June 13, 2002

10 CFR 50.54(f)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

Gentlemen:

In the Matter of	)	Docket No. 50-327
Tennessee Valley Authority	)	50-328

SEQUOYAH NUCLEAR PLANT (SQN) - UNIT 2 ITEM 5 RESPONSE TO NRC BULLETIN 2001-01, "CIRCUMFERENTIAL CRACKING OF REACTOR PRESSURE VESSEL HEAD PENETRATION NOZZLES," DATED AUGUST 3, 2001 (TAC No. MB2660) - UNIT 2 ITEM 2 RESPONSE TO NRC BULLETIN 2002-01, "REACTOR PRESSURE VESSEL HEAD DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY," DATED MARCH 18, 2002 (TAC No. MB4579)

References:

1. NRC letter to TVA dated November 20, 2001, Sequoyah Nuclear Plant, Units 1 and 2, and Watts Bar Nuclear Plant, Unit 1 - Responses to NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles" (TAC Nos. MB2660, MB2661, and MB2675)

2. TVA letter to NRC dated August 31, 2001, Sequoyah Nuclear Plant, Units 1 and 2, and Watts Bar Nuclear Plant, Unit 1 - Response to NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles" dated August 3, 2001.

3. TVA letter to NRC dated April 2, 2002, Sequoyah Nuclear Plant (SQN) Units 1 and 2 - Response To NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," Dated March 18, 2002.

4. TVA letter to NRC dated May 17, 2002, Sequoyah Nuclear Plant (SQN) Units 1 and 2 and Watts Bar Nuclear Plant (WBN) Unit 1 - Sixty-day Response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," Dated March 18, 2002. (TAC Nos. MB4578, MB4579, MB2675).

This letter provides TVA's 30-day, after plant restart, information for SQN Unit 2 in response to Item 5 of NRC Bulletin 2001-01 and Item 2 of NRC Bulletin 2002-01. Item 5 requests information pertaining to the structural integrity of the reactor pressure vessel head penetration (VHP) nozzles, including the extent of VHP nozzle leakage and cracking, and inspections and repairs. Item 2 requests information relative to inspection of the reactor pressure vessel head to identify any degradation, including inspection scope, results, corrective actions taken, and root cause of the degradation.

Additionally, on May 3, 2002, a telephone conference was conducted between TVA personnel and NRC staff to discuss SQN Unit 2 reactor vessel head inspection activities. During the discussion, the NRC staff identified two review questions associated with Reference No. 3.

Enclosure 1 provides TVA's response to the requested information for Items 2 and 5. Enclosure 2 provides TVA's response to NRC staff questions associated with Reference No. 3.

No commitments have been made as a result of this letter.

This letter is being sent in accordance with NRC RIS 2001-05. If you have any questions regarding this response, please contact me at (423) 843-7071 or J. D. Smith at (423) 843-6672.

Sincerely,

Original signed by

Pedro Salas
Licensing and Industry Affairs Manager

Subscribed and sworn to before me
on this *13th* day of ___June 2002___

Penny D. Walker
Notary Public

My Commission Expires May 9, 2005

Enclosures
cc (Enclosures):
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT (SQN)
UNIT 2

THIRTY-DAY, AFTER PLANT RESTART, RESPONSE TO:
NRC BULLETIN 2001-01, "CIRCUMFERENTIAL CRACKING OF REACTOR PRESSURE VESSEL HEAD PENETRATION NOZZLES"

NRC BULLETIN 2002-01, "REACTOR PRESSURE VESSEL HEAD DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY"

This enclosure contains SQN's 30-day, after plant restart, response to Item 5.0 of Bulletin 2001-01, dated November 20, 2001, and Item 2.0 of Bulletin 2002-01, dated March 18, 2002.

NRC Request:

Bulletin 2001-01:

5.0 Within 30 days after plant restart following the next refueling outage 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) 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.

Bulletin 2002-01:

2.0 Within 30 days after plant restart following the next inspection of the reactor pressure vessel head to identify any degradation, all PWR addressees are required to submit to the NRC the following information:

A. the inspection scope (if different that that provided in response to item 1.D.) and results, including the location, size, and nature of any degradation detected,

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B. the corrective actions taken and the root cause of the degradation.

RESPONSE

SCOPE OF INSPECTION:

SQN performed a remote under insulation inspection of the Unit 2 reactor vessel head exterior surfaces during the Cycle 11 Refueling Outage (RFO) for evidence of boric acid leakage or leakage associated with Control Rod Drive Mechanism Penetration (CRDMP) nozzles. A total of 83 penetrations were examined. This population included penetrations for 78 Control Rod Drive Mechanisms (CRDM), 4 Upper Head Injection (UHI) nozzles (abandoned), and 1 vent line nozzle. The head area adjacent to the penetrations was also examined for evidence of boron deposits.

TECHNIQUE:

Access to the examination area was obtained by raising the insulation/CRDM duct work shroud approximately 5 inches above the vessel head. A remote camera was used to perform a visual examination using ASME Section XI VT-2 methodology with camera resolution representative of VT-1 sensitivity. Examination was performed by an NDE, Level III, inspector certified in visual examination. Any suspect areas were also reviewed by a Metallurgical Engineer qualified to TVA's Borated Water Corrosion (BWC) Program.

RESULTS:

Some interference's were encountered during the visual examination which restricted viewing of the penetration interface on the uphill side. The interference's were a result of debris and insulation support rings (ISRs) that had slipped down the CRDM column and were in contact with the reactor pressure vessel (RPV) head. Out of 83 penetrations, 16 penetrations were found with slipped ISRs resulting in reduced inspection access. In these cases, the penetration interface could not be seen (usually on the uphill side), however; no evidence of boron crystals was noted outside the ISR. Where physical access was permitted, the ISRs were moved to allow additional examination. Figure Nos. 1 and 2 (CRDMP No. 58) provide a typical example of the ISR inspection interference before the ISR was moved and after movement.

The majority of the penetrations exhibited debris buildup on the uphill side. This debris varied from light to heavy. There was no impact on determining the presence of boron in the annulus area of the penetration as a result of light debris being present. In areas where heavy debris was present, that affected visual examination, compressed air at approximately 30 pounds per square inch was directed at the location to move the debris. These areas were re-inspected after movement of debris. There was no indication of boron in these areas that would indicate pressure boundary leakage. Figure Nos. 3 and 4 (CRDMP No. 33), 5 and 6 (CRDMP No. 14), 7 and 8 (CRDMP No. 37), and 9 and 10 (CRDMP No. 78) show typical "heavy" debris that were observed as found and after movement. Debris identified during the inspection process was not specifically retrieved. The condition was placed into the corrective action program and evaluated for foreign material exclusion (FME) and visual examination impacts. Movement of the debris was adequate to support visual inspection and the tight fit of the shroud to the reactor vessel would prevent the debris from being an FME concern. Additionally, because of potential ALARA concerns the decision was made to not attempt retrieval of the debris. The debris identified during inspection and which were left on the RPV head have not caused and are not expected to cause any degradation to the head.

One area of concern was located at CRDM No. L-15 (CRDMP No. 75) which is an outer peripheral penetration. A Conoseal mechanical joint leak was identified at CRDM No. L-15. The leakage path extended to the penetration interface at the head and continued down the RPV head onto the flange. The characteristics of residue and corrosion product indicates that the leakage had occurred sometime prior to plant shut down. There was no evidence of leakage at the penetration to RPV head interface. Figures 11, 13, and 15 show the as found condition.

The leakage condition at CRDM No. L-15 (CRDMP No. 75) that resulted from the Conoseal mechanical joint was entered into the TVA corrective action program and evaluated under TVA's BWC Program. As part of the corrective actions taken, the boron residue and corrosion product was removed from the CRDM column (accessible areas), RPV head penetration area, RPV head, and flange area. Residue was sufficiently removed on the CRDM column so as to not mask any critical areas (e.g. canopy seal weld area, bi-metallic weld, head penetration, etc.) for future evaluations for leakage. Figures 12, 14 and 16 show the cleaned, as left, condition. The corrosion on the RPV head, as a result of CDRM No. L-15 leakage, was superficial and had no indication of material degradation after removal. This location is on the outer periphery of the RPV head and is inspected each refueling outage. The inspection is required by site procedure to monitor for penetration leakage. The root cause of CRDM No. L-15 leakage was indeterminate. The most likely causes are either: 1) foreign material was present that did not cause a scratch or sealing surface flaw, or 2) the connecting clamp was insufficiently torqued during previous reassembly. Neither cause could be confirmed from the evidence at hand, and both appear to have sufficient steps in place in the reactor reassembly procedure to prevent recurrence.

In conclusion, 100 percent of the penetrations and the circumferential area was examined. No indication of boron leakage was observed in the interface area that would be associated with Primary Water Stress Corrosion Cracking on the inside surfaces of the RPV head. All penetrations were examined by a Level III inspector certified in visual examination, with questionable areas evaluated and reviewed by a Metallurgical Engineer qualified to TVA's BWC Program.

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT (SQN)
UNIT 2

THIRTY-DAY, AFTER PLANT RESTART, RESPONSE TO:
NRC BULLETIN 2001-01, “CIRCUMFERENTIAL CRACKING OF REACTOR PRESSURE VESSEL HEAD PENETRATION NOZZLES”

NRC BULLETIN 2002-01, “REACTOR PRESSURE VESSEL HEAD DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY”

Figure 1 – CRDMP No. 58
Typical Insulation Support Ring
Interference **Before** Repositioning

Figure 2 – CRDMP No. 58
Typical Insulation Support Ring
Interference **After** Repositioning

Figure 3 – CRDMP No. 33
Debris In Examination Area
(**As Found**)

Figure 4 – CRDMP No. 33
Examination Area
(**After Debris Movement**)

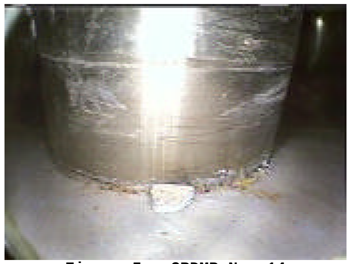

Figure 5 – CRDMP No. 14
Debris In Examination Area
(**As Found**)

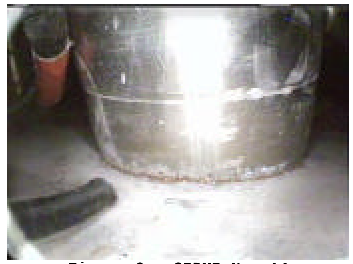

Figure 6 – CRDMP No. 14
Examination Area
(**After Debris Movement**)

Figure 7 – CRDMP No. 37
Debris In Examination Area
(**As Found**)

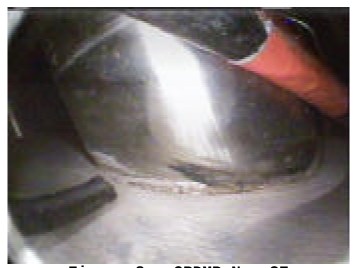

Figure 8 – CRDMP No. 37
Examination Area
(**After Debris Movement**)

Figure 9 – CRDMP No. 78
Debris In Examination Area
(**As Found**)

Figure 10 – CRDMP No. 78
Examination Area
(**After Debris Movement**)

Figure 11 – CRDMP No. 75
L-15 Conoseal Leakage Path at CRDM Column (**As Found**)

Figure 12 – CRDMP No. 75
L-15 Conoseal/CRDM Column
(**After Cleaning**)

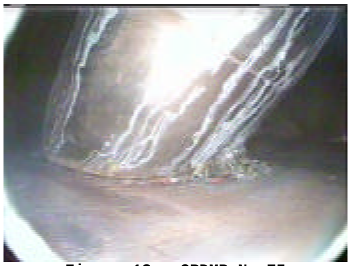

Figure 13 – CRDMP No.75
L-15 Conoseal Leakage Path at Penetration to RPV Head Interface Side View (**As Found**)

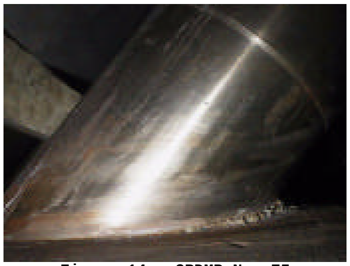

Figure 14 – CRDMP No. 75
L-15 Conoseal CRDM Column at Penetration to RPV Head Interface Side View (**After Cleaning**)

Figure 15 – CRDMP No. 75
L-15 Conoseal Leakage Path at Penetration to RPV Head Interface (**As Found**)

Figure 16 – CRDMP No. 75
L-15 Conoseal/CRDM Column at Penetration to RPV Head Interface (**After cleaning**)

This enclosure contains SQN’s response to NRC staff questions that were identified on May 3, 2002, relative to the TVA response provided to NRC Bulletin 2002-01, dated April 2, 2002.

NRC Question No. 1:

Relative to the Unit 1 Cycle 6 boric acid inspection, minor boron residue was identified. What was the source of the leakage? How was the leakage and leak location identified?

RESPONSE TO IR QUESTIONS

According to inspection records during the Unit 1 Cycle 6 refueling outage, the reactor head showed some boron buildup around the column for CRDM No. A-5. It was determined that the residue was the result of a Conoseal leak as documented in the work performed section of the Work Order and the Refuel Floor Logbook. There was evidence that the leakage path originated at the mechanical joint of the Conoseal. The area cleaned was around the column and column penetration for CRDM No. A-5. The other areas of the head, where boron residue or water streaking was noted, were not removed because no evidence of corrosion damage was present and the condition would not mask any future evidence of pressure boundary leakage.

NRC Question No. 2:

Relative to the Unit 2 Cycle 9 boric acid inspection, boron deposits were identified. What was the source of the leakage? Provide a description of the boron deposits.

RESPONSE TO IR QUESTIONS

Review of the Unit 2 documentation indicates that the Conoseal flanges are cleaned when the mechanical joints are taken apart. Since the boron residue was in the vicinity of the Conoseal and appeared to be balled up or clustered in nature, the boron residue could have been from the flange cleaning process. The area was re-inspected in the following outages (Cycle 10 and Cycle 11) with no evidence of additional boron residue.