



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
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South Texas Project
Units 1 and 2
Docket No. STN 50-498, STN 50-499
Inspection and Mitigation of Alloy 82/182 Pressurizer Butt Welds

In October 2006, while performing inspections of pressurizer Alloy 82/182 butt welds in accordance with MRP-139, a PWR licensee discovered several circumferential indications in the pressurizer surge, safety, and relief nozzles. Because of the potential importance of this issue, STP Nuclear Operating Company (STPNOC) commits to the following actions taken or planned at the South Texas Project (STP) for inspecting or mitigating Alloy 600/82/182 butt welds on pressurizer spray, surge and relief lines.

Inspection/Mitigation Schedule

The affected Alloy 600/82/182 butt weld in the STP Unit 1 pressurizer surge line has been mitigated and inspected. Details concerning the mitigated location are provided in the attached Table 1. Results of completed inspections are attached as Table 3.

Remaining STP Unit 1 pressurizer steam space mitigation activities will be completed after December 31, 2007, during the Spring 2008 refueling outage. This scheduled date is acceptable as justified below. The inspection of pressurizer steam space butt welds at STP Unit 1 will be performed in accordance with industry guidance (MRP-139). The results of the STP Unit 1 inspections or mitigation of pressurizer steam space Alloy 600/82/182 butt weld locations will be reported to the NRC within 60 days of startup from the outage in which they were performed.

Inspection of pressurizer Alloy 600/82/182 butt welds at STP Unit 2 in accordance with industry guidance (MRP-139) has not yet been completed. STPNOC intends to complete all of the mitigation and inspection activities on these locations in refueling outage 2RE12 (Spring 2007). Details concerning STP Unit 2 inspection and mitigation activities are provided in the attached Table 2. Results of completed inspections are attached as Table 4. The inspection of pressurizer butt welds at STP Unit 2 will be performed in accordance with industry guidance (MRP-139). The results of the STP Unit 2 inspections or mitigation of pressurizer Alloy 600/82/182 butt weld locations will be reported to the NRC within 60 days of startup from the outage in which they were performed.

Justification for Inspection/Mitigation Schedule

Previous Inspection Results

The results of previous inspections of pressurizer butt welds at STP Units 1 and 2 are provided in Tables 3 and 4, respectively. There have been no relevant indications.

Assessment of Original Fabrication Welds

An assessment of the original fabrication radiography documentation for the STP Unit 1 pressurizer upper head nozzle safe end welds was performed to identify welds that were reworked during construction. The review determined that only Unit 1 Safety Nozzle RC2009NSS incurred any weld repairs during fabrication. The repairs to RC2009NSS passed the final radiography, pre-service inspection, and inservice inspection (Table 4).

Leak Detection Capability

STP Unit 1 and Unit 2 incorporate design provisions supported by procedures that enable detection of leaks originating from the reactor coolant system.

Monitoring Methods Employed

Reactor coolant system unidentified leakage is determined every 24 hours by plant surveillance procedure. A Reactor Coolant inventory is required to be performed every 72 hours in accordance with Technical Specification 3.4.6.2. Reactor Coolant inventory performs a primary system mass balance with a 0.12 gpm unidentified leakage sensitivity.

Containment airborne monitors and area radiation monitors have demonstrated early detection of RCS leakage. RCS inventory checks are required daily by Technical Specification 3.4.6.1 when the airborne radiation monitor is not in service.

Overall Sensitivity to RCS Leakage

Reactor containment building airborne radiation monitor, particulate channel, can generally detect small changes in RCB atmospheric radioactivity due to increases in fission gas daughter products, water and corrosion activation products, and fission products. Previous occurrences of low level fluid leakage demonstrate that unidentified leakage from the pressurizer steam space can be detected at leakage levels of ≤ 0.10 gpm.

Reactor Containment Sump inflow calculations can detect a change in inflow of about 0.10 gpm. However, an estimated eight-hour delay can occur between initiation and detection of a leak. The operator records sump unidentified leakage each shift using the plant computer or manual calculation.

The overall sensitivity of daily reactor coolant inventories, reactor containment building airborne radiation monitoring, and reactor containment sump inflow calculations is expected to be 0.10 gpm.

If an RCS leak is suspected, the condition is tracked using the site corrective action program. A detailed plan of action and a monitoring plan are developed to identify the source of the leak.

Preventive Maintenance activities performed bi-weekly include review of primary system trends to detect RCS leakage at low levels. Review of ICS trends can detect a 0.02 gpm change in containment sump inflow rates. These methods have previously demonstrated their capability to detect an RCS leak measuring 0.025 gpm.

Action Levels and Responses to Action Levels Exceeded

In accordance with site procedures, the RCS unidentified leakage alert limits and actions are:

- Greater than or equal to 0.2 gpm

Perform operational troubleshooting and walkdowns of the CVCS and RCS in the MAB and RCB based on recent evolutions, alternate indications such as

increasing sump or tank levels, or increasing radiation levels. Operational troubleshooting may involve isolation of specific portions of the CVCS or RCS in accordance with normal operating procedures.

Notify the duty management team [All action levels]

- Greater than or equal to 0.3 gpm or 0.2 gpm for 72 hours

Perform inspections of the areas inside the missile barrier.

- Expected to exceed 1 gpm within 24 Hrs

Form a team to perform operational troubleshooting and walkdowns (24 hours a day until leak is located).

If STP Unit 1 or Unit 2 is shut down due to excessive primary system unidentified leakage, and if the leakage cannot be confirmed to originate from a source other than the pressurizer, a bare metal visual examination of Alloy 600/82/182 butt weld locations on the pressurizer is performed to determine if the leakage originated at those locations.

Historical Performance

The STP leakage detection program is robust and STPNOC has a consistent history of prompt and thorough response to indications of RCS leakage. For example:

- In May, 1990, Unit 2 was shut down to repair reactor coolant pressure boundary leakage from a small leak in the drain line from the "C" Steam Generator. The leak rate was estimated to be about 10 ml/minute and was initially detected by the containment atmosphere radiation monitors. [LER 2-90-008]
- In April, 2003, STPNOC identified very small boron deposits on two bottom-mounted instrumentation penetrations in Unit 1 during restart from a refueling outage. STPNOC determined that the deposits were due to pressure boundary leakage. The plant was cooled down and defueled. All 58 Unit 1 BMI penetrations were ultrasonically examined and no other penetration was found to be affected. The two affected penetrations were repaired prior to restart of the unit. The minute leakage from the affected penetrations was well below the detection capability of the on-line leakage detection systems and could only be identified by visual inspection. STPNOC's prompt action in resolution of the BMI leakage issue demonstrated the station's overall ability to identify and respond to very small leaks. [LER 1-03-003]
- In December 2004, a leak of about 0.12 gpm was discovered in a fitting on a Unit 1 Train A RCS hot leg primary system 3/8" sample line (i.e., not RCS pressure boundary leakage). The initial indication of the leak was from the particulate channel of the containment atmosphere radiation monitor.
- In February, 2005, STP Unit 2 was shut down to repair a primary pressure boundary leak from a 3/4 inch vent line off of the "A" Cold Leg Safety Injection line. At the time of discovery, the total unidentified reactor coolant system leak rate was determined to be 0.13 gallons per minute. There were no challenges to plant safety. [LER 2-05-001]

Plant Age

The susceptibility of Alloy 600/82/182 to PWSCC is largely a function of time at temperature when all other variables are constant. STP Unit 1 is a relatively young plant compared to other domestic nuclear power plants. EPRI MRP-48, Table 2-1 lists the effective full power years (EFPY) of operation for each of the 69 operating PWRs.

The EFPY data from the MRP-48 survey ranked STP 64th out of 69 with 9.2 EFPY. The list was current as of February 28, 2001. Upon entry into the most recent refueling outage (1RE13), STP Unit 1 had operated for approximately 14 EFPY. STP's relative ranking generally will not change as time passes since the listed plants will have gained similar operating time since the table was compiled.

Design Assessment

STPNOC will review the STP leak monitoring processes, program, and equipment to determine if changes should be made. STPNOC will inform the NRC by May 31, 2007, of the status of the review.

Advanced Non-Linear Finite Element Analysis

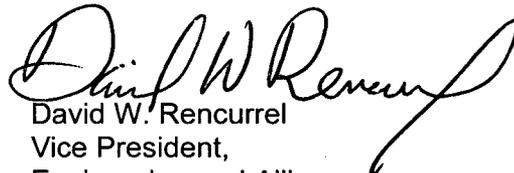
Additional refined crack growth calculations of the limiting pressurizer nozzle Alloy 600/82/182 weld configuration are being developed using three-dimensional finite element analysis as described in correspondence from Marvin D. Fertel, Nuclear Energy Institute, to Luis A. Reyes, Executive Director of Operations, NRC, dated January 26, 2007. Modeling a changing crack shape, rather than a semi-elliptical flaw shape, is expected to result in a significant increase in the estimated time between through-wall penetration and rupture for the limiting case nozzle. The status of this effort will be provided in the May 31, 2007, submittal.

Contingency Planning

STPNOC will perform a mid-cycle outage for mitigation and inspection of the Unit 1 pressurizer butt welds if analytical results do not demonstrate to the NRC that current schedules are adequate. The schedule could also be accelerated if results obtained during upcoming inspections challenge current assumptions.

Commitments made in this letter are listed in attachment 5. Changes to any of the information contained in this letter will be provided to the NRC for review prior to making a formal revision.

STPNOC staff is available to meet with the NRC to discuss any of the information in this letter. If there are any questions, please contact either Mr. Philip L. Walker at (361) 972-8392 or me at (361) 972-7867.


David W. Rencurrel
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PLW

- Attachment:
1. Table 1, South Texas Project Unit 1 Inspection and Mitigation Summary for Alloy 600/82/182 Pressurizer Butt Welds
 2. Table 2, South Texas Project Unit 2 Inspection and Mitigation Summary for Alloy 600/82/182 Pressurizer Butt Welds
 3. Table 3, South Texas Project Unit 1 Previous Inspection Results
 4. Table 4, South Texas Project Unit 2 Previous Inspection Results
 5. List of Commitments

cc:

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**Table 1: South Texas Project Unit 1
 Inspection and Mitigation Summary for Alloy 600/82/182 Pressurizer Butt Welds**

Nozzle		MRP-139 Volumetric Inspection Requirement Met or to be Met		Mitigation Completed or to be Completed	Comments
Function / Designation	Susceptible Material Description	Outage Designation	Start Date (MM/YYYY)	Outage Designation	
Spray / RC1003BB	<i>Nozzle-to-safe end weld</i>	1RE14	04/2008	To be completed 1RE14	Mitigate by Full Structural Weld Overlay and inspect. This outage will occur after 12/31/2007.
Surge / RC1412NSS		1RE13	10/2006	Completed 1RE13	Mitigated by Full Structural Weld Overlay and inspected. Mitigation is complete.*
Safety / RC1004NSS		1RE14	04/2008	To be completed 1RE14	Mitigate by Full Structural Weld Overlay and inspect. This outage will occur after 12/31/2007.
Safety / RC1009NSS		1RE14	04/2008	To be completed 1RE14	Mitigate by Full Structural Weld Overlay and inspect. This outage will occur after 12/31/2007.
Safety / RC1012NSS		1RE14	04/2008	To be completed 1RE14	Mitigate by Full Structural Weld Overlay and inspect. This outage will occur after 12/31/2007.
Relief / RC1015NSS		1RE14	04/2008	To be completed 1RE14	Mitigate by Full Structural Weld Overlay and inspect. This outage will occur after 12/31/2007.

* STPNOC completed the ultrasonic examination for the STP Unit 1 pressurizer surge nozzle weld overlay on October 24, 2006. No relevant indications were found. Two non-relevant indications were detected that were found to be acceptable per the standards of ASME Section XI, IWB-3514-2 and/or IWB-3514-3 criteria for their respective size and position. These indications are laminar-type flaws located in the first weld layer at the base metal interface. No repairs to the overlay material and/or base metal were required or performed. The results were submitted to the NRC November 1, 2006 (ML063170071).

**Table 2: South Texas Project Unit 2
 Inspection and Mitigation Summary for Alloy 600/82/182 Pressurizer Butt Welds**

Nozzle		MRP-139 Volumetric Inspection Requirement Met or to be Met		Mitigation Completed or to be Completed	Comments
Function / Designation	Susceptible Material Description	Outage Designation	Start Date (MM/YYYY)	Outage Designation	
Spray / RC2003BB	<i>Nozzle-to-safe end weld</i>	2RE12	04/2007	To be completed 2RE12	Mitigate by Full Structural Weld Overlay and inspect
Surge / RC2412NSS		2RE12	04/2007	To be completed 2RE12	Mitigate by Full Structural Weld Overlay and inspect
Safety / RC2004NSS		2RE12	04/2007	To be completed 2RE12	Mitigate by Full Structural Weld Overlay and inspect
Safety / RC2009NSS		2RE12	04/2007	To be completed 2RE12	Mitigate by Full Structural Weld Overlay and inspect
Safety / RC2012NSS		2RE12	04/2007	To be completed 2RE12	Mitigate by Full Structural Weld Overlay and inspect
Relief / RC2015NSS		2RE12	04/2007	To be completed 2RE12	Mitigate by Full Structural Weld Overlay and inspect

Table 3: South Texas Project Unit 1 Previous Inspection Results

Nozzle	Refueling Outage	Inspection Type(s)	Inspection Results
Spray / RC1003BB	Spring 1995 Spring 2005 Fall 2006	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications
Surge / RC1412NSS	Spring 1991 Spring 2005 Fall 2006	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications
Safety / RC1004NSS	Fall 1989 Spring 2005 Fall 2006	UT & PT VT-1 & BMV VT-1, BMV & PT	No relevant Indications
Safety / RC1009NSS	Fall 1992 Spring 2005 Fall 2006	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications
Safety / 6RC1012NSS	Fall 1992 Spring 2005 Fall 2006	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications
Relief / 6RC1015NSS	Fall 1989 Spring 2005 Fall 2006	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications

Table 4: South Texas Project Unit 2 Previous Inspection Results

Nozzle	Refueling Outage	Inspection Type(s)	Inspection Results
Spray / RC2003BB	Spring 1997 Spring 2004 Fall 2005	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications
Surge / RC2412NSS	Spring 1997 Fall 2005	UT & PT VT-1 & BMV	No relevant Indications
Safety / RC2004NSS	Fall 1990 Spring 2004 Fall 2005	UT & PT VT-1 & BMV VT-1, BMV	No relevant Indications
Safety / RC2009NSS	Fall 1995 Spring 2004 Fall 2005	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications
Safety / 6RC2012NSS	Fall 1995 Spring 2004 Fall 2005	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications
Relief / 6RC2015NSS	Fall 2002 Spring 2004 Fall 2005	UT & PT VT-1 & BMV VT-1 & BMV	No relevant Indications

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	CR Action	Expected Completion
The inspection of pressurizer butt welds at STP Unit 1 will be performed in accordance with industry guidance (MRP-139).	05-15744-79	05/01/2008
The inspection of pressurizer butt welds at STP Unit 2 will be performed in accordance with industry guidance (MRP-139).	05-15744-80	05/01/2007
The results of future inspections or mitigation of pressurizer Alloy 600/82/182 butt weld locations will be reported to the NRC within 60 days of startup from the outage in which they were performed.	Unit 1: 05-15744-81	06/23/2008
The results of future inspections or mitigation of pressurizer Alloy 600/82/182 butt weld locations will be reported to the NRC within 60 days of startup from the outage in which they were performed.	Unit 2: 05-15744-82	06/26/2007
Remaining STP Unit 1 mitigation activities will be completed after December 31, 2007, during the Spring 2008 refueling outage.	05-15744-83	04/24/2008
If STP Unit 1 or Unit 2 should shut down due to excessive primary system unidentified leakage, and if the leakage cannot be confirmed to originate from a source other than the pressurizer, a bare metal visual examination of Alloy 600/82/182 butt weld locations on the pressurizer will be performed to determine if the leakage originated at those locations.	Unit 1: 05-15744-84 Unit 2: 05-15744-85	03/30/2008 03/25/2007
STPNOC will review the STP leak monitoring processes, program, and equipment to determine if any changes should be made. STPNOC will inform the NRC by May 31, 2007, of the status of the review.	05-15744-86	05/31/2007
Additional refined crack growth calculations of the limiting pressurizer nozzle Alloy 600/82/182 weld configuration are being developed using three-dimensional finite element analysis. The status of this effort will be provided in the May 31, 2007, submittal.	05-15744-88	05/31/2007
STPNOC will perform a mid-cycle outage for mitigation and inspection of the Unit 1 pressurizer butt welds if analytical results do not demonstrate to the NRC that current schedules are adequate. The schedule could also be accelerated if results obtained during upcoming inspections challenge current assumptions.	05-15744-89	03/30/2008
Changes to any of the information contained in this letter will be provided to the NRC for review prior to making a formal revision.	05-15744-87	04/24/2008