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

September 8, 2005

NOC-AE-05001918
File No.: G25
10CFR50.55a

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

South Texas Project
Unit 1
Docket No. STN 50-498
Request for Relief from ASME Boiler and Pressure Vessel Code,
Section XI Requirements for the Essential Cooling Water System (ECW Train 1A)
(Relief Request RR-ENG-2-41)

In accordance with the provisions of 10CFR50.55a(g)(5)(iii), the South Texas Project requests relief from IWA-5250 of Section XI of the ASME Boiler and Pressure Vessel Code. Approval will allow deferral of code repair of flaws recently identified in the Essential Cooling Water (ECW) Class 3 piping. Repair of the flaws with a code repair at this time is impractical. In accordance with the guidance provided in Generic Letter 90-05 and subject to Nuclear Regulatory Commission approval, code repairs will be implemented no later than the next refueling outage for the affected unit.

Through-wall indications have been identified on the 30-inch pipe of the Unit 1 "A" train ECW system pipe below ECW valve EW-0027. Several small holes/indications were found in the aluminum-bronze pipe; however, there is no external leakage. The indications are on the ECW pipe inside wall in an area covered by a slip-on flange.

Operability and functionality of the system have been maintained, and deferring code repair of the flaw with application of a temporary non-code repair will not affect the health and safety of the public.

The attached relief request addresses the present condition of the pipe section, and implementation of compensatory and corrective actions in accordance with the guidelines provided in Generic Letter 90-05. A list of commitments in the request is provided.

If there are any questions, please contact either Mr. P. L. Walker at (361) 972-8392 or me at (361) 972-8922.

Kenneth D. House
Acting Manager,
Design Engineering

PLW

Attachment: Request for Relief from ASME Boiler and Pressure Vessel Code, Section XI Requirements for the Essential Cooling Water System (ECW Train 1A) (Relief Request RR-ENG-2-41)

A047

STI: 31911072

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

cc:
(paper copy)

Bruce S. Mallett
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

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

Jeffrey Cruz
U. S. Nuclear Regulatory Commission
P. O. Box 289, Mail Code: MN116
Wadsworth, TX 77483

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

(electronic copy)

A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP

David H. Jaffe
U. S. Nuclear Regulatory Commission

Jack A. Fusco
Michael A. Reed
Texas Genco, LP

C. Kirksey
City of Austin

Jon C. Wood
Cox Smith Matthews

J. J. Nesrsta
R. K. Temple
E. Alarcon
City of San Antonio

SOUTH TEXAS PROJECT
REQUEST FOR RELIEF FROM ASME BOILER AND PRESSURE VESSEL CODE, SECTION XI REQUIREMENTS FOR THE ESSENTIAL COOLING WATER SYSTEM (ECW TRAIN 1A) (RELIEF REQUEST RR-ENG-2-41)

---

1. Component for Which Relief is Requested

   (a) Description:

   Unit 1 Train A Essential Cooling Water (ECW) 30-inch piping (Line Number 30" EW 1105-WT3) immediately downstream of valve EW-0027 from Component Cooling Water (CCW) heat exchanger 1A.

   (b) Function:

   The ECW system is designed to supply cooling water to various safety-related systems for normal plant operation, normal shutdown, and during and after postulated design-basis accidents.

   (c) Class:

   ASME Code Class 3

   (d) Flaw Characterization and Root Cause Determination:

   Through-wall indications have been identified on the 30-inch pipe of ECW Train A downstream of ECW valve EW-0027. Damage consists of pitting located immediately downstream of throttle valve EW-0027 on the inside wall of the pipe in an area covered outside the pipe by a slip-on flange. Some pitting extends through the 1/4-inch thick wall into the flange material for an approximate total depth of 1.145 inch. While there is some damage to the slip-on flange, the slip-on flange and the attendant welds prevent leakage from the ECW system. The root cause of the pitting is apparent cavitation resulting from required throttling of the EW-0027.

   In addition, a linear flaw indication was found in the pipe end-to-flange fillet weld. The flaw is approximately 11.25 inches long along the pipe circumference and extends through the pipe wall but not through the flange. There was no active leak because of the carbon steel slip-on flange. The lower fillet weld acts as a pressure-retaining boundary. The linear indication is the result of high residual stress initiated during assembly combined with stresses due to high cycle fatigue.

   The condition does not meet ASME code requirements for a Class 3 piping system.

2. Applicable Code Edition and Addenda

   ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition

3. Applicable Code Requirement

   ASME Section XI IWA-4310 states:

   Defects shall be removed or reduced in size in accordance with this Article. The component shall be acceptable for continued service if the resultant section

thickness created by the cavity is equal to or greater than the minimum design thickness. If the resulting section thickness is reduced below the minimum design thickness, the component shall be repaired in accordance with this Article. Alternatively, the component may be evaluated and accepted in accordance with the design rules of either the Construction Code, or Section III, when the Construction Code was not Section III.

Relief is requested so that code repair of the through-wall flaw at this location may be deferred until the next outage of sufficient duration but not later that the next refueling outage provided the conditions of Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2 and 3 Piping," are met.

4. Flaw Detection During Plant Operation

While performing maintenance on July 5, 2005, aluminum-bronze piping downstream of throttle valve EW-0027 in Unit 1 ECW Train A was found to be damaged. Implementing Code repairs within the allowed outage time for the affected train was not expected to be achievable. Consequently, a plant shutdown was expected to be required to enable completion of the repairs.

5. Impracticality Determination

As stated in Generic Letter 90-05, the staff has determined that an ASME Code repair is required for code Class 1, 2, and 3 piping unless specific written relief has been granted by the NRC. However, the staff has determined that temporary non-code repair of Class 3 piping that cannot be isolated without a plant shutdown is justified in some instances.

A repair is considered to be impractical if:

- The flaw detected during plant operation is in a section of Class 3 piping that cannot be isolated to complete a code repair within the time period permitted by the limiting condition for operation of the affected system as specified in the plant Technical Specifications, and
- Performance of code repair necessitates a plant shutdown.

Performance of code repairs within the allowed outage time for the Essential Cooling Water System at the South Texas Project, as permitted by the limiting condition for operation, was not expected to be practical due to the amount of time required to obtain the replacement parts and implement the repair, combined with uncertainties associated with completing the task. Therefore, the South Texas Project requests approval of this relief request on the basis of impracticality.

6. Proposed Alternative and Basis for Use

6.1 Temporary Non-code Repair Method

Contrary to ASME Section XI IWA-4310, defects were not removed prior to returning the affected train to service. Non-code repairs using seal welds have been completed in areas where pitting is excessive and where separation had occurred at the inside diameter fillet weld.

Voids and imperfections on wetted surfaces of the 30" ECW return line from CCW Heat Exchanger 1A (Line Number 30" EW 1105-WT3) downstream of Valve 1-EW0027 were filled with Belzona 1111 to minimize further degradation. The Belzona application is not

intended to repair the pressure boundary parts to satisfy the piping minimum wall thickness requirements. Belzona serves solely as a barrier against further erosion and corrosion until code repairs can be implemented.

6.2 Basis for Use

6.2.1 Scope

Through-wall indications have been identified on the 30-inch pipe of ECW Train A downstream of ECW valve EW-0027. Damage consists of pitting located immediately downstream of throttle valve EW-0027 on the inside wall of the pipe in an area covered outside the pipe by a slip-on flange. Some through-wall pipe pitting has an approximate depth of 1.145 inch with corrosion extending into the flange. While there is some damage to the slip-on flange, the slip-on flange and the attendant welds prevent leakage from the ECW system. The root cause of the pitting is apparent cavitation resulting from required throttling of EW-0027.

In addition, a linear flaw indication was identified in the pipe end-to-flange fillet weld. The flaw is approximately 11.25 inches long along the pipe circumference and extends through the pipe wall but not through the flange. There was no active leak because of the carbon steel slip-on flange. The lower fillet weld acts as a pressure-retaining boundary. The linear indication is the result of high residual stress initiated during assembly combined with stresses due to high cycle fatigue.

6.2.2 Specific Considerations

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. Therefore, the consequences associated with failure of high-energy lines are not applicable to this relief request.

Consequences of potential system interactions, including flooding, spray on equipment, and 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 aluminum-bronze pipe has a nominal diameter of 30 inches and a nominal thickness of 0.25 inch. The pipe material is SB 169 CA-614 rolled and welded plate (6-8 percent aluminum) fabricated to SA-155 tolerances. The slip-on flange material is SA-105 carbon steel. The slip-on flange is welded to the 30-inch aluminum bronze pipe with fillet welds at both ends. The configuration is depicted in the attached figures.

The ECW pumps and the cooling reservoir have adequate design margin and make-up capability to account for postulated small leakage and are therefore fully capable of fulfilling the design basis functions and mission times during a design basis accident (DBA).

Belzona coatings have been used in various components at the South Texas Project as protective coatings for erosion and corrosion control. Subsequent inspections of these components have demonstrated that Belzona coatings perform well in an immersed ECW environment. Belzona coatings do not pose a threat to the piping, downstream components, or the safety function of the ECW system.

6.2.3 Flaw Evaluation

The structural integrity of the ECW piping in the flawed areas was evaluated using the "through-wall flaw" evaluation approach in Section C-3a of NRC Generic Letter 90-05.

This approach evaluates the flaw stability using linear elastic fracture mechanics (LEFM).

The results for Train A are as follows:

To summarize the results:

s = stress at the flaw location

s = 7.92 ksi

K = stress intensity factor

K = 30.77

Stresses	Pressure + Dead Weight	Faulted	Thermal
Stress (psi)	4798	7341	2261
Allowable Stress (psi)	18000	43200	27000
Safety Margin	3.75	5.88	11.94

With the slip-on flange in place and the piping flaws not extending through the flange, the flange acts as a pressure-retaining boundary as well as provides additional structural support for the piping joint.

The current flaw size and the bending loads are less than the respective allowed critical crack size and the bending loads determined by the limit load methodology.

Structural integrity analysis shows that at the locations of maximum stress in the piping, very large cracks would be required for sudden failure to occur. Through-wall cracks are expected to be detected well before they reach a size sufficient to result in such failure.

6.2.4 Augmented Inspection

The ECW piping is readily accessible for visual inspection; consequently, through-wall system leakage resulting from deterioration of the ECW piping can be detected during weekly VT-2 inspections. However, nondestructive examination using ultrasonic or radiographic testing is not feasible due to the configuration and dimensions in the affected area.

6.2.5 Conclusion

Areas of significant damage discovered during this inspection of ECW Train A have been repaired using non-code repair methods. Defects were not removed prior to returning the affected train to service. This is acceptable for continued train operation until code-based repairs can be completed because:

- Stress safety margin without complete replacement of the flaws from a bounding analysis of Train A is at least 3.75.
- There is continued protection against system leakage from the flaws at this location because of the welded slip-on flange.

- Visual checks can determine if leaking is in progress.

These temporary repairs of the degraded piping between the two fillet welds provide added assurance that the flange and pipe are acceptable until the next available outage of sufficient duration to perform the code repair as per guidance provided in Generic Letter 90-05.

7. Duration of Proposed Alternative

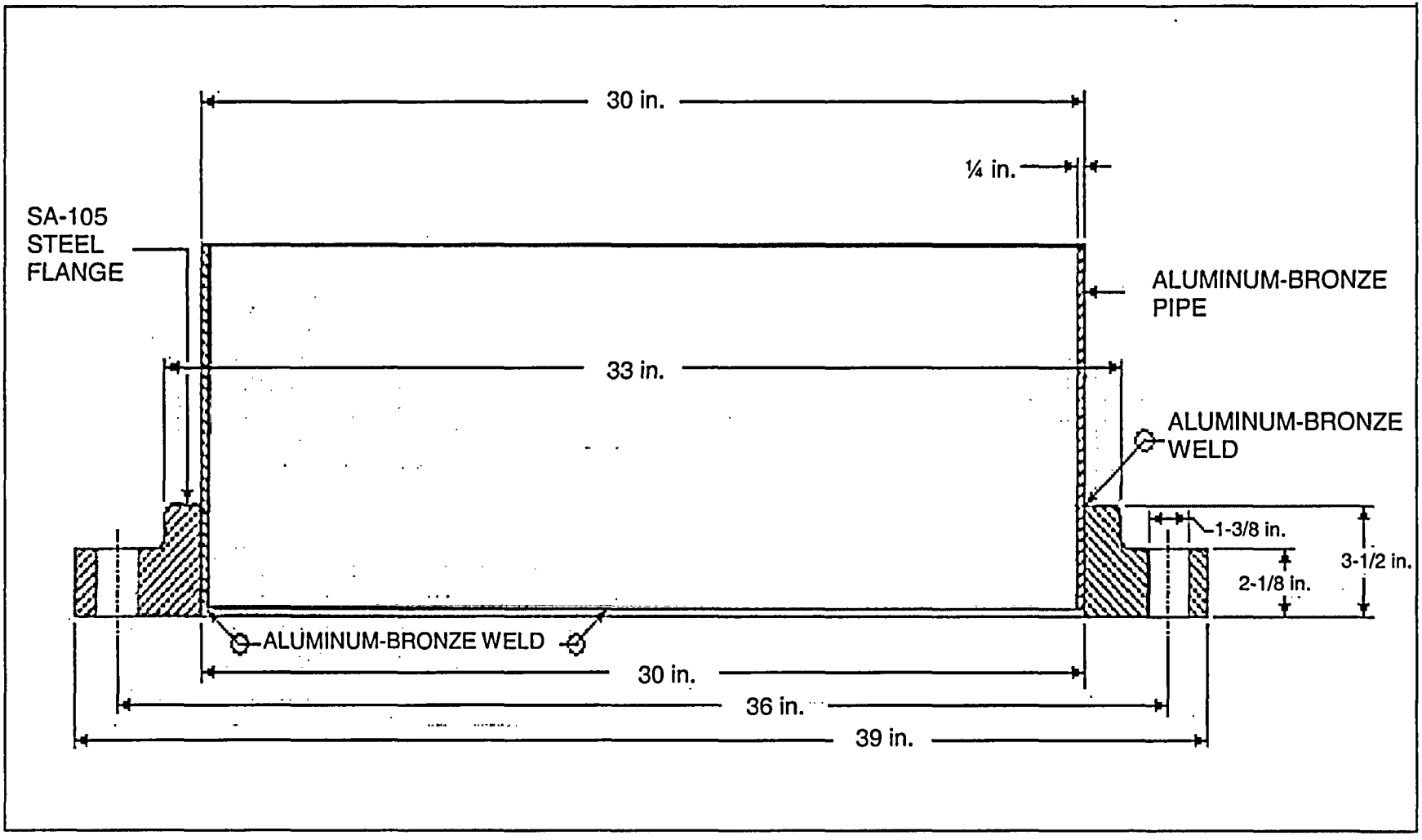
Code repair will be deferred until adequate time is available for the repair. Temporary non-code repair is applicable until the next scheduled outage exceeding 30 days, but no later than the next refueling outage, provided the condition continues to meet the acceptance criteria of Generic Letter 90-05 and is enveloped by the analysis. The next Unit 1 refueling outage is currently scheduled to begin in October 2006.

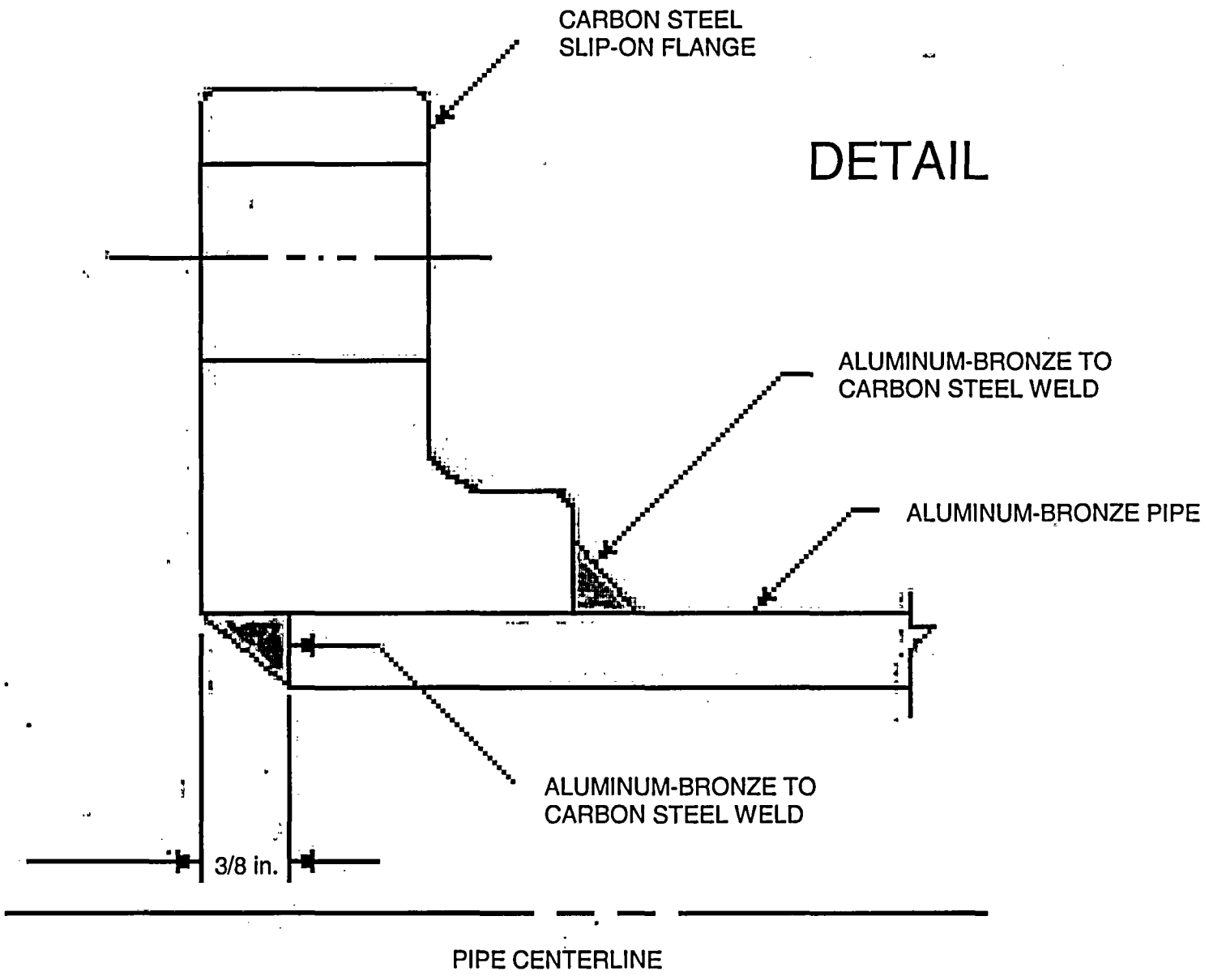
LIST OF COMMITMENTS

The following table identifies the actions in this document to which the STP Nuclear Operating Company has committed. Statements in this submittal with the exception of those in the table below are provided for information purposes and are not considered commitments. Please direct questions regarding these commitments to Philip Walker at (361) 972-8392.

Commitment	Expected Completion Date	CR Action No.
Through-wall system leakage resulting from deterioration of the ECW piping can be detected during weekly VT-2 inspections.	Ongoing	05-7071-14

SLIP-ON FLANGE




CARBON STEEL
SLIP-ON FLANGE
DETAIL
ALUMINUM-BRONZE TO
CARBON STEEL WELD
ALUMINUM-BRONZE PIPE
ALUMINUM-BRONZE TO
CARBON STEEL WELD
3/8 in.
PIPE CENTERLINE