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

November 29, 2006
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File No.: G25
10 CFR 50.55a

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

South Texas Project
Unit 1
Docket No. STN 50-498
Summary Assessment of Pressurizer Surge Line Weld Overlay:
Shrinkage and Fatigue Crack Growth (RR-ENG-2-43) (TAC Nos. MD1414-1423)

Reference: Letter dated September 28, 2006, from David W. Rencurrel, STPNOC, to NRC Document Control Desk, "Response to Request for Additional Information on Proposed Alternative to ASME Section XI Requirements for Application of a Weld Overlay (RR-ENG-2-43) (TAC Nos. MD1414-1423)," (NOC-AE-06002068)

Pursuant to 10 CFR 50.55a(a)(3)(i), the STP Nuclear Operating Company (STPNOC) requested approval to use an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI for the structural weld overlays on the South Texas Project Unit 1 and Unit 2 pressurizer spray, relief, safety, and surge nozzle safe-ends. Verbal approval to perform structural weld overlays in Unit 1 was given in subsequent discussions with the NRC. The scope of the overlays to be performed in the October 2006 Unit 1 refueling outage (1RE13) was subsequently limited to only the pressurizer surge line. This supplement to the request fulfills commitments made in Reference 1.

STPNOC completed a stress analysis of the surge line pre-emptive weld overlay prior to restart of Unit 1. Summaries of the results are provided in the attachment. The stress analysis results support the conclusion that structural weld overlays are a suitable pre-emptive measure for anticipated flaw development. Unit 2 is expected to have similar results when weld overlays are installed in the upcoming refueling outage (2RE11) in March 2007.

There are no commitments in this submittal.

If there are any questions, please contact either Mr. Philip L. Walker at (361) 972-8392 or me at (361) 972-7030.

M. J. Berg
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PLW
Attachment: Summary Assessment of Pressurizer Surge Line Weld Overlay: Shrinkage and Fatigue Crack Growth

STI NO: 32092752

A047

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Shrinkage Assessment:

Calculated

Limits on design stress due to shrinkage were determined prior to completing the weld overlay. The calculation was performed using WESTDYN 7.1, a program acceptable for use in piping analysis, with an assumed pipe temperature of 70°F. A displacement of 0.25-inch was applied to the pressurizer safe end as cold spring loading. This displacement is assumed as the main loading input to represent shrinkage due to the nozzle weld overlay.

The highest bending stress due to shrinkage as determined by computer calculations is 1620 psi. The code allowable stress for piping at 70°F is 40,000 psi ($2S_m$). Therefore, piping where shrinkage does not exceed 0.25-inch will qualify under code stress requirements.

Actual

Actual measured shrinkage on the surge line nozzle following the overlay was measured at 0.080-inch or less at 90° increments around the circumference of the overlay. Because the piping is designed for significantly greater shrinkage and still satisfies code design requirements, the actual shrinkage experienced results in even greater design margin. Consequently, there is no need to update the shrinkage calculation to reflect the actual values.

The design pressure and normal operating pressure are 2,485 psig and 2,235 psig, respectively. With the additional stress provided by the structural weld overlay, the total stresses remain significantly below the code allowable stresses.

Fatigue crack growth assessment:

WCAP-16611-P, "South Texas Units 1 and 2 Pressurizer Safety/Relief, Spray, and Surge Nozzles Structural Weld Overlay Qualification," August 2006, addresses the issue of fatigue crack growth. Chapter 8 is specifically applicable to the pressurizer surge line nozzle. Figure 8-10 depicts the expected service life relative to the ratio of initial flaw depth to the original wall thickness. If an assumed flaw in the piping extends through 75% of the pipe thickness, Figure 8-10 indicates that more than 23 years can be expected to pass before the flaw grows through the base metal. Consequently, such a flaw would not grow through-wall before the next inservice inspection. There is additional assurance in that post-weld overlay inspection did not identify any flaws in the inspectable volume of the base metal for the pressurizer surge line weld overlay.