NRR S/G Conference Call

Specific Questions

1. Discuss whether any primary to secondary leakage existed in this unit prior to shutdown.

   - None attributed to tube degradation.

2. Discuss the results of secondary side pressure tests.

   - Secondary Side pressure tests were not performed in 1RF10.

3. For each SG, provide a general description of areas examined, including the expansion criteria utilized and type of probe used in each area. Also, be prepared to discuss your inspection of the tube within the tubesheet, particularly the portion of the tube below the expansion/transition region.

   - The following is the base scope inspection plan for the 1RF10 outage in April 2004. Inspection will be performed in all four SGs and the primary side inspection scope is the same in all four:

     1) 100% full length bobbin examination in Rows 3 and greater and 100% bobbin inspection in the hot and cold leg straight sections of Rows 1 and 2.
     2) 100% hot leg top of tubesheet (TTS) (+/- 3") +Point examination of hard rolled tubes
     3) +Point inspection of 100% of WEXTEX tubes at the hot leg tubesheet (TTS +3" thru tube end hot)
     4) 20% +Point examination of hard rolled tubes in the cold leg TTS (+/- 3")
     5) 100% Row 1 through 10 U-bend mid-range +Point examination
     6) 20% Row 11 through 22 U-bend mid-range +Point examination
     7) 25% +Point examination of tubes expanded at cold leg baffles B (C2) and D (C3)
     8) +Point examination of dents, regardless of voltage, at AVB locations
     9) Rotating probe examination of mixed residuals (> 1.5 volts as measured by bobbin) and hot leg dented intersections > 5 volts (as measured by bobbin) according to the requirements of GL 95-05
     10) Rotating probe examination of preheater baffle plate indications and freespan bobbin coil indications for flaw confirmation and characterization
     11) 100% +Point inspection of all dented TSP intersections at the H3 TSP > 2 volts
     12) 20% +Point inspection of freespan dings > 2 volts and < 5 volts between TSH and H3
     13) 100% +Point inspection of freespan dings > 5 volts
     14) 20% +Point freespan paired ding inspection between the top 2 TSPs (hot leg and cold leg)
     15) Inspection of tubes deplugged during 1RF10 consistent with the above plan, with the exception of TTS +Point inspection
     16) +Point inspection of the tubes selected for the installation of Alloy 800

sleeves, in the region of lower roll joint (TTS -7.0" to -10.0") to confirm that the tube is defect free at this location

17) 100% +Point inspection of sleeves installed in 1RF09 (inspection extent should include TIG weld, expansion in tubesheet, and the full length in between)

18) Base line +Point examination of all A800 sleeves installed during 1RF10

19) 100% tube plug video inspection in accordance with site desktop instruction. Tube bundle secondary side video inspection including a limited scope TTS in-bundle inspection and FOSAR at TTS and cold leg baffle plate B.

4. Discuss any exceptions taken to industry guidelines.

- No exceptions to industry guidelines have been taken to date and none are planned.

5. Provide a summary of the number of indications identified to-date of each degradation mode and SG tube location (e.g., tube-support-plate, top-of-tubesheet, etc.). Also provide information, such as voltages, and estimated depths and lengths of the most significant indications.

Top of Tubesheet:

- Circumferential ODSCC
  Number of affected tubes, 288, was significantly less than observed at 1RF09 (667 affected). All circumferential ODSCC is located at the expansion transition. Breakdown by SG is as follows:
  - SG1: 44 affected tubes, largest +Pt amplitude 0.22 volts
  - SG2: 84 affected tubes, largest +Pt amplitude 0.29 volts
  - SG3: 82 affected tubes, largest +Pt amplitude 0.43 volts
  - SG4: 76 affected tubes, largest +Pt amplitude 0.33 volts

  Maximum arc length 318 degrees; maximum calculated PDA 55%; maximum depth 54% through wall.

- Circumferential PWSCC
  Two tubes were reported with circumferential PWSCC. Largest +Pt amplitude was 1.29 volts, with an arc length of 106 degrees.

- Axial ODSCC
  A total of 7 tubes were reported with axial ODSCC within the expansion transition. The maximum +Pt amplitude reported was 0.39 volts, maximum length was 0.26".

- Axial PWSCC
  Three tubes were reported with axial PWSCC. The maximum +Pt amplitude is 0.81 volts with a length of 0.16".

- Volumetric Degradation

Approximately 12 tubes were reported with volumetric degradation, likely attributed to loose parts or historical laps. All were of low +Pt volts.

Freespan:

- Freespan Axial ODSCC
  One tube was reported with freespan axial ODSCC not associated with dings. This indication was reported by bobbin coil and confirmed by +Pt. Maximum +Pt amplitude was 0.20 volts, with a maximum length of 0.56".

- Ding ODSCC
  Five tubes were reported with ding ODSCC, 2 in U-bends, 2 at U-bend tangents, and one in straight leg. The longest ding flaw length is 0.20".

- U-bend PWSCC
  No degradation was reported in Rows 1 or 2. These rows were heat treated prior to operation. One axial PWSCC was reported in Row 6. Seven tubes were reported with circumferential PWSCC in U-bends. Two in Row 4, two in Row 5, and 3 in Row 10. The largest amplitude was approximately 2.2 volts, located in a Row 10 tube. All have been located at the flank, all have short (50 to 60 degree) arc lengths. An indication was reported in a Row 18 tube, however, no other locations are reported in this SG.

Tube Support Plates:

- DSI population remains essential constant to the 1RF09 population, with approximately 230 total affected tubes. The largest DSI amplitude reported by bobbin coil is 1.11 volts. No PWSCC was reported at dented TSP intersections. No circumferential ODSCC was reported at dented TSP intersections.

- Approximately 250 cold leg baffle plates contain reported wear indications. The largest reported depth is 39%.

- No AVB wear exceeded the plugging criteria.

6. Describe repair/plugging plans for the SG tubes that meet the repair/plugging criteria.

   - Will plug all crack-like indications, sizable wear greater than 40% at AVBS and baffle plates. Also, any wear associated with loose parts in all areas beyond TTS. Will A800 sleeve all crack-like indications and volumetric @ TTS.

7. Discuss the previous history of SG tube inspection results, including any "look backs" performed, specifically for significant indications or indications where look backs are used in support of dispositioning (e.g., manufacturing burnish marks).

   - We perform history look-ups on all AVB & preheater wear, MBI, DFI, NQI & PLI calls. This is done by both resolution analysts. History look-ups at CPSES goes back to the first ISI.

8. Discuss, in general, new inspection findings (e.g., degradation mode or location of degradation new to this unit).

   - New mechanisms identified are PWSCC at hardroll expansion transitions, U-bend PWSCC in Row 3 and higher.

9. Discuss your use or reliance on inspection probes (eddy current or ultrasonic) other than bobbin and typical rotating probes, if applicable.

   - No other probes are being used to disposition indications.

10. Describe in-situ pressure test plans and results, if applicable and available, including tube selection criteria.

    - Tube selection for in situ testing will follow the methodology prescribed by the EPRI guideline. To date, two candidates have been identified, the circumferential PWSCC located at TTS, and one tube with U-bend circumferential indications. The testing requirements are related to leakage testing only. No structural screening limits have been exceeded.

11. Describe tube pull plans and preliminary results, if applicable and available; include tube selection criteria.

    - No tube pulls are planned.

12. Discuss the assessment of tube integrity for the previous operating cycle (i.e., condition monitoring).

    - Assessment of tube integrity for the previous outage will follow a methodology consistent with the EPRI tube integrity guideline. No indications reported to date represent a structural integrity challenge.

    - Preliminary benchmarking of Cycle 10 operational assessment indicates that observed degradation is below predicted levels.

13. Provide the schedule for SG-related activities during the remainder of the current outage.

    - Eddy current un-plugged tubes
    - In-Situ testing as required
    - Plug removal
    - Plug installation
    - Sleeve installation
    - RPC u-bends
    - Special Interests

14. Discuss the following regarding loose parts:
    a) What inspections are performed to detect loose parts?

- Annulus and Tubelane of the TTS of all 4 SG's.
- T-Slot and annulus region of B Baffle Plate (C2) for all 4 SG's.
- In-bundle of TTS in response to +Pt inspection (100%).
- As applicable response to +Pt inspection of B BP (25%).

b) Describe if any loose parts were detected and their location within the SG.
- 2 hex nuts, 2 threaded studs, a small curved piece of metal, small wires, and a small rod were removed from B Baffle plate region.
- Small pieces of weld slag and small wires were removed from the TTS region.

c) If loose parts were removed from the SG.
- 2 hex nuts, 2 threaded studs, a small curved piece of metal, small wires, and a small rod were removed from B Baffle plate region.
- Small pieces of weld slag and small wires were removed from the TTS region.

d) Indications of damage associated with loose parts, and
- None except for one hex nut had dinged a tube that was already plugged.

e) The source or nature of the loose parts, if known.
- Threaded rods source is suspected to be the feedwater heater.
- Hex nut sources are unknown at this point.

15. Discuss any changes to data analysis guidelines that will be implemented during the outage.

- No data analysis guideline changes are currently planned.

16. Describe any actions (e.g., training) that have been implemented to ensure the quality of the data analysis and resolution will be as high as that ultimately reached during the last outage (1RF09).

- Analysts were specifically instructed to closely scrutinize freespan regions using all differential and absolute channels. A voltage threshold for reporting was not applied.

17. Describe any plans for inserting "Judas" ("cobra") tubes into the data stream.

- There are no plans to use "Judas" in 1RF10.

NRC areas of Interest to be addressed on the next call (currently scheduled for 4/23/04 @ 1:00 CDT)

1. Discuss Special Interest eddy current inspections.

   Bobbin probe I codes were identified and re-examined with RPC. Bobbin I codes were confirmed as degradation with RPC. RPC I codes identified free span axial ODSCC, axial ODSCC at ding locations and a small number of free span volumetric indications. These indications are consistent with indications identified in 1RF09.

2. Further discuss scope expansion in the U-bend region.

   U-Bend +Point examination for oblique PWSCC original scope was 100%, row 3 to row 10. Row 3 to row 8 was defined as the critical area and row 9 and row 10 as the buffer zone.
   Circumferential PWSCC was detected in Row 10 tubes in Steam Generators 1 and 2. U-bend +Point examination scope was then expanded to 100% of all tubes out to Row 21 in all Steam Generators. The critical area was redefined as Row 3 through Row 17, with rows 18 through 21 defined as the buffer zone. The redefined critical area was based on strain levels in the U-bends.

3. Discuss in situ testing performed; both tube selection and testing results.

   Screening of indications was based on the EPRI In Situ Guideline Revision 2, Comanche Peak experience and industry experience.

   Two indications with greater than 0.5V amplitudes were in situ tested:
   1) R10 C105 in SG1 contained a 2.2 V (+Pt) circumferential PWSCC indication in the U-bend. This tube was pressure tested to 4266 psi in a full tube mode with no leakage or burst reported. The pressure test was carried to proof conditions for conservatism.
   2) R11 C91 in SG4 contained a 1.29 V (+Pt) circumferential PWSCC indication at the hardroll expansion transition. This indication is a required leak test only due to the lack of industry in situ data for this mechanism. The indication was tested to proof conditions, with no leakage reported at SLB conditions and no burst reported @4481 psi.

   Two other indications were conservatively in situ pressure tested:
   1) R7 C12 in SG3 contained an axial ODSCC indication in the free span. Amplitude with (+Pt) was less than 0.5 V with a length of ~0.65". No leakage was reported at SLB pressure differential and no burst was reported @ 4266 psi.
   2) R27 C51 SG1, the final indication pressure tested was a 1.11 V (+Pt) ding axial ODSCC indication. The ding amplitude was approximately 5.8 volts. This indication was pressure tested due to its length, 0.77" and the potential influence for large voltage dings to negatively impact sizing performance. This indication was pressure tested in a full tube mode; no leakage or burst occurred at a test pressure of 4266 psi.

4. Discuss Alloy 800 sleeve installation.

Alloy 800 sleeves are being installed for tubes with new indications of degradations at the top of tubesheet (~280 tubes) and de-plugged tubes(~280 tubes). Alloy 800 sleeved tubes were required to be defect free at the locations of the lower (mechanical roll) and the upper (hydraulic expansion) sleeve joints. Eddy current inspection was completed before installation to ensure the parent tube was defect free. A video inspection of tubes to be sleeved is performed after the tube conditioning step is complete and prior to sleeve insertion.

Currently ~560 Alloy 800 sleeves are in the process of installation, across all four Unit 1 Steam Generators. +Point examination, of the sleeve and the parent tube, for all A800 sleeves installed during 1RF10 is in progress to establish a baseline. This baseline will be used for future in-service inspections of the sleeve with + Point probes.

5. Discuss examination results of the restricted TIG-welded sleeves.

During 100% +Point inspection of sleeves installed in 1RF09 (inspection extent included full length of the sleeve), 36 TIG welded sleeves would not permit a 0.500" diameter +Pt probe to pass. These tubes are removed from service by plugging.

An additional 22 TIG welded sleeves will be administratively repaired by plugging. +P examination, of the additional 22 TIG welded sleeves, shows no degradation of the parent tube or sleeve. However, the +P trace on these tubes suggests some ovalization.

Visual examination found no tubes were totally restricted.