



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
Unit 2
Docket No. STN 50-499
Results of Reactor Head Penetration Inspection
Pursuant to Revision 1 of Order EA-03-009

Pursuant to Revision 1 of NRC Order EA-03-009, STP Nuclear Operating Company (STPNOC) provides the results of bare metal visual (BMV) and volumetric inspections of the South Texas Project (STP) Unit 2 reactor pressure vessel (RPV) head penetrations. The revised Order requires that licensees provide a description of the inspection performed in accordance with the Order within 60 days after returning a unit to operation. The inspection was performed during STP Unit 2 refueling outage 2RE12; the unit was returned to operation on April 28, 2007.

The Order requires the following inspections:

- A BMV inspection every third refueling outage or five years, whichever is shorter;
- A non-visual, non-destructive inspection (NDE) prior to February 11, 2008; and
- A visual inspection to identify boric acid leak paths during every refueling outage.

In accordance with Paragraph IV.C(5)(a) of the Order, STPNOC performed a BMV inspection of the STP Unit 2 RPV upper head. There were no relevant indications. No evidence of cracks, leakage, or wastage was found.

In accordance with Paragraph IV.C(5)(b)(i) of the Order, non-visual nondestructive volumetric inspection was performed on all 76 reactor head penetration tubes with J-groove welds, including the head vent penetration and the de-gas penetration. The inspection detected no discontinuities or indications of boric acid leak paths, and no flaws needing disposition or corrective action were identified.

In accordance with Paragraph IV.D of the Order, an inspection of the pressure-retaining components above the RPV head was performed. During this inspection, a small active leak was identified on an active control rod drive mechanism, penetration no. 35. A light film of boric acid residue was observed on the penetration at the insulation interface. The BMV inspection of

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the RPV head confirmed that the leak deposited no boric acid residue on the RPV head or into the RPV head penetration annulus.

A list of commitments is provided as an attachment to this letter.

If there are any questions, please contact either Philip L. Walker at (361) 972-8392 or me at (361) 972-7867.



David W. Rencurrel
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- Attachments:
1. Response to NRC Order EA-03-009 for South Texas Project Unit 2 – 2RE12 Inspection Results
 2. List of Commitments

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**South Texas Project
Unit 2
Response to NRC Order EA-03-009 for South Texas Project Unit 2 –
2RE12 Inspection Results**

Pursuant to Revision 1 of NRC Order EA-03-009, STP Nuclear Operating Company (STPNOC) calculated the susceptibility of the South Texas Project (STP) Unit 2 reactor pressure vessel head to pressurized water stress corrosion cracking (PWSCC), as represented by effective degradation years (EDY) at the end of each operating cycle. Unit 2 was determined to have an EDY of 7.6 EDY when the 2RE12 refueling outage began in March 2007. The Order Inspection Category, determined in accordance with Section IV.A, is "low." Therefore, STPNOC was required to perform an inspection in accordance with NRC Order EA-03-009, Sections IV.C(5)(a), IV.C(5)(b)(i), and IV.D.

Requirements

Section IV.C(5)(a) requires a bare metal visual (BMV) examination of 100 percent of the reactor pressure vessel (RPV) head surface (including 360 degrees around each RPV head penetration nozzle). If evidence of boron or corrosive product is identified, the RPV head surface under the support structure is to be examined to ensure that the RPV head is not degraded.

Section IV.C(5)(b)(i) requires ultrasonic testing of the reactor head penetration nozzle volume from two inches above the highest point of the root of the J-groove weld to one inch below the lowest point of the toe of the J-groove weld, including all penetration nozzle surfaces below the J-groove weld having an operating stress level of 20 ksi or greater. The Order also requires an assessment to determine if there has been leakage into the annulus between the head penetration nozzle and the head low-alloy steel.

Section IV.D requires visual inspections during each refueling outage to identify potential boric acid leaks from pressure-retaining components above the RPV head.

Inspection Parameters

During 2RE12, STPNOC performed a bare metal visual of the RPV head surface in compliance with Section IV.C(5)(a) and non-visual nondestructive volumetric inspection of the reactor head penetration tubes in compliance with Section IV.C(5)(b)(i) of Revision 1 of the Order. Of the 79 penetrations:

- 74 penetrations were examined from the underside of the reactor vessel head using ultrasonic test equipment maneuvered into place using a remote positioning manipulator;
- Two penetrations were examined using both automated ultrasonic testing and manual eddy current testing; and
- Three penetrations were not included because they are not attached to the head with "J-groove" welds.

Inspection Results

- In accordance with Paragraph IV.C(5)(a) of the Order, STPNOC performed a BMV inspection of the STP Unit 2 RPV upper head. The penetrations were viewed using a robot with a front and back camera with lights, augmented with a borescope. There were no relevant indications. No evidence of cracks, leakage, or wastage was found. The inspections were videotaped.

- In accordance with Paragraph IV.C(5)(b)(i), the penetrations were scanned starting from the taper-to-cylinder transition at the bottom of each nozzle up to at least two inches above the highest point of the J-groove weld. STPNOC performed an analysis which supports limiting the inspection zone to 1-inch below the lowest point of each J-groove weld. UT coverage of most of the penetrations with J-groove welds addressed at least the specified one inch. No recordable indications were found. However, eight Control Rod Drive Mechanism penetrations had inspection coverage less than one inch because the penetration length only allowed inspection to 0.63-inch below the weld toe in the worst case. The inside diameter chamfer on the end of each nozzle precludes coverage to the very end of the nozzle below the J-groove weld. The eight penetrations that received less coverage than required by the NRC Order will be addressed in a relaxation request to the NRC in a separate submittal consistent with the schedule requirements of the Order.

The head vent and de-gas lines were examined with both ultrasonic testing (UT) and eddy current testing (ET) to satisfy the requirements of the Order. These penetrations were scanned starting from the taper-to-cylinder transition at the bottom of the weld to at least two inches above the highest point of the J-groove weld. The vent and de-gas lines are flush with the inside contour of the head and the chamfer on the corner of these penetrations prevents full coverage to the very end of the nozzle. Consequently, the configuration of the weld at the base of these lines is not suitable for inspection by UT. The J-groove weld surface for these penetrations was examined using ET. No recordable indications were found using either method.

The inspections detected no discontinuities or indications of boric acid leak paths.

- In accordance with Paragraph IV.D of the Order, the pressure-retaining components above the RPV head were inspected. The inspection identified a small active leak on a control rod drive mechanism canopy (penetration #35). A light film of boric acid residue was observed on the penetration at the insulation interface. BMV inspection of the RPV head confirmed that the leak had deposited no boric acid residue on the RPV head or into the RPV head penetration annulus. The leak was stopped using a mechanical seal.

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.
The eight penetrations that received less coverage than required by the NRC Order will be addressed in a relaxation request to the NRC in a separate submittal consistent with the schedule requirements of the Order.	12/31/2007	06-8754-11