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

September 30, 1998
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10CFR50.55a

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-27)

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 service water 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 which is scheduled to begin in October, 1998.

The flaw is a discoloration on the exterior of a 3-inch flange that is part of the cast aluminum-bronze screen wash booster pump located in the Train "C" Unit 2 Essential Cooling Water Intake Structure. The dealloying appears to be localized at the takeoff point for a 1/2-inch seal water flow line attached to the pump body flange. The discoloration is currently about 1/16-inch in diameter with no visible leakage. Engineering has analyzed this condition and determined operability and functionality of the system have been maintained. 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 flange, 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

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Attachment: Request for Relief from ASME Boiler and Pressure Vessel Code Section XI Requirements (Relief Request RR-ENG-27)

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c:
Ellis W. Merschoff
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

Cornelius F. O'Keefe
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, D.C. 20555-0001

SOUTH TEXAS PROJECT UNIT 2
REQUEST FOR RELIEF FROM ASME BOILER AND PRESSURE VESSEL CODE SECTION XI REQUIREMENTS
(RELIEF REQUEST RR-ENG-27)

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)"

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, Train "C" Screen Wash Booster Pump flange.

(b) Function: The Essential Coolir g 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 pump provides screen wash water for the Unit 2, Train "C" traveling screen. Dealloying is at the takeoff point for a 1/2-inch seal water tubing connection on the pump body discharge flange.

(c) Class: ASME Code Class 3

(d) Description of the flaw: A reoccurring discoloration about 1/16 inch in diameter has been identified on the discharge 3-inch flange which is part of the screen wash booster pump. The dealloying is at the takeoff point for a 1/2-inch sealwater tubing connection. There is currently no leakage or surface accumulation of moisture at this location. South Texas Project experience with reoccurring discoloration of aluminum-bronze cast components indicates a through-wall dealloyed defect. The small size of the discolored area 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 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 resulting from the discovery of this condition provides assurance any 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 3-inch flange which is part of the Train "C" screen wash booster pump. The pump body material is aluminum-bronze, ASME SB 148 CA954. The discovered through-wall flaw is the result of a previously analyzed dealloying process in an aluminum-bronze cast component.

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 will be made no later then the next scheduled Unit 2 refueling outage. The Unit 2 refueling outage is 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 provide a code repair or replacement of the flawed component when the system can be taken out of service for an adequate time but no later than the next Unit 2 refueling outage which is scheduled for October 1998, and subject to augmented monitoring, meeting the criteria for consequences, and meeting structural integrity requirements.

C. Evaluation:

C1. Flaw Detection During Plant Operation and Impracticality of Non-Code Replacement:

The flaw was identified on July 13, 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 the flange 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 6-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 3-inch flange, 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 will require additional engineering attention to confirm the technical justification of this relief request remains valid.