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

August 29, 2001
NOC-AE-01001163
STI: 31336863

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Response to NRC Bulletin 2001-01,
"Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles"

Attached is the STP Nuclear Operating Company (STPNOC) response to U.S. Nuclear Regulatory Commission (NRC) Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," dated August 3, 2001. STPNOC is participating in the Electric Power Research Institute, Inc., Materials Reliability Program associated with the issue. South Texas Project Units 1 & 2 are in the category of plants with low susceptibility to circumferential cracking of the reactor pressure vessel head penetration nozzles. STPNOC also coordinated preparation of this response with the other participants in the Strategic Teaming and Resource Sharing (STARS) group.

If you should have any questions regarding this submittal, please contact me at 361-972-8757 or Mr. Michael Lashley at 361-972-7523.

J. J. Sheppard
Vice President,
Nuclear Engineering and
Technical Services

AWH/

Attachments:
1. Affidavit
2. Response to Bulletin 2001-01
3. List of Commitments

A088

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter			
	)		
	)		
STP Nuclear Operating Company	)	Docket Nos.	50-498
	)		50-499
South Texas Project Units 1 & 2			
	)		

AFFIDAVIT

I, J. J. Sheppard, being duly sworn, hereby depose and say that I am Vice President, Engineering & Technical Services of South Texas Project; that I am duly authorized to sign and file with the Nuclear Regulatory Commission the attached response to Bulletin 2001-01, that I am familiar with the content thereof; and that the matters set forth therein are true and correct to the best of my knowledge and belief.

J. J. Sheppard
Vice President,
Nuclear Engineering & Technical Services

STATE OF TEXAS)
)
COUNTY OF MATAGORDA)

Subscribed and sworn to before me, a Notary Public in and for the State of Texas, this 29th day of August, 2001.

LOIS J. MILLS
Notary Public, State of Texas
My Commission Expires
JULY 27, 2003

Notary Public in and for the State of Texas

Response to NRC Bulletin 2001-01
Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles

Below is the STP Nuclear Operating Company (STPNOC) response to Nuclear Regulatory Commission (NRC) Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles, dated August 3, 2001 (Reference 1). The Bulletin's "Requested Information" is shown in bold.

STPNOC is participating in the Electric Power Research Institute, Inc. (EPRI) Materials Reliability Program (MRP) associated with this issue. Information associated with the MRP efforts are compiled in "PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48), EPRI, Palo Alto, CA: 2001: TP-1006284," (Reference 2). This report was transmitted to the NRC by Nuclear Energy Institute letter, "Generic Information for Use by Licensees in Response to NRC Bulletin 2001-01", dated August 21, 2001 (Reference 3). Reference to the MRP report is made, where appropriate.

Requested Information

1. All addressees are requested to provide the following information:

a. the plant-specific susceptibility ranking for your plant(s) (including all data used to determine each ranking) using the PWSCC [Primary Water Stress Corrosion Cracking] susceptibility model described in Appendix B to the MRP-44, Part 2, report;

Response

As shown in Table 2-1 of Reference 2, South Texas Project (STP) Unit 1 & Unit 2 have been evaluated for relative susceptibility to PWSCC of the Reactor Pressure Vessel (RPV) head penetration nozzles. The evaluation indicates it would take approximately 56.6 and 46.7 Effective Full Power Years (EFPYs) of additional operation for STP Unit 1 & Unit 2, respectively, to reach the same time-at-temperature as Oconee Nuclear Station Unit 3 (ONS3). The 56.6 and 46.7 EFPYs are based from March 1, 2001. March 2001 is when leaking nozzles were discovered at ONS3. As described in Reference 2, the evaluation used the same time-at-temperature model as described in Appendix B to MRP-44, Part 2 (Reference 4).

Using the criteria stated in NRC Bulletin 2001-01, STP can be considered as having a low susceptibility to circumferential cracking of the reactor pressure vessel head penetration nozzles.

Requested Information

1. **All addressees are requested to provide the following information:**

   b. **a description of the VHP [vessel head penetration] nozzles in your plant(s), including the number, type, inside and outside diameter, materials of construction, and the minimum distance between VHP nozzles;**

Response

Reference 2, Table 2-3, provides the requested nozzle information.

Requested Information

1. **All addressees are requested to provide the following information:**

   c. **a description of the RPV head insulation type and configuration;**

Response

The STP RPV head insulation type and configuration are briefly described in Reference 2, Table 2-1. The reactor vessel head insulation is a reflective (mirror) insulation constructed to be permanent, yet removable and reusable. The main portion of the insulation is installed horizontally above the dome of the reactor vessel with outer portions stepped down to accommodate the circular vessel configuration. The insulation is positioned between the top of the vessel and the head penetration flanges, which connect to the Control Rod Drive Mechanism (CRDM) housings. The insulation is provided in individual panels that fit together in a specific arrangement and are fastened by buckles.

Requested Information

1. **All addressees are requested to provide the following information:**

   d. **a description of the VHP nozzle and RPV head inspections (type, scope, qualification requirements, and acceptance criteria) that have been performed at your plant(s) in the past 4 years, and the findings. Include a description of any limitations (insulation or other impediments) to accessibility of the bare metal of the RPV head for visual examinations;**

Response

STPNOC has not performed RPV head and nozzle inspections under the inside-shroud insulation within the past four years. While no specific inspections for nozzle leakage have been performed, no leakage has been identified during the performance of mandatory RPV head

inspections. Accessibility limitations to the RPV head bare metal for visual examinations include the dose, resources and time associated with removal and reinstallation of the head insulation and cooling shroud.

Requested Information

1. All addressees are requested to provide the following information:

e. a description of the configuration of the missile shield, the CRDM housings and their support/restraint system, and all components, structures, and cabling from the top of the RPV head up to the missile shield. Include the elevations of these items relative to the bottom of the missile shield.

Response

Table 1 provides relative elevations of various significant components to the missile shield. The STP integrated head package consists of the head lift rig, missile shield, seismic supports, control rod drive mechanisms (CRDM), CRDM cooling system, and the power and instrumentation cabling. Figure 1 shows the assembled system attached to the reactor vessel head.

Reactor Missile Shield

The missile shield is a circular, steel plate attached to three lift rods that extend down to the reactor vessel head. The shield is laterally supported by six seismic tie rods attached to the reactor cavity wall. The missile shield may be detached to provide access to the CRDMs. In addition to providing containment for missiles that may be ejected from the head, it also provides seismic support for the CRDMs and serves as a spreader for the head lift rig.

CRDM Cooling Shroud

The CRDM Cooling Shroud is a generally cylindrical steel structure that maintains a suitable atmosphere for the CRDMs in order to protect and prolong the life of the CRDM coils. The CRDM cooling shroud encircles the RPV head insulation and impedes access to the insulation panels.

RPV Head Penetrations

There are 79 RPV head penetrations. Seventy-six (76) of these penetrations are J-groove welded RPV head penetrations, of which 74 are the CRDM type penetrations. Of these 74 penetrations, 57 penetrations are used for the CRDMs, four (4) penetrations are spares mounted with capped latch assembly housings, seven (7) penetrations are spares capped with female flanges, two (2) penetrations contain instrumentation for the Reactor Vessel Water Level System (RVWL), and four (4) penetrations contain thermocouple connections. The two (2) remaining J-groove welded RPV head penetrations are for the head vent and the degasification line. The three (3) remaining penetrations are OD butt welded penetrations containing the internals support housing lift rods.

CRDMs	The CRDMs are located on the dome of the reactor vessel. The CRDM consists of four separate subassemblies. They are the pressure vessel (housing), coil stack assembly, latch assembly, and the drive rod assembly. The CRDM pressure vessel is connected by a seal-welded threaded connection to the CRDM RPV head penetration and restrained at the top by the missile shield. The other CRDM subassemblies are external to the CRDM pressure vessel and provide for withdrawal or insertion of the rod control cluster assemblies (RCCAs), and for RCCA position indication. All power and instrumentation cable assemblies traverse up from the head penetration components to the messenger tray out to the cable tray.
RPV Head Insulation	See response to 1.c.
CRDM RPV Head Penetrations	The CRDM RPV head penetrations provide a pressure boundary from the RPV to the threaded seal-welded connection for the CRDMs. The penetrations are structured to provide a uniform height transition from the round reactor vessel dome to the CRDM housing.

Requested Information

2. If your plant has previously experienced either leakage from or cracking in VHP nozzles, addressees are requested to provide the following information:

a. a description of the extent of VHP nozzle leakage and cracking detected at your plant, including the number, location, size, and nature of each crack detected;

b. a description of the additional or supplemental inspections (type, scope, qualification requirements, and acceptance criteria), repairs, and other corrective actions you have taken in response to identified cracking to satisfy applicable regulatory requirements;

c. your plans for future inspections (type, scope, qualification requirements, and acceptance criteria) and the schedule;

d. your basis for concluding that the inspections identified in 2.c will assure that regulatory requirements are met (see Applicable Regulatory Requirements section). Include the following specific information in this discussion:

(1) If your future inspection plans do not include performing inspections before December 31, 2001, provide your basis for concluding that the regulatory

requirements discussed in the Applicable Regulatory Requirements section will continue to be met until the inspections are performed.

(2) If your future inspection plans do not include volumetric examination of all VHP nozzles, provide your basis for concluding that the regulatory requirements discussed in the Applicable Regulatory Requirements section will be satisfied.

Response

STP Unit 1 and Unit 2 have not previously experienced either leakage from or cracking in VHP nozzles. Therefore, this section is not applicable.

Requested Information

3. If the susceptibility ranking for your plant is within 5 EFPY of ONS3, addressees are requested to provide the following information:

a. your plans for future inspections (type, scope, qualification requirements, and acceptance criteria) and the schedule;

b. your basis for concluding that the inspections identified in 3.a. will assure that regulatory requirements are met (see Applicable Regulatory Requirements section). Include the following specific information in this discussion:

(1) If your future inspection plans do not include performing inspections before December 31, 2001, provide your basis for concluding that the regulatory requirements discussed in the Applicable Regulatory Requirements section will continue to be met until the inspections are performed.

(2) If your future inspection plans include only visual inspections, discuss the corrective actions that will be taken, including alternative inspection methods (for example, volumetric examination), if leakage is detected.

Response

STP Unit 1 and Unit 2 susceptibility rankings are not within 5 EFPY of ONS3. Therefore, this section is not applicable.

Requested Information

4. **If the susceptibility ranking for your plant is greater than 5 EFPY and less than 30 EFPY of ONS3, addressees are requested to provide the following information:**

   a. **your plans for future inspections (type, scope, qualification requirements, and acceptance criteria) and the schedule;**

   b. **your basis for concluding that the inspections identified in 4.a will assure that regulatory requirements are met (see Applicable Regulatory Requirements section). Include the following specific information in this discussion:**

      (1) **If your future inspection plans do not include a qualified visual examination at the next scheduled refueling outage, provide your basis for concluding that the regulatory requirements discussed in the Applicable Regulatory Requirements section will continue to be met until the inspections are performed.**

      (2) **The corrective actions that will be taken, including alternative inspection methods (for example, volumetric examination), if leakage is detected.**

Response

STP Unit 1 & Unit 2 susceptibility rankings are not within the band of greater than 5 EFPY and less than 30 EFPY of ONS3. Therefore, this section is not applicable.

Requested Information

5. **Addressees are requested to provide the following information within 30 days after plant restart following the next refueling outage:**

   a. **a description of the extent of VHP nozzle leakage and cracking detected at your plant, including the number, location, size, and nature of each crack detected;**

   b. **if cracking is identified, a description of the inspections (type, scope, qualification requirements, and acceptance criteria), repairs, and other corrective actions you have taken to satisfy applicable regulatory requirements. This information is requested only if there are any changes from prior information submitted in accordance with this bulletin.**

Response

STPNOC will provide the requested information or indicate that no leakage was identified within 30 days after plant restart following the next refueling outage (Units 1 & 2).

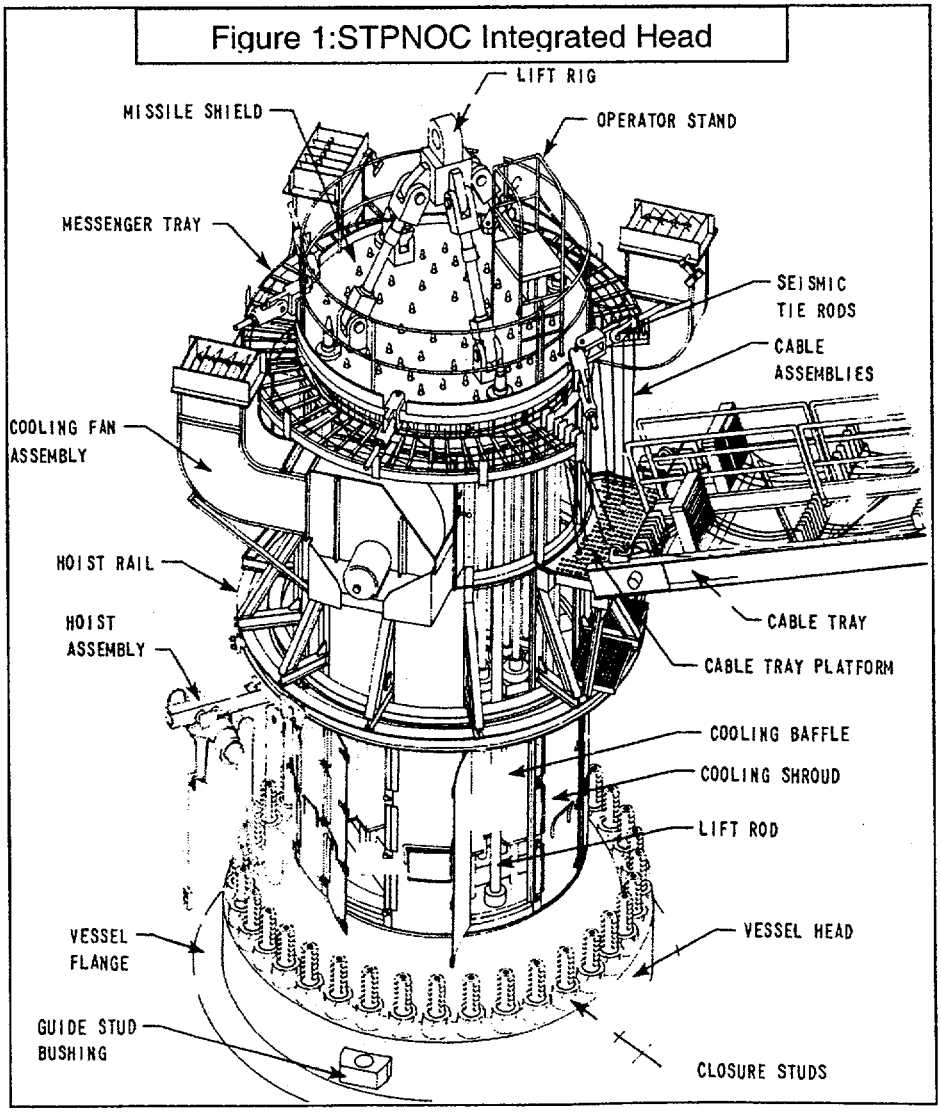
Table 1

South Texas Project

Relative Elevation of Significant Components

Distance from Missile Shield(ft-in)	Component
0'	Bottom of Missile Shield
0' (attached)	Top of CRDMS
20'-4"	CRDM Penetration Flanges
21'	Head Insulation (Upper Horizontal Step)
21'-4"	Top of RPV Head
26'	RPV Flange

Figure 1:STPNOC Integrated Head



References

1. NRC Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles, dated August 3, 2001.

2. PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48), EPRI, Palo Alto, CA: 2001. TP-1006284

3. NEI letter from Alexander Marion to Dr. Brian W. Sheron (NRC), "Generic Information for Use by Licensees in Response to NRC Bulletin 2001-01", dated August 21, 2001.

4. PWR Materials Reliability Program, Interim Alloy 600 Safety Assessments for US PWR Plants (MRP-44): Part 2: Reactor Vessel Top Head Penetrations, EPRI, Palo Alto, CA: 2001.

LIST OF COMMITMENTS

The following table identifies those actions committed to by STPNOC in this document. Any other statements in this submittal are provided for information purposes and are not considered to be commitments. Please direct questions regarding these commitments to Mr. Wayne Harrison at 361-972-7298.

COMMITMENT	Due Date/Event
STPNOC will provide the requested information (NRC Bulletin 2001-01, Request 5) or indicate that no leakage was identified.	Within 30 days after plant restart following the next refueling outage (Units 1 & 2).