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Ref: 10CFR50.55a

CPSES-200402319
Log # TXX-04183

October 14, 2004

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
UNIT 2 - DOCKET NO. 50-446
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION
RE: 2RF06 AND 2RF07 STEAM GENERATOR REPORTS

Gentlemen:

By means of an e-mail dated August 9, 2004, the NRC provided a request for additional information (RAI) necessary to complete their review of the Unit 2 Steam Generator (SG) tube inservice inspection (ISI) reports submitted by TXU Generation Company LP (TXU Power) subsequent to refueling outages 2RF06 and 2RF07. During a conference call on October 4, 2004, TXU Power and NRC staff discussed preliminary and clarifying information related to this RAI. The final questions, and TXU Power's answers to these questions, are attached to this letter.

Should you have any questions, please contact Mr. Bob Kidwell at (254) 897-5310.

This communication contains no new or revised commitments.

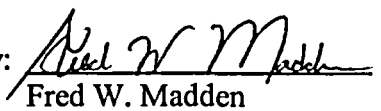
A047

Sincerely,

TXU Generation Company LP

By: TXU Generation Management Company LLC
Its General Partner

Mike Blevins

By: 
Fred W. Madden
Director, Regulatory Affairs

RJK
Attachment

c - B. S. Mallett, Region IV
W. D. Johnson, Region IV
M. C. Thadani, NRR
Resident Inspectors, CPSES

Attachment to TXX-04183

Response to NRC Request for Additional Information

Question:

1. *Of the eight tubes plugged during the 2RF06 outage due to the presence of single volumetric indication (SVI), two of the tubes (SG2-7-15 and SG2-24-37) displayed SVIs within a hot-leg tube support plate (TSP) and one tube (SG3-6-80) displayed an SVI in the freespan region between two hot-leg TSPs. The remaining five tubes (SG2-43-32, SG2-36-59, SG3-37-55, SG3-38-55, and SG3-38-56) displayed SVIs just above the hot-leg top-of-tubesheet (HTS) surface. The percent throughwall SVI penetration depth was not given for any of these indications.*

   a. *If you were unable to reliably determine the SVI penetration depth, discuss how you were able to evaluate the integrity of these tubes.*

CPSES Response to 1.a:

All eight SVI indications were phase-depth sized using a calibration standard based on an ASME 0.0625-inch diameter flat bottom hole of 20%, 40%, 60%, 80% and 100% through wall depths. This approach has been demonstrated to provide good sizing performance across a wide range of simulated wear scar morphologies. Seven of the eight indications relied on this sizing technique using a rotating pancake coil with only the indication in tube R6, C80 using the +Point coil. Bobbin coil identified a possible loose part in tube R6, C80 at the u-bend apex. This lead to a special interest + Point coil test that confirmed a possible loose part. The resulting throughwall maximum depths are shown in the following table. Additionally, all eight identified tubes were evaluated for foreign object wear indications against the tube integrity performance criterion with regard to structural and leakage integrity. This assessment is documented in WPT-16312, Foreign Object Wear Indications at Comanche Peak Unit 2 RF06 Outage, dated 4/24/02. Condition monitoring evaluation confirmed that all indications satisfied the performance criteria of NEI 97-06.

SG	Tube	SVI Location	RPC Depth Estimate
2	R7 C15	H10	14% TW
2	R24 C37	H1 (FDB)	28% TW
2	R36 C59	TTS (HL)	9% TW
2	R43 C32	TTS (HL)	28% TW
3	R6 C80	U-Bend Apex	46% TW
3	R37 C55	TTS (HL)	44% TW
3	R38 C55	TTS (HL)	43% TW
3	R38 C56	TTS (HL)	26% TW

Question:

1.b. Discuss whether any of these SVIs were present during previous inspections and whether any growth had occurred. If any of these SVIs were detected during previous inspections, discuss whether these SVIs have changed with time.

CPSES Response to 1.b:

SG 2 and SG 3 were not inspected in 2RF05 and there is no report of these indications in the 2RF04 or 2RF03 inspection data.

Question:

1.c. Provide the reason for plugging each of the eight tubes with SVIs, including the cause for each SVI (e.g., wear, intergranular attack, possible loose part, wear, etc.).

CPSES Response to 1.c:

The table below highlights the cause for the SVI and the basis for plugging the respective tube. Recognizing that sizing techniques are not qualified for loose parts all tubes were conservatively plugged. In some cases the estimated percent through wall exceeded the Technical Specification repair limit and these tubes were likewise plugged.

SG	Tube	SVI Mechanism	Repair Basis
2	R7 C15	Possible loose part	Conservatively plugged
2	R24 C37	Possible loose part	Conservatively plugged
2	R36 C59	Foreign object	Plugged/Stabilized since FO was not retrieved
2	R43 C32	Possible loose part	Conservatively plugged
3	R6 C80	Possible loose part	Exceeded Tech Spec repair limit
3	R37 C55	Possible loose part	Exceeded Tech Spec repair limit
3	R38 C55	Possible loose part	Exceeded Tech Spec repair limit
3	R38 C56	Possible loose part	Conservatively plugged

Question:

2. *During the 2RF06 outage, three tubes (SG3-12-30, SG3-8-33, and SG3-9-33) with indications denoted as "PCT" were plugged, according to the table in the June 5, 2002, report. The indications of interest in these three tubes were less than 11% throughwall. The indications were located near the top of cold-leg tube support plate C6.*

   2.a. *Discuss whether any of these indications were present during previous inspections. If any of these indications were detected during previous inspections, discuss whether these indications have changed with time.*

CPSES Response to 2.a:

The three tubes in SG 3 identified as exhibiting preheater baffle plate wear indications (R12C30, R8C33, R9C33) were not inspected at 2RF04 and there is no report of these indications in the 2RF03 data. However, in the 2RF05 outage (SG1 and SG 4 inspection only) two tubes were reported with tube-baffle plate wear. The maximum reported depth was 6%TW. Both indications were reported in the 2RF04 data and growth for these 2 indications was 2% and 3%.

Question:

   2.b. *Provide the reason for plugging each of the three tubes, including the cause for each PCT indication (e.g., axial ODSCC, intergranular attack, etc.). Discuss whether denting was associated with these PCT indications.*

CPSES Response to 2.b:

The volumetric indications of R12C30 (11%TW), R8C33 (5%TW) and R9C33 (6%TW) located at the upper edge of C6 in SG 3 are believed to be related to wear with the baffle plate. These tubes were conservatively plugged in support of the philosophy of skipping outages (i.e., indications remaining in service for two cycles). There were no dent indications at any of these locations.

Question:

3. *During the 2RF06 and 2RF07 outages, discuss whether any inspections (e.g., eddy current and/or visual) for loose parts were conducted. If loose parts were detected, provide the results of these inspections. If visual inspections were not performed pursuant to any potential loose part signals and/or the part was not removed, discuss what analyses were performed to ensure these potential loose parts do not compromise tube integrity for the period of time between inspections.*

CPSES Response to 3:

A secondary side FOSAR inspection of all four SGs was performed during 2RF06 and 2RF07. Additionally, EC inspections of SG 2 and SG 3 (2RF06) and SG 1 and SG 4 (2RF07) for detection of possible loose parts were also conducted. These inspections identified a number of foreign objects that were removed where possible. The tables that follow present the results of the respective inspections for all SGs reported from both EC and FOSAR. For 2RF06 the associated tubes, where loose parts could not be removed from the SGs, were plugged. Likewise for 2RF07, an evaluation (WPT-16497, Evaluation of Foreign Objects During the Fall 2003 Outage) of the loose parts that could not be removed from the SGs was performed. The evaluation demonstrates that it is acceptable to operate for up to two cycles with these objects in the SGs, whereupon a reassessment of the conditions would be necessary to justify continued operations.

Also note that a total of eight tubes were reported with foreign object wear in the 2RF06 inspection of SG 2 and SG 3 (these were discussed in detail in response to Question 1) and no tube wear due to loose parts was reported in the 2RF07 ECT inspection of SG 1 and SG 4.

Summary of Foreign Object/Loose Parts Identified During 2RF06

SG	Leg	Row/Col	Elev.	First Found By	Shape	Confirmed By	Resolution	Removed
1	CL	Annulus C45	TTS	Video inspection	sludge rock 0.25"x0.50"	Visual	Retrieved by Brooks on 4/15/2002	Yes
1	CL	Annulus C45	TTS	Video inspection	sludge rock 0.125"x0.250"	Visual	Retrieved by Brooks on 4/15/2002	Yes
1	CL	R13C57	TTS	Video inspection	Weld slag 0.750"x0.375"x0.250"	Visual	Retrieved by Brooks on 4/16/2002	Yes
1	CL	R13C57	TTS	Video inspection	Weld slag 0.50"x0.25"x0.25"	Visual	Retrieved by Brooks on 4/16/2002	Yes
2	HL	R36C52, R36C53, R38C53	TTS	+Point	Egg shaped weld slag	Video inspection	Retrieved during sludge lance on 4/13/2002	Yes
2	HL	R30C56	TTS	+Point	N/A	N/A	Nothing found	N/A
2	HL	R35C59, R36C59	TTS	+Point	Sludge rock	Video inspection	Location precluded retrieval. Attempted to inspect 3 times	No
2	CL	R8C58	B	Video inspection	Sludge rock 0.718"x0.468"x0.343"	Visual	Retrieved by Brooks on 4/13/2002	Yes
2	CL	R8C58	B	Video inspection	Wire mesh 0.406"x0.531"x0.015"	Visual	Retrieved by Brooks 4/13/2002	Yes
2	CL	R23C69	B	Video inspection	Sludge rock 0.781"x0.406"x0.343"	Visual	Retrieved by Brooks 4/13/2002	Yes
2	CL	R23C56	B	Video inspection	Weld slag 0.486"x0.781"x0.343"	Visual	Retrieved by Brooks 4/13/2002	Yes
2	CL	R22C56	B	Video inspection	Sludge rock 0.718"x0.531"x0.343"	Visual	Retrieved by Brooks 4/13/2002	Yes
2	CL	R23C69	B	Video inspection	Weld slag 0.531"x0.218"x0.2.18"	Visual	Retrieved by Brooks 4/13/2002	Yes
2	CL	R8C56	B	Video inspection	Weld slag 0.406"x0.406"x0.234"	Visual	Retrieved by Brooks 4/13/2002	Yes
2	CL	R1C56	B	Video inspection	Flat sludge rock 0.406"x0.593"x0.218"	Visual	Retrieved by Brooks 4/13/2002	Yes
2	HL	R24C37	A	+Point	Weld slag 0.656"x0.593"x0.156"	Visual	Retrieved by Brooks 4/13/2002	Yes
2	CL	R20C56, R20C57	B	+Point	Wedge 4"x2"x1"	Visual	Detected by EC as a Baffle Support Signal (BSS) Removed by Brooks on 4/14/2002	Yes

Summary of Foreign Object/Loose Parts Identified During 2RF06 (cont)

SG	Leg	Row/Col	Elev.	First Found By	Shape	Confirmed By	Resolution	Removed
3	HL	R37C55	TTS	NDE Wear	N/A	N/A	Nothing found	N/A
3	HL	R38C55	TTS	NDE Wear	N/A	N/A	Nothing found	N/A
3	HL	R38C56	TTS	NDE Wear	N/A	N/A	Nothing found	N/A
3	HL	R6C114	TTS	+Point	Tube scale	Visual	Viewed 3" level and found small tube scale piece attached to tube	No
3	HL	R14C92	TTS	+Point	Sludge rock (approx. 0.4")	Visual	Retrieved during FOSAR	Yes
3	HL	R6C80	H11	+Point	N/A	N/A	Did not see with video since upper bundle was not opened (no access), leave in place, Eng. Justification	No
3	HL	Annulus C34-58	TTS	Video inspection	Various small items (14): mesh (1), weld slag (9), sludge (1), wire (3)	Visual	Retrieved by Brooks 4/13/2002	Yes
3	CL	Annulus C67	TTS	Video inspection	Various small items (12): sludge rock (1), weld slag (6), wire (5)	Visual	Retrieved by Brooks 4/13/2002	Yes
3	CL	R43C93	B	Video inspection	Bolt 0.375"x0.625"	Visual	Retrieved by Brooks 4/13/2002	Yes
3	CL	R49C42	A	Video inspection	Sheet metal	Visual	Retrieved by Brooks 4/13/2002	Yes
3	CL	R20-21 C55,56,57, 58 & 59	A	Video inspection	Various material (12): Sludge rock (1), slag (6), machine curl (1), wire (1), mesh (3)	Visual	Retrieved by Brooks 4/13/2002	Yes

Summary of Foreign Object/Loose Parts Identified During 2RF07

SG	Leg	Row/Col	Elev.	First Found By	Shape	Confirmed By	Resolution	Removed
1	HL	T-slot C57	TTS	Video Inspection	Sludge Rock 0.188"x 0.375"	N/A	Retrieved by Brooks 10/21/03	Yes
1	HL	R7C3, R8C2, R8C3	TTS	+Point	Rough metal strip wedged in place	Video, Bobbin, NDE History	Leave in place, 2RF04 justification	No
1	HL	R3C54	TTS	Video Inspection	Sheet Metal 0.031" x 0.25" x 0.50"	N/A	Retrieved by Brooks 10/21/03	Yes
1	HL	R11C60	TTS	Video Inspection	Wire 0.016 " x 0.75"	N/A	Retrieved by Brooks 10/21/03	Yes
1	HL	R32C60	TTS	Video Inspection	Weld Slag 0.50" diameter	N/A	Retrieved by Brooks 10/21/03	Yes
1	HL	R15C74	TTS	Video Inspection	Sludge Rock 0.375" diameter	N/A	Crumbled in SG during Retrieval	No
1	HL	R4C96	TTS	Video Inspection	Sheet Metal 0.031' x 0.25" x 0.50"	N/A	Retrieved by Brooks 10/21/03	Yes
1	CL	R3C13	TTS	Video Inspection	Weld Slag 0.250" x 0.500"	N/A	Retrieved by Brooks 10/21/03	Yes
1	CL	R35C26	TTS	Video Inspection	Sludge Rock 0.250" diameter	N/A	Retrieved by Brooks 10/21/03	Yes
1	CL	R14C59	TTS	Video Inspection	Sludge Rock 0.125" x 0.500" x 0.500"	N/A	Retrieved by Brooks 10/21/03	Yes
1	CL	R11C58	TTS	Video Inspection	Sludge Rock 0.125" x 0.375" x 0.375"	N/A	Broke up when attempting to retrieve	No
1	CL	R46C54, R46C55	BP B (C2)	+Point	Curved Metal 0.5" x 0.375" x 0.25"	Video Inspection	Retrieved by Brooks 10/23/03	Yes
2		Tubelane – Nozzle	TTS	Video Inspection	Weld Slag 1.75" x 0.25"	N/A	Retrieved by Brooks 10/18/03	Yes
2	HL	T-slot - R36C56	TTS	Video Inspection	Weld Slag 0.375" and 0.125"	N/A	Retrieved by Brooks 10/18/03	Yes
2	HL	T-slot - R36C59	TTS	+Point	Weld Slag	Video Inspection and NDE History at 2RF06	Attempted Retrieval 10/18/03 - R36C59 was plugged at 2RF06 and dispositioned	No
2	CL	T-slot	TTS	Video Inspection	Wire 0.016" x 0.50"	N/A	Retrieved by Brooks 10/19/03	Yes
2	CL	R43C59	TTS	Video Inspection	Sludge Rock 0.188" diameter	N/A	Retrieved by Brooks 10/19/03	Yes

Summary of Foreign Object/Loose Parts Identified During 2RF07 (cont)

SG	Leg	Row/Col	Elev.	First Found By	Shape	Confirmed By	Resolution	Removed
4	HL	R26C66	TTS	Video Inspection	Sludge Rock 0.600" diameter	N/A	Retrieved by Brooks 10/19/03	Yes
4	HL	R18C66	TTS	+Point	N/A	2RF03, 2RF04	Still could not find	No
4	HL	R23C79, R23C80, R22C80	TTS	+Point	Nail (~2")	NDE History	Leave in place, 2RF05 justification	No
4	CL	R8C59	TTS	Video Inspection	Sludge Rock 0.315" diameter	N/A	Retrieved by Brooks 10/19/03	Yes
4	CL	R4C30	BP B (C2)	Bobbin	Scale Indication	NDE History	Leave in place, 2RF03 justification	No
4	CL	R21C45, R22C45	BP B (C2)	Bobbin	Metal Thread	NDE History	Leave in place, 2RF03 justification	No
4	CL	R49C35/34	BP B (C2)	+ Point	Bolt Piece 0.25" x 0.50"	N/A	Retrieved by Brooks 10/21/03	Yes
4	CL	R43C92, R43C93	BP B (C2)	+ Point	Hollow Rod 0.50" x 0.625"	N/A	Retrieved by Brooks 10/21/03	Yes
4	CL	R21C69	BP B (C2)	Video Inspection	Metallic Remnant 0.25" x 1.00" x 0.125"	N/A	Retrieved by Brooks 10/21/03	Yes
4	CL	R21C47, R21C48	BP B (C2)	Video Inspection	Crescent-shaped Piece 0.313" wide	N/A	Wedged between Tubes - Not Retrieved	No
4	CL	R21C43, R21C44, R22C43	BP B (C2)	+ Point	Sludge Rock 0.75" x 1.00" 0.125"	N/A	Retrieved by Brooks 10/21/03	Yes

Question:

4. *In the June 5, 2002 (2RF06) and June 30, 2004 (2RF07) reports, a 100% +Point* inspection of all dented TSP intersections 5 volt dented TSP intersections at the H3 TSPs in all four steam generators was reported. The NRC staff notes that dented/dinged locations can serve as initiation sites for axial and circumferential cracks. The staff notes that both stress and temperature affect a tube's susceptibility to stress corrosion cracking. As a result, a smaller dent at a higher temperature may be as severe (from a stress corrosion cracking standpoint) as a larger dent at a lower temperature (material properties being equal).*

   4.a. *Explain the basis for performing +Point* inspections at the dented H3 TSP intersections and not at other dented TSP intersections. Clarify your inspection scope and expansion criteria for dented TSP intersections.*

CPSES Response to 4.a:

This location (H3 – the lowest support plate in the hot leg, H1 being the flow distribution baffle plate) was conservatively selected as the likely first sign of the onset of SCC degradation at TSP intersections due to ding/dent related corrosion. Recognizing that the 405 stainless plate quatrefoil tube hole design largely precludes in-service denting in Model D5 SGs and any observed denting is likely related to the manufacture process. Also, the enhanced resistance of thermally treated Alloy 600 tubing, demonstrated to date by the absence of ding/dent-related cracking in D5, Model F and F-type replacement SGs further supports this limited inspection scope. Nonetheless, the following inspections were implemented.

2RF06: Initial inspection included 100% +Pt of > 5 volt dents at H3 TSP in SGs 2 and 3. If crack like indications were detected, expansion would have followed predetermined criteria. The minimum expansion would have included a 100% +Pt inspection of all dents at H3 and a 20% +Pt sample of the dents at H5 in all SGs. Additional expansions would follow based on the findings (i.e. ID or OD) and if the indications were not detected by bobbin.

2RF07: Initial inspection included 100% +Pt of > 5 volt dents at H3 TSP and 50% +Pt of > 5 volt dings in the hot leg (below H11) in SGs 1 and 4. If crack like indications were detected, expansion would have followed predetermined criteria. The minimum expansion would have included a 100% +Pt inspection of all dents at H3 and a 20% +Pt sample of the dents at H5 in all SGs. Additional expansions would follow based on the findings (i.e. ID or OD) and if the indications were not detected by bobbin.

Question:

4.b. Discuss the extent to which the bobbin probe is qualified to inspect dented/dinged regions exceeding a specific voltage threshold (e.g., 5 volts).

CPSES Response to 4.b:

The bobbin probe is functionally equivalent to an Appendix H qualified probe to detect axial OD indications in lower voltage (≤ 5 volt) dent/dings per Westinghouse report SG-99-03-005, "Appendix H Certification of Bobbin Coil Detection Performance in Freespan Dings (South Texas Project)", March 1999.

Question:

4.c. Confirm that your voltage normalization scheme for determining the size of dents is consistent with the standard industry approach (i.e., consistent with the approach developed in support of Generic Letter 95-05).

CPSES Response to 4.c:

Even though the repair criterion of GL 95-05 is not applied for the Unit 2 steam generators, the bobbin voltage normalization is consistent with the approach developed in support of GL 95-05. This also includes use of calibration standards which have been normalized to the laboratory standard used in support of GL 95-05 database. Thus the dent/ding voltages reported from bobbin inspection are consistent with industry approach.

Question:

5. *Describe what actions, if any, were taken to verify that the steam generator tubes were manufactured (i.e., regarding processing, heat treatment, etc.) as specified so as to exhibit optimal resistance to degradation (refer to NRC Information Notice 2002-21 Supplement 1, dated April 1, 2003). If tubes with non-optimal tube processing have been identified,*

CPSES Response to 5:

SGs in CPSES Unit 2 have similar design characteristics (TT Alloy 600 tubes and stainless steel tube support plates with quatrefoil holes, though tube size is different) as Seabrook and could be susceptible to similar degradation (axial ODSCC at TSP intersections) as discussed in IN 2002-21 Supplement 1. Root cause investigation of the Seabrook indications led to the conclusion that the affected tubes had very high residual stress similar to tubes that were not thermally treated. Tubes with such condition could be identified from the full-length bobbin coil inspection signals. A procedure developed by Westinghouse uses bobbin signal profiles for tubes that are thermally treated after U-bending (rows 1 through 9 in Model D-5 SGs) and bobbin amplitude offset at U-bend tangent points for the outer row tubes. This procedure was applied prior to 2RF07 to the entire population of CPSES Unit 2 SG tubes in service using bobbin coil data from prior inspections. The tubes possibly having higher residual stress were identified and documented in a site-specific Westinghouse report LTR-SGDA-03-151, June 2003, "Comanche Peak Unit 2 Evaluation of Steam Generator Tubes for Elevated Residual Stress." These tubes (73 were identified as potentially having high residual stress) are shown in the following table. Inspection of these potentially affected tubes was made a permanent part of the Unit 2 Degradation Assessment prior to 2RF07 by the CPSES Corrective Action Program in response to IN 2002-21, Supplement 1. Subsequently, all tubes identified as potentially having high residual stress in SGs 1 and 4 were included in the 2RF07 bobbin inspection and the TTS +Point inspection programs with no indications identified.

Listing of Identified Tubes with Elevated Stress

No	SG1		SG2		SG3		SG4	
	Row	Col	Row	Col	Row	Col	Row	Col
1	18	5	1	23	14	24	29	15
2	16	6	36	35	44	30	18	26
3	17	8	10	36	42	31	10	31
4	18	13	47	37	14	35	10	34
5	17	19	20	45	12	47	10	35
6	21	22	10	48	12	48	32	35
7	27	28	49	50	12	49	10	36
8	33	54	1	55	13	50	15	36
9	33	55	5	61	14	50	10	37
10			31	81	12	52	10	53
11			2	88	14	57	28	55
12			1	89	11	58	13	77
13			2	92	13	59	13	82
14			2	93	13	62	28	88
15			1	95	44	63	15	103
16					11	65		
17					24	66		
18					49	72		
19					48	78		
20					38	79		
21					49	79		
22					48	80		
23					49	80		
24					48	81		
25					14	83		
26					48	83		
27					48	84		
28					28	85		
29					48	85		
30					12	86		
31					48	86		
32					28	91		
33					38	93		
34					25	102		