied in several previous laboratory failure analyses. The dealloying process normally initiates from a crevice such as the area behind a backing ring, a fabrication-induced flaw, or a casting flaw. A dealloyed area may include cracks. UT examination of this tee revealed no indications of cracking. Dealloying in this case is believed to be the result of a combination of an existing crevice and susceptible material.

C3. Flaw Evaluation:

A previous evaluation of a Unit 2 six-inch tee to flange joint by Bechtel assumed 100% of the joint material had been dealloyed. In the evaluation, Bechtel used lower material strengths obtained by actual tensile tests of dealloyed samples. Since dealloying was only visible at one small location on the ten-inch tee, the analysis assuming 100% dealloying conservatively envelopes this condition and demonstrates an acceptable margin with respect to ASME Section III requirements (Reference 3).

Dealloying analyses found degradation to be a slow process. Rapid or catastrophic failure is not a consideration. In addition, the Essential Cooling Water System is a low pressure system with normal operating pressures of approximately 50 psig and a design pressure of 120 psig. The failure consequences associated with high energy lines are not applicable for the Essential Cooling Water System.

C4. Augmented Inspection:

Augmented weekly inspections have been implemented to detect any changes in the size of the discolored area or leakage. A significant change in the condition of the area will result in additional engineering attention to confirm that the technical justification of this relief request remains valid.