Progress Energy

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.36

May 20, 2005
3F0505-12

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – Revised Response to NRC Request for Additional Information Regarding Once-Through Steam Generator Tube Inservice Inspection Conducted During Refueling Outage 13

References:
1. NRC to PEF letter dated February 1, 2005, "Request for Additional Information Regarding Crystal River Unit 3 – Once-Through Steam Generator Tube Inservice Inspection Conducted During Refueling Outage 13 (TAC NOS. MC1176 and MC1853)"
2 PEF to NRC letter dated March 30, 2005, "Crystal River Unit 3 – Response to NRC Request for Additional Information Regarding Once-Through Steam Generator Tube Inservice Inspection Conducted During Refueling Outage 13"

Dear Sir:

Florida Power Corporation, doing business as Progress Energy Florida, Inc. (PEF), is hereby providing a revised response to Reference 1, NRC Request for Additional Information (RAI). The information provided herein, supersedes the March 30, 2005 submittal (Reference 2). Crystal River Unit 3 (CR3) personnel discussed the need for a revised submittal with the NRC staff during a meeting held on April 26, 2005. Specifically, CR3 is deleting the information regarding a technique for predicting leakage attributed to Tube End Cracks during the next Refueling Outage (14R), which was previously contained in Question 1b, Attachment A. CR3 also deleted the Background questions related to each of the February 1, 2005 RAI questions (Attachment A) and made minor editorial changes. Additions to the text of Attachment A are shown in Italics font. No changes were made to Attachment B.

Attachment C was changed to add a clarification. Additions to the text are shown in Italics font.

Attachment D has been added to provide the corrective actions established by CR3 to address exceeding the postulated Main Steam Line Break (MSLB) as-found primary to secondary leakage during Refueling Outage 13 (13R). The attachment also provides additional data informally requested by the NRC staff.

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Progress Energy Florida, Inc.
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This letter establishes no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

Michael J. Annacone
Manager Engineering

MJA/lvc

Attachments:

A. Response to NRC Request for Additional Information Regarding Once-Through Steam Generator Tube Inservice Inspection Conducted During Refueling Outage 13
B. Tubes with Tube End Cracks (TEC) Remaining In-Service (Without Repair)
C. Revision of Refueling Outage 12 (12R), MODE 4 Report, Table 3
D. CR3 Corrective Actions from 13R Discussed During the April 26, 2005 Meeting, and Supplemental Data Requested by the NRC staff

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT A

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING ONCE-THROUGH STEAM GENERATOR TUBE INSERVICE INSPECTION CONDUCTED DURING REFUELING OUTAGE 13

FEBRUARY 1, 2005 – NRC RAI QUESTION 1

With respect to your accident induced leakage assessment, please provide the following

a) a technical description of the methodology used to project the number and location (tubesheet radius) of tube-end-crack indications and the technical basis for this methodology (e.g., a benchmarking of this methodology based on previous inspection data). Include in this description, the actual values used.

b) the actual value of leakage from tube-end-crack indications based on the number of projected indications (from 1a above) and the existing NRC-approved leakage model.

c) a clarification of the number of tubes with tube-end-crack indications and the number of tube-end-crack indications. The staff notes that there appears to be a discrepancy in the reported number of tubes with tube-end-crack indications and the number of indications in both steam generators. For example, in steam generator A, 957 tubes were reported to have 1228 tube-end-crack indications in the October 31, 2003, letter; however, Appendix 5 to the January 27, 2004, letter indicates 1105 tubes in steam generator A contained tube end cracks. In addition, Table A-3 of the August 10, 2004, letter indicates 1119 tubes contained 1474 indications which does not appear (based on a cursory count) to match the number of tubes listed in Tables A-1 and A-2 (1099 tubes).

RESPONSE – 1a)

For the Refueling Outage 13 (13R) Operation Assessment Tube End Crack (TEC) leakage, Crystal River Unit 3 (CR3) used the methodology to project leakage from TEC as described in BAW-2346P, Alternate Repair Criteria for Tube End Cracking in the Tube-to-Tubesheet Roll Joint of Once-Through Steam Generators, Revision 0. The projected number of TEC for each radial zone *was* based on the number of as-found indications multiplied by the inverse of the probability of detection (POD) for Stress Corrosion Cracking (SCC) in the upper tube end. To account for cracks that were not detected during the inspection, which could potentially leak during accident conditions, during the next cycle of operation the frequency distribution of TEC is scaled upward by a factor of 1/POD (based on radius location found during the eddy-current inspections). The equation used is from section 10.0 of BAW-2346P:

$$\mathbf{NI_{radius} = [(1/POD)(N_{AsFound})_{radius}] - [(N_{repaired})_{radius}(1)]}$$

Where:

$\mathbf{NI_{radius}}$ = estimated number of indications at given radius zone
$N_{AsFound})_{radius}$ = number of indications actually detected at given radius zone
$N_{repaired})_{radius}$ = number of repaired indications at a given radius zone
POD = probability of detection for TECs = 0.84

The actual values of 13R TEC indications are summarized in Tables 1 & 2 below:

TABLE 1 – A-OTSG 13R TEC Indications							
Radial Zone	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**	**Totals**
As-Found Indications	450	423	273	173	58	97	1474
As-Left Indications	449	422	233	122	0	2	1228
Repaired Indications	1	1	40	51	58	95	246
Projected Indications (POD & As-Left)	534.7	502.6	285.0	155.0	11.0	20.4	1509

TABLE 2 – B-OTSG 13R TEC Indications							
Radial Zone	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**	**Totals**
As-Found Indications	163	348	396	167	73	141	1288
As-Left Indications	149	343	391	165	14	9	1071
Repaired Indications	14	5	5	2	59	132	217
Projected Indications (POD & As-Left)	180.0	409.3	466.4	196.8	27.9	35.9	1316

To account for an increase in the TEC population, (more than those indications accounted for in the POD), CR3 repaired additional tubes to reduce the as-left TEC calculated leakage. The number of tubes repaired reduced the Refueling Outage 14 (14R) projected as-found TEC leakage value below the TEC leakage limit (0.856) by an amount approximately equivalent to the excess as-found 13R leakage value.

RESPONSE – 1b)

The *projected* TEC leak rate from all zones for each OTSG is *based on t*he NRC approved plant specific TEC leak rate and corresponding radial zones for CR3 (See Table 3 below). These values are obtained from the most conservative leak rate table from Addendum A of BAW-2346P, Revision 0 (FPC to NRC letter, 3F0599-21, dated May 28, 1999).

TABLE 3 - CR3 TEC Leak Rate vs. Tubesheet Radius (faulted steam generator, plugged tube case) **CR-3 SLB Accident Condition**				
	Upper Tubesheet		**Lower Tubesheet**	
Radial Zone	Radius (inch)	Leak Rate (gpm)	Radius (inch)	Leak Rate (gpm)
1	> 3, ≤ 39	7.10E-5	> 3, ≤ 42	7.10E-5
2	> 39, ≤ 49	1.90E-4	> 42, ≤ 49	1.90E-5
3	> 49, ≤ 53	3.83E-4	> 49, ≤ 53	3.83E-4
4	> 53, ≤ 55	5.41E-4	> 53, ≤ 55	5.41E-4
5	> 55, ≤ 56	1.37E-3	> 55, ≤ 56	1.37E-3
6	> 56	5.72E-3	> 56	5.72E-3
Radius – Location of tube center relative to the center of the tubesheet				

The actual values used in the TEC leakage projections for the next cycle are based on the BAW-2346P method of using as-left leakage attributed to TEC and adding an additional amount for the POD. The leakage is calculated using the projected indications (as-left & POD) for the A and B-OTSGs from Tables 1 and 2 above.

The Topical Report BAW-2346P projected TEC leakage values for the current operating cycle are:

TABLE 4 – A-OTSG 13R TEC Projected Leakage

Radial Zone	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Totals
Projected Indications (POD & As-Left)	534.7	502.6	285.0	155.0	11.0	20.4	1509
Leakage Value (gpm)per Indication from Table 3	7.10E-5	1.90E-4	3.83E-4	5.41E-4	1.37E-3	5.72E-3	N/A
As-Left Leakage (gpm)	0.032	0.080	0.089	0.066	0.000	0.011	0.279
POD Leakage (gpm)	0.006	0.015	0.020	0.018	0.015	0.106	0.180
Projected Leakage (POD & As-Left)(gpm)	0.038	0.095	0.109	0.084	0.015	0.117	0.459 Note 1

- Note 1 – This is the Leakage value reported as the Projected Accident Leakage for TEC in the Mode 4 Report (CR3 to NRC letter, 3F1003-07, dated October 31, 2003).

TABLE 5 – B-OTSG 13R TEC Projected Leakage

Radial Zone	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Totals
Projected Indications (POD & As-Left)	180.0	409.3	466.4	196.8	27.9	35.9	1316
Leakage Value (gpm)per Indication from Table 3	7.10E-5	1.90E-4	3.83E-4	5.41E-4	1.37E-3	5.72E-3	N/A
As-Left Leakage (gpm)	0.011	0.065	0.150	0.089	0.019	0.051	0.385
POD Leakage (gpm)	0.002	0.013	0.029	0.017	0.019	0.154	0.234
Projected Leakage (POD & As-Left)(gpm)	0.013	0.078	0.179	0.106	0.038	0.205	0.619 Note 2

- Note 2 – This is the Leakage value reported as the Projected Accident Leakage for TEC in the Mode 4 Report (CR3 to NRC letter, 3F1003-07, dated October 31, 2003).

Conclusion

The projection of TEC for the next cycle was based on BAW-2346P. Additionally, CR3 repaired tubes with TEC to reduce the as-left leakage to account for a population increase in TEC. Tubes in the highest leakage value zone were repaired to minimize the recurrence of TEC in those zones. The methodology to project the number of indications was based on the number of new TEC indications identified in 13R since Progress Energy personnel considered that there are too few data points to develop a meaningful historical trend. The improvements in eddy current data analysis training in 13R gives confidence that CR3 identified TEC indications more accurately in 13R than in past outages.

CR3 recognized that additional corrective actions had to be taken during the 13R outage as a result of finding the TEC postulated leakage higher than the allowable. Besides procedural and administrative changes to the OTSG inspection program, the physical changes to the plant include the re-rolling of additional tubes with TEC in both OTSGs to conservatively reduce the as-left leakage even further than the existing BAW-2346P criteria. *Attachment D lists corrective actions established to prevent recurrence.*

As part of the corrective actions, CR3 submitted License Amendment Request (LAR) #290, Revision 0, to the NRC on January 27, 2005. Approval has been requested prior to the next refueling outage for use in estimating leakage for the subsequent cycle. The LAR proposes to utilize a probabilistic methodology to determine the contribution to SLB leakage rates from TEC. The proposed probabilistic method to estimate TEC leakage provides more accurate and realistic TEC leakage predictions while maintaining all other assumptions in BAW-2346P, Revision 0. The methodology change for TEC leakage calculation proposed in LAR #290, Revision 0, utilizes the same probabilistic process approved by the NRC for use by plants implementing Generic Letter (GL) 95-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking." The predicted leakage from TEC indications found in 13R would not have exceeded predictions had the probabilistic method been employed.

RESPONSE – 1c) Part 1

The CR3 October 31, 2003 letter to the NRC (3F1003-07) provided the number of axially orientated TEC indications left in-service after the 13R inspection outage in each steam generator. The reported population of tubes included tubes with TEC indications that were not removed from service by re-rolling or plugging. Those tubes left in service with TEC have a projected accident leakage value assigned to each indication. The number of as-left TEC tubes reported was:

OTSG	TUBES	INDICATIONS
Location	UTE/LTE	UTE/LTE
A	953/4	1221/7
B	729/105	959/112

The tubes with TEC indications were also identified by upper tube end (UTE) or lower tube end (LTE) since this was the first occurrence of lower tube end cracking. For the A-OTSG, the total number of tubes with TEC indications per steam generator was the sum of the two (957) because there were no tubes with a TEC on both the upper and lower tube end of the same tube. For the B-OTSG, the total number of tubes with TEC indications per steam generator was not the sum of the two because there are some tubes with a TEC on both the upper and lower tube ends. The total of unique tubes for B-OTSG is 804 and tube ends is 834. In either case, when determining TEC leakage for each steam generator, a leakage value is assigned to each and every indication whether the TEC indications are on the upper or lower tube end.

Appendix 5 from the CR3 January 4, 2004 letter (3F0104-03) to the NRC provided tables of tubes in the A and B steam generators with TEC remaining in service after the 13R outage. After a detailed comparison between the lists in the October 31, 2003 and January 4, 2004 letters, CR3 determined that the January 2004 list included some TEC tubes that are in-service, but had been re-rolled during the 13R outage. Therefore, while the list accurately represented in-service tubes with a TEC identified, the population of re-rolled tubes should not have been included in this list. Once a tube end is re-rolled, a TEC is no longer assigned a leakage value because the tube end is outside the new pressure boundary. The re-roll is assigned a different leakage value instead of the TEC leakage value. Pages 1 through 7 of Appendix 5 identify that 1105 tubes had TECs in the A-OTSG. When revised for repaired (re-rolled) tubes, the total agrees with the 957 (953+4) identified in the first table. Pages 8 through 13 of Appendix 5 identify that 972 tubes had TECs in the B-OTSG. When revised for repaired (re-rolled) tubes, the total also agrees with the 834 (729+105) total tube ends identified above. A revised Appendix 5, consistent with previous submittals, is included as Attachment B. This attachment provides an updated listing including a tube count column.

RESPONSE – 1c) Part 2

Table A-3 from the August 10, 2004 letter (3F0804-04) to the NRC provided a summary of the A and B-OTSG as-found TEC indications. The totals from Table A-3 are summarized below:

OTSG	A Tubes	A Indications	B Tubes	B Indications
Upper Tubesheet	1115	1467	908	1173
Lower Tubesheet	4	7	108	115
Totals	**1119**	**1474**	**1016**	**1288**

The above numbers of tubes and indications have been reviewed and determined to be accurate. RAI question 1c questions whether the number of tubes listed in Tables A-1 and A-2 agree with the totals above for A-OTSG. A review of the tube numbers from Table A-1 (pages 2 thru 23 from the August 10, 2004 letter) identified a total of 1115 tubes with 1467 indications. A review of the tube numbers from Table A-2 (page 24) identified a total of 4 tubes with 7 indications. The same review was performed for the tube numbers in the B-OTSG. A review of the tube numbers from Table B-1 (pages 25 thru 42) identified a total of 908 tubes with 1173 indications. A review of the tube numbers from Table B-2 (pages 43 thru 45) identified a total of 108 tubes with 115 indications.

The CR3 review did not identify any discrepancies between the number of tubes/indications in the A-3 Summary Table and the corresponding detailed tables A-1, A-2, B-1, or B-2.

FEBRUARY 1, 2005 – NRC RAI QUESTION 2

In the November 24, 2004, response to RAI question 1.d, it was indicated that indications are classified as being attributed to wear based on bobbin coil data. These "wear indications" are then compared to previous inspection data to determine if there is a change in signal characteristics. Rotating probe examinations are then performed at these locations of "wear" if the indications are new, the bobbin signal characteristics have changed, or there is no previous rotating probe data. Given that crack indications have been found at locations also affected by wear, please provide the technical basis for this approach. This technical basis should include the following:

a) a description of the bobbin coil eddy current data parameters used to distinguish wear from other degradation mechanisms (including intergranular attack and cracking); In particular, discuss whether other degradation mechanisms (e.g., intergranular attack and cracking) may also pass the test for being called wear based on screening the bobbin data.

b) the data supporting these parameters for screening wear from other forms of degradation.

c) a description of the criteria used to determine if the bobbin signal characteristics have changed and the basis for this "change criteria." Please discuss whether operational data supports your screening criteria. For example, in the cases where cracking has been observed in wear scars, discuss whether the bobbin signals from these indications would have met your criteria for performing rotating probe examinations. If field wear scars with cracks would not have met your criteria for performing rotating probe examinations, discuss what corrective actions will be taken (including the basis for concluding that existing wear scars (with the potential for cracks being present) will have adequate integrity at the time of your next inspection).

RESPONSE – 2

Each tube in service is inspected with the bobbin coil from tube end-to-tube end. An indication, such as wear, intergranular attack (IGA), or stress corrosion cracking (SCC) is first identified as a non-quantifiable indication (NQI) with the bobbin coil and then re-evaluated with a rotating coil probe to characterize the indication. If the indication is characterized as wear from the rotating coil examination, it is sized with the qualified bobbin sizing technique and left in-service pending review for structural integrity. Historic wear indications previously evaluated with a rotating coil and characterized as wear (volumetric wall loss) with the bobbin signal characteristics having no notable change, have the percent through-wall dimension recorded using the bobbin data. Indications are compared to the earliest inspection data (typically data from three inspections) to determine if there is any change in signal characteristics. If an indication does not have previous bobbin data (new indication) or previous rotating coil data, the indications are marked for further evaluation (NQI) using a mid-frequency +Point probe and 0.115 RPC Coil. All indications identified as NQI are resolved prior to the close out of the inspection.

The technical basis for not repeating the rotating coil exam on confirmed wear signals is based on observing no notable bobbin signal change and that the previous rotating coil examination did not identify a flaw, other than wear. Since there is no notable change in the bobbin signal, there is reasonable assurance that the tube condition has not changed and a rotating coil exam would repeat the finding from the previous confirmation examination.

At a minimum, a notable change is characterized as a change in the phase angle of ~10% or a change in the signal voltage of ~0.5V or 25% of the previously recorded voltage. However, an absolute criterion for signal change is not always applicable and therefore a smaller amount of change may prompt a rotating coil exam at the discretion of the Eddy Current Qualified Data Analyst (QDA). For example, if the analyst determines that the formation of the lissajous for a specific indication is different than that of the previous data, but the phase angle and voltage are the same as the previous data, the QDAs are expected to mark the indication for further evaluation (NQI) using a mid-frequency +Point probe and 0.115 RPC.

To date, there have been no indications of wear that have had other degradation [such as Outside Diameter Stress Corrosion Cracking (ODSCC)] associated with the wear scar. In general, other degradation such as ODSCC has not occurred at broached support wear scars anywhere within the OTSG fleet. At CR3, a sample of tubes with previous wear have been examined with rotating coil during the past two inspections, Refueling Outages 12 and 13 (12R) and (13R), to confirm no change in the bobbin coil wear signal characterization.

From discussions with steam generator program representatives from other utilities with non-OTSG design steam generators, there has been no other degradation such as ODSCC that has "grown out of" support wear scars. It should also be understood that the prevalent source of ODSCC in the free span of OTSGs is "groove IGA" which develops from scratches in the tubes from tube manufacturing. In other steam generator designs, such as the Combustion Engineering (CE) design utilizing "eggcrate" lattice structures, ODSCC develops from corrosion within the crevice created at the support structure.

IGA and SCC bobbin signals are included for the Site Specific Performance Demonstration (SSPD) test that each QDA (primary, secondary, resolution, independent, and utility QDAs) must successfully complete prior to analyzing data at CR3. During the site familiarization training, the QDAs are provided examples of graphics of bobbin signals for IGA and SSC and expectations for identifying indications for further review.

The technical basis for the bobbin technique used at CR3 is based on the Electric Power Research Institute (EPRI) qualified techniques for wear, impingement, IGA, and stress corrosion cracking detection (SCC). EPRI Specific Technique Sheet (ETSS) 96007.1 and 96008.1 for IGA and SCC respectively are the basis for the CR3 ETSS bobbin coil examination technique. The EPRI qualifications were evaluated for application to the OTSG tubes at CR3 and determined that the essential variables are equivalent and applicable to CR3, including the data sample set. [Framatome Document 51-5005589-02]. Additionally, the qualification probability of detection for intergranular attack and stress corrosion cracking detection was determined using pulled tube data from OTSG tubes, including tubes from CR3 [B&WOG Documents 77-1258722-00, "Probability of Detection of Defects in Once-Through Steam Generators" and 77-5002925-05, "Probability of Detection of Defects in Once-Through Steam Generators" (2002 Project Supplement)].

Inspection Results

Cracking in a wear scar has not been specifically observed at CR3 as an active degradation mechanism. During 12R (fall 2001), 109 wear indications in the A-OTSG and 503 indications in B-OTSG were inspected using the rotating coil and no flaws, other than wear, were identified. During the bobbin examination, 222 indications were identified as NQI, using the screening criteria described above, in A-OTSG, of which 47 indications were near a tube support plate (TSP) or upper tube sheet secondary face (±1.0 inch from the TSP centerline) where a wear signal is expected to appear. Two of the 47 indications were evaluated as unacceptable, volumetric IGA or SCC indications, and were removed from service (one indication was evaluated as a single circumferential crack, not associated with a wear indication). In B-OTSG, 101 indications were near a TSP or upper tube sheet secondary face (±1.0 inch from the TSP centerline) where a wear signal is expected to appear. Two of the 101 indications were evaluated as volumetric indications (IGA) and were removed from service.

During 13R (fall 2003), 281 wear indications in the A-OTSG were inspected using the rotating coil. One indication in A-OTSG, tube 143-3, had a flaw other than wear and was removed from service. The indication was identified during the bobbin exam and indicated as a NQI and was further evaluated with RPC and confirmed to have a volumetric indication (IGA). In B-OTSG, 323 wear indications were inspected using the rotating coil. No flaws, other than wear, were identified. During the bobbin examination, 188 indications were identified as NQI using the screening criteria described above in A-OTSG, of which 21 indications were near a TSP or upper tubesheet secondary face (±1.0 inch from the TSP centerline). Three indications were evaluated as IGA and were removed from service. In B-OTSG, 9 indications were near a TSP or upper tube sheet secondary face (±1.0 inch from the TSP centerline) where a wear signal is expected to appear. No indications were identified or confirmed as a flaw. This specific data demonstrates that CR3 applies a conservative threshold for evaluating wear indications for further characterization based on the small percentage of wear NQIs that actually have additional degradation. No corrective actions are considered necessary since the operational data shows that unacceptable flaws near the TSP would be detected.

Conclusion

Bobbin indications of wear in the 2003 inspection were evaluated and compared for change based on available historical data for that indication. If there was previous rotating coil data AND there was no significant change in the bobbin signal based on available historical data, the bobbin indication was assigned a through-wall dimension. Over the past several cycles there have been hundreds of bobbin NQI indications reported, and all NQI indications are characterized with a rotating coil. Within these examinations are many support structures, of which all that have been inspected show no evidence of other degradation associated with wear scars.

The standard industry practice is to use the bobbin coil to screen the OTSG tubes for indications potentially associated with SCC and perform a follow-up inspection with a rotating coil. The bobbin technique was able to detect IGA and SCC near the TSP as detailed above. Therefore, the qualification for detection of flaws and operational data provides reasonable assurance that unacceptable flaws near the TSP (wear) would be detected for further evaluation using the bobbin coil technique.

CR3 reviewed NRC Information Notice (IN) 03-05, Failure to Detect Freespan Cracks in PWR Steam Generator Tubes. As identified in IN 03-05, the industry practice is to use the bobbin coil technique to screen for indications potentially associated with SCC and then further characterize the indication with rotating coil techniques. The proposed actions in the IN were to evaluate the reporting criteria for bobbin flaws to ensure that potential flaws are further evaluated with the appropriate technique. During the review of IN 03-05, the CR3 data analyst guidelines were reviewed to ensure they included the minimum expectation to report any change in the bobbin signal from all available previous data. The qualified data analysts at CR3 are required to pass the site-specific performance demonstration test, which includes bobbin indications where flaws were later confirmed, with a rotating coil. The analysis process at CR3 is an independent review of all of the data by primary analysts and secondary analysts. If an indication is called by one group and not the other, two resolution analysts (Level III QDAs) evaluate the indications to determine the appropriate action, keep the indication for further evaluation or determine the indication is non-relevant. The indications are then reviewed by an Independent QDA or Utility QDA for concurrence on the final disposition. This rigor in data analysis provides reasonable assurance that unacceptable flaws will be identified and appropriately dispositioned within the industry guidelines.

FEBRUARY 1, 2005 – RAI QUESTION 3

In the November 24, 2004, response to RAI question 2b, it was indicated that the difference between certain inspection numbers was due to the sleeves installed in the steam generators. In response to question 1b, it was indicated that 163 sleeves were installed in each steam generator at the start of the 2003 outage. Clarify the difference between the inspection numbers for steam generator B which is 159 rather than 163 (as it is for steam generator A).

RESPONSE – 3

There were 163 Alloy 690 sleeves originally installed in 1994 in both A and B-OTSG. One sleeved tube was removed from service from B-OTSG during the 1997 inspection due to an outside diameter indication in the non-sleeved region of the tube. Three sleeved tubes were removed from service in B-OTSG during the 1999 inspection due to indications in the parent tube. Therefore, at the beginning of the fall 2003 inspection, there were 163 sleeves in-service in A-OTSG and 159 sleeves in-service in B-OTSG.

In the 2003 outage, four sleeved tubes in A-OTSG were removed from service because the eddy current probes could not traverse the sleeve upper end. Also in the 2003 outage, three sleeved tubes in B-OTSG were removed from service preventatively to address tube end degradation and operating experience recommendations from the Three Mile Island tube sever issue. At the conclusion of the fall 2003 inspection, there were 159 sleeves in-service in A-OTSG and 156 sleeves in-service in B-OTSG.

FEBRUARY 1, 2005 – NRC RAI QUESTION 4

In the November 24, 2004, response to RAI question 3, the size of indications with the largest voltages was provided. Given that the largest voltage indication may not always correspond to the most severe indication (in terms of structural and leakage integrity), confirm that, in this case, the largest voltage indications were the most severe indications detected. In the future it would be beneficial to delineate the location of each imperfection based on whether the indications are in the original roll transition, the original roll expanded region (other than the transition and the tube end), the re-roll upper or lower roll transition, the re-roll expanded region, the unexpanded portion of tube in the tubesheet region (not between re-rolls), the free span portion of the tube (outside the tubesheet) etc. In addition, it would be beneficial to specify the number of re-rolls (if any) were in the tube at the time of the inspection if the imperfections are in the tubesheet region.

RESPONSE – 4

The response to RAI question 3 from the November 24, 2004 letter provided a table of the eddy current indications that identified the largest signal voltage for a given type of Non-destructive Examination (NDE) indication. This table provided a list of many of the largest percent through-wall indications found during the inspection. The response also provided a separate list of indications in each OTSG excluding indications near the cladding, first span intergranular attack and wear. However, not all of the largest voltage indications are the most severe when compared to a condition monitoring assessment for structural and leakage evaluation. As requested, the most limiting indications based on the structural and leakage assessment are identified in the table and Figures 1 and 2 below. Where a given type of NDE indication is not represented in the table, it is because that type of indication was not considered the most limiting based on the structural and leakage assessment. To provide additional flaw information, the locations of the imperfections are identified by OTSG landmark.

The choice of the largest indications for the A-OTSG and B-OTSG is from the 13R Condition Monitoring (CM) assessment. For condition monitoring, degradation dimensions are inferred from NDE measurements. Therefore, the condition monitoring limit curves in Figures 1 & 2 include NDE sizing uncertainties as well as material property variation and burst pressure calculation uncertainties. NDE readings which plot under the Condition Monitoring Limit curve demonstrate at least a 0.95 probability at 50% confidence that the burst pressure meets or exceeds a value of 3 Delta P. Indications with NDE measured lengths and depths at or below the Condition Monitoring Limit curve meet the required deterministic structural performance criteria for minimum degraded tube burst pressure. Each of the indications was compared to the CM criteria which are established for CR3. The leakage assessment for these indications was also acceptable.

13R Largest Indications For Structural and Leakage Integrity

OTSG & Tube Number	Type of Degradation & Indication Code	Location in OTSG	NDE Length (inches) & Depth	Passed Condition Monitoring for Structural & Leakage Integrity?
A2-26	Multiple Axial Crack Indications (MAI)	15S – 7.30 inch (Freespan)	3.8 25% TW	YES
A2-26	Single Axial Crack Indication (SAI)	15S – 5.73 inch (Freespan)	4.0 34% TW	YES
A2-26	Single Axial Crack Indication (SAI)	15S – 3.28 inch (Freespan)	0.31 31% TW	YES
A13-67	Single Volumetric Indication (SVI)	15S + 0.03 inch (Within 15th TSP)	0.62 x 0.22 16% TW	YES
A77-50	Single Volumetric Indication (SVI)	UTS + 0.21 inch (Secondary face of Upper Tubesheet)	0.21 x 0.14 27% TW	YES
A110-3	Single Volumetric Indication (SVI)	15S – 0.22 inch (Within 15th TSP)	0.18 x 0.17 23% TW	YES
A143-3	Volumetric Indication (SVI)	15S + 0.73 inch (Top of 15th TSP)	0.44 x 0.22 48% TW	YES
B6-6	Single Axial Indication (SAI)	15S – 5.09 inch (Freespan)	0.39 43% TW	YES
B46-2	Volumetric Indication (SVI)	LTS + 0.00 inch (Top of Lower Tubesheet	0.38 x 0.23 57% TW	YES
B114-1	Axial Crack Indication (SAI)	15S – 1.62 inch (Freespan)	0.53 42% TW	YES

TSP Tube Support Plate
TW Through-Wall

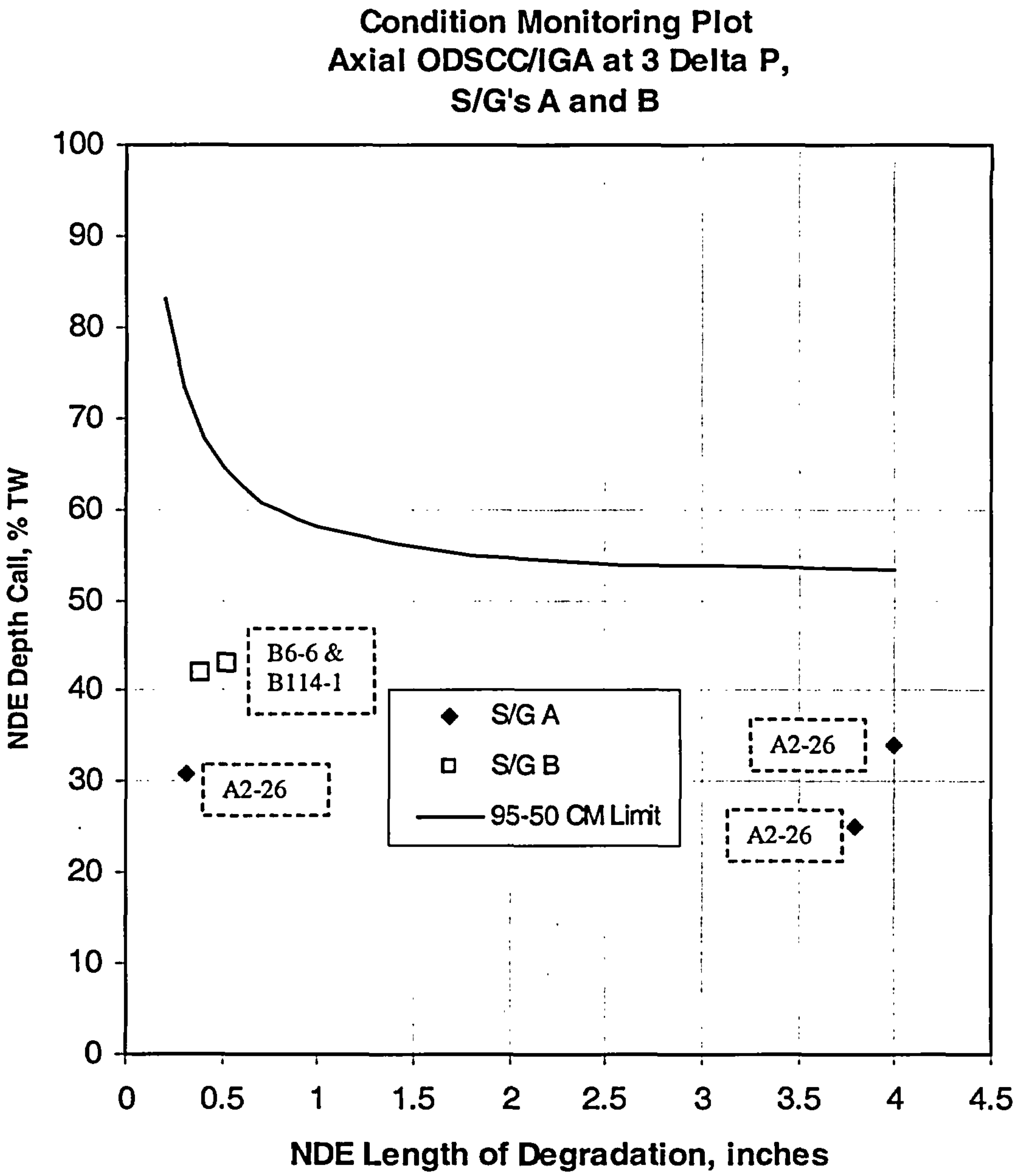

Condition Monitoring Plot
Axial ODSCC/IGA at 3 Delta P,
S/G's A and B
NDE Depth Call, % TW
NDE Length of Degradation, inches
0
10
20
30
40
50
60
70
80
90
100
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
B6-6 &
B114-1
A2-26
A2-26
A2-26
S/G A
S/G B
95-50 CM Limit

Figure 1

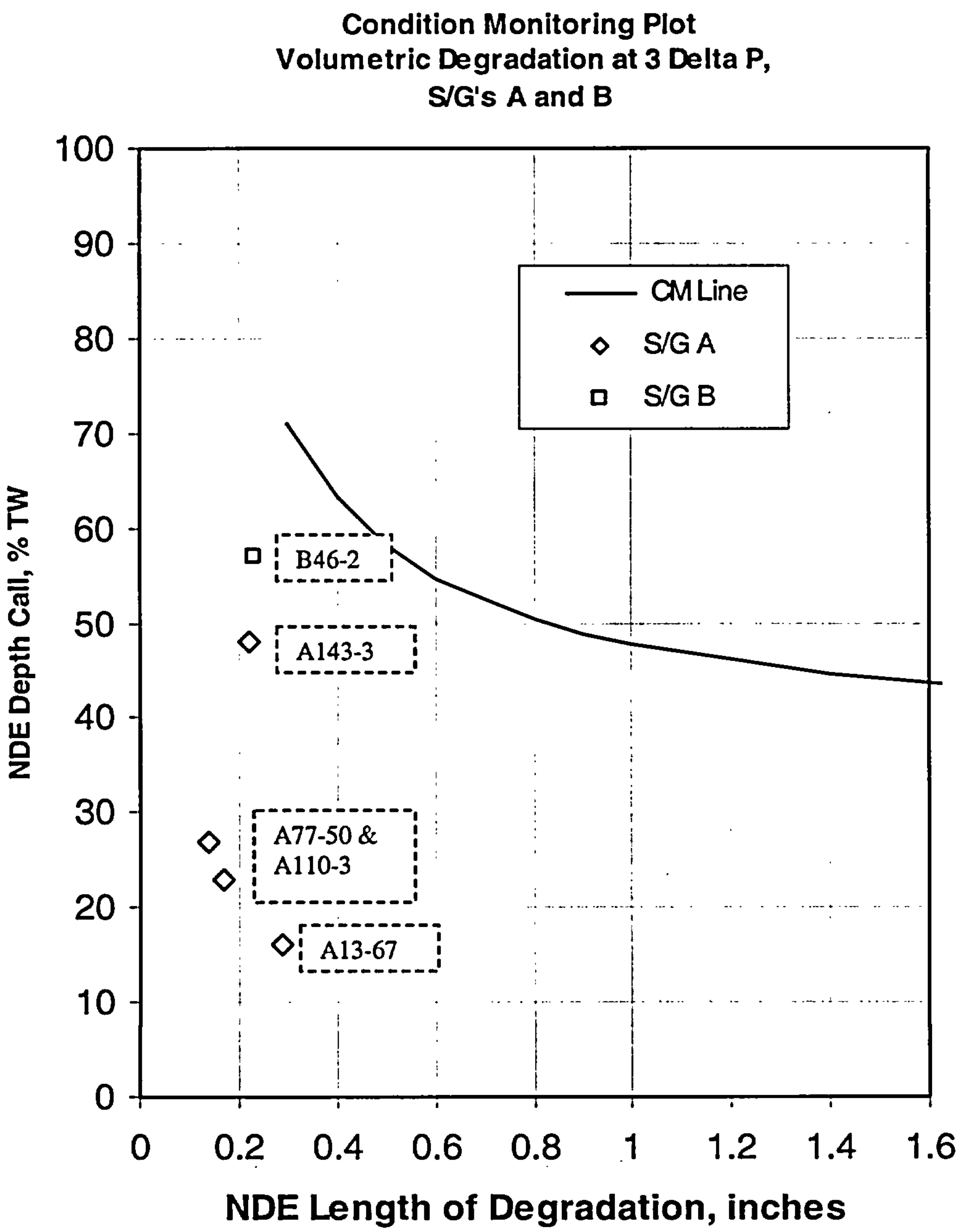

Condition Monitoring Plot
Volumetric Degradation at 3 Delta P,
S/G's A and B
CM Line
S/G A
S/G B
B46-2
A143-3
A77-50 &
A110-3
A13-67
NDE Depth Call, % TW
NDE Length of Degradation, inches
0
10
20
30
40
50
60
70
80
90
100
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6

Figure 2

February 1, 2005 – NRC RAI Question 5

In the November 24, 2004, response to RAI question 5, you indicated that the obstructed sleeves were attributed to tube/sleeve end damage from previous loose parts and no indications were identified in the portion of the sleeve and tube examined. Please discuss the following with respect to this finding:

a) State whether the loose part was identified and removed from the steam generator (presumably from the primary side of the steam generator). Discuss the source of the part. If a part was not identified, discuss the basis for concluding the damage was from a loose part.

b) Discuss the location of the obstruction (i.e., the portion of tube/sleeve extending above the upper tubesheet). If the obstruction was located in the portion of tube/sleeve within the tubesheet (including the clad), discuss how the part caused the obstruction.

c) Given that the upper sleeve joint is a mechanical joint, discuss how you confirmed that the obstruction did not result in a weakening of the joint (i.e., pulling of the sleeve away from the parent tube) such that the sleeve could not meet its original design criteria. Provide the extent of the obstruction and the technical basis for your conclusion.

d) Although no rejectable flaw-like signals were identified during the inspection of the portion of the sleeve that could be inspected, discuss whether an obstruction in another sleeved tube could have weakened the joint such that the sleeve could no longer meet its original design criteria.

RESPONSE – 5a)

Loose parts on the primary side of the OTSG are typically identified visually before the eddy current inspection begins and then using the eddy current tool camera. There was not a specific loose part removed from the upper tubesheet area of the A-OTSG in the 2003 inspection. However, the A-OTSG tubes have had significant tube end (upper 0.125 inch) damage from loose parts in previous cycles. The source of loose parts was foreign material (section of Unistrut and related fasteners) in the Reactor Coolant System after Refueling Outage 8. During 13R, the decision was made to plug the sleeved tubes even though no defects were identified, instead of delaying the outage by several shifts waiting for the tube-end repair tool to arrive on site.

RESPONSE – 5b)

The damage was at the tube end and the bobbin coil probe could not completely traverse the sleeved tube end that extends above the tubesheet. The roll joints in the tube were inspected from the cold leg (lower tube end) and did not reveal any flaws in the sleeve or parent tube.

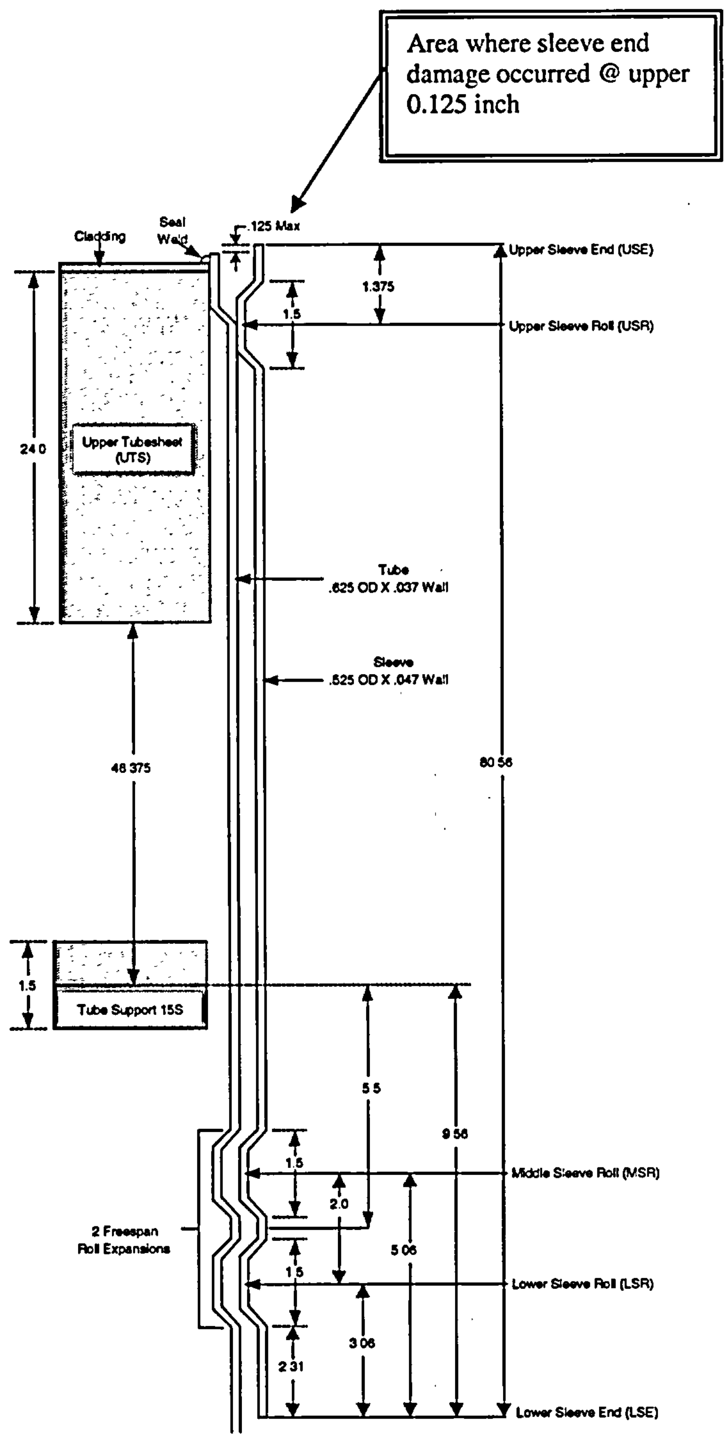
RESPONSE – 5c)

Visual inspection of the sleeve ends showed that the ends were not pulled away from the parent tube and the sleeve opening was essentially round indicating only minor impacts from above. The sleeve end was only slightly deformed to the point where the eddy current probe could not enter and traverse the sleeve. For example, there were several other sleeves that originally could not pass a probe (NDE Code OBS) which later had the sleeve ends opened using a tube end repair tool. Once the tube ends were opened, every sleeve was inspected and no defects were identified in any sleeve or rolled joint. These four sleeves/tubes were only plugged because the original tube-end repair tool had to be replaced and a new tool was not available in a timely manner. In addition, the original sleeve qualification testing (BAW-2120P, Steam Generator Tube Sleeving) included axial load cycling in excess of the possible impact loading from loose parts. The qualification testing results, along with the minimal damage to the sleeve end, was the technical basis for determining the sleeve and rolled joints were still acceptable.

RESPONSE – 5d)

As explained in response 5a), the obstruction was tube end damage and not foreign material. The tubes and upper sleeve ends extend above the tubesheet approximately 0.187 inch. The upper sleeve rolled joint is centered approximately 1.375 inch below the tube end. Therefore, sleeve end damage is not expected to weaken the joint such that the sleeve could no longer meet its original design criteria. A drawing of a typical sleeve is attached.

Cross Sectional View of an OTSG Tubing Sleeve at Crystal River Unit 3



FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT B

TUBES WITH TUBE END CRACKS (TEC) REMAINING IN-SERVICE
(Without Repair)

A-OTSG

TUBE COUNT	ROW	TUBE
1	5	21
2	5	23
3	5	24
4	5	32
5	5	33
6	6	25
7	6	27
8	6	30
9	6	34
10	6	36
11	7	30
12	8	26
13	8	30
1	5	21
2	5	23
14	9	54
15	10	30
16	10	49
17	10	56
18	11	39
19	11	57
20	11	59
21	12	45
22	12	53
23	12	65
24	13	35
25	13	37
26	13	39
27	13	42
28	13	47
29	13	48
30	13	53
31	13	54
32	13	55
33	13	56
34	13	68
35	14	45
36	14	46
37	14	47
38	14	54
39	14	55
40	14	66
41	14	67
42	14	69
43	14	70
44	15	39
45	15	40
46	15	44
47	15	46
48	15	67
49	15	68
50	16	40
51	16	42

TUBE COUNT	ROW	TUBE
52	16	46
53	16	48
54	16	58
55	16	70
56	16	73
57	17	38
58	17	41
59	17	57
60	17	70
61	17	71
62	17	72
63	17	73
64	17	74
65	17	75
66	17	78
67	18	16
68	18	50
69	18	59
70	18	60
71	18	70
72	18	72
73	18	74
74	18	75
75	18	76
76	18	78
77	19	59
78	19	62
79	19	69
80	19	72
81	19	73
82	19	74
83	19	75
84	19	76
85	19	77
86	20	39
87	20	40
88	20	41
89	20	42
90	20	59
91	20	66
92	20	68
93	20	75
94	20	76
95	20	77
96	20	79
97	20	85
98	21	38
99	21	61
100	21	62
101	21	64
102	21	73
103	21	74
104	21	75

TUBE COUNT	ROW	TUBE
105	21	76
106	21	77
107	21	81
108	21	83
109	21	85
110	22	8
111	22	33
112	22	52
113	22	63
114	22	65
115	22	66
116	22	72
117	22	74
118	22	76
119	22	78
120	22	82
121	22	85
122	22	86
123	22	89
124	23	50
125	23	65
126	23	69
127	23	76
128	23	77
129	23	78
130	23	79
131	23	80
132	23	81
133	23	85
134	23	86
135	23	89
136	24	24
137	24	53
138	24	55
139	24	66
140	24	68
141	24	69
142	24	77
143	24	79
144	24	80
145	24	83
146	24	84
147	24	86
148	24	90
149	25	13
150	25	55
151	25	59
152	25	66
153	25	67
154	25	78
155	25	79
156	25	80
157	25	81

A-OTSG

TUBE COUNT	ROW	TUBE
158	25	85
159	25	88
160	25	89
161	25	90
162	26	43
163	26	46
164	26	50
165	26	55
166	26	68
167	26	79
168	26	81
169	26	82
170	26	85
171	26	86
172	26	87
173	26	88
174	26	90
175	26	93
176	27	56
177	27	57
178	27	60
179	27	66
180	27	78
181	27	79
182	27	82
183	27	83
184	27	84
185	27	86
186	27	87
187	27	88
188	27	90
189	27	93
190	28	47
191	28	59
192	28	61
193	28	67
194	28	70
195	28	75
196	28	79
197	28	80
198	28	83
199	28	88
200	28	89
201	28	91
202	29	50
203	29	54
204	29	58
205	29	83
206	29	93
207	29	94
208	29	95
209	29	97
210	30	13

TUBE COUNT	ROW	TUBE
211	30	33
212	30	49
213	30	51
214	30	55
215	30	57
216	30	59
217	30	70
218	30	71
219	30	72
220	30	82
221	30	84
222	30	89
223	30	90
224	30	95
225	30	96
226	31	9
227	31	40
228	31	43
229	31	69
230	31	71
231	31	86
232	31	95
233	31	96
234	32	16
235	32	37
236	32	48
237	32	56
238	32	58
239	32	59
240	32	63
241	32	72
242	32	83
243	32	86
244	32	90
245	32	91
246	32	94
247	32	96
248	32	97
249	32	101
250	33	15
251	33	51
252	33	65
253	33	93
254	33	97
255	33	100
256	34	59
257	34	83
258	34	90
259	34	93
260	34	95
261	34	96
262	34	98
263	34	99

TUBE COUNT	ROW	TUBE
264	35	60
265	35	61
266	35	73
267	35	74
268	35	82
269	35	90
270	35	95
271	35	96
272	35	99
273	36	76
274	36	78
275	36	86
276	36	91
277	36	95
278	36	97
279	36	98
280	36	99
281	36	100
282	36	103
283	36	104
284	36	105
285	36	106
286	36	107
287	36	109
288	37	61
289	37	76
290	37	83
291	37	88
292	37	89
293	37	94
294	37	97
295	37	98
296	37	99
297	37	100
298	37	103
299	37	106
300	37	109
301	37	110
302	38	63
303	38	77
304	38	84
305	38	87
306	38	95
307	38	96
308	38	98
309	38	99
310	38	100
311	38	101
312	38	104
313	38	105
314	38	109
315	38	111
316	38	115

A-OTSG

TUBE COUNT	ROW	TUBE
317	39	36
318	39	64
319	39	71
320	39	76
321	39	78
322	39	89
323	39	90
324	39	91
325	39	99
326	39	100
327	39	101
328	39	103
329	39	104
330	39	111
331	40	15
332	40	16
333	40	58
334	40	77
335	40	88
336	40	94
337	40	99
338	40	100
339	40	101
340	40	111
341	40	112
342	40	113
343	41	53
344	41	60
345	41	73
346	41	77
347	41	89
348	41	90
349	41	91
350	41	95
351	41	96
352	41	98
353	41	99
354	41	101
355	41	103
356	41	104
357	41	108
358	41	111
359	41	112
360	42	15
361	42	69
362	42	90
363	42	97
364	42	101
365	42	102
366	42	103
367	42	104
368	42	105
369	42	107

TUBE COUNT	ROW	TUBE
370	42	114
371	43	56
372	43	61
373	43	62
374	43	80
375	43	83
376	43	88
377	43	90
378	43	91
379	43	92
380	43	93
381	43	96
382	43	98
383	43	99
384	43	100
385	43	101
386	43	107
387	43	109
388	43	112
389	43	114
390	43	115
391	44	60
392	44	62
393	44	65
394	44	89
395	44	91
396	44	93
397	44	94
398	44	97
399	44	100
400	44	101
401	44	102
402	44	103
403	44	105
404	44	106
405	44	107
406	44	109
407	44	110
408	44	114
409	45	66
410	45	88
411	45	90
412	45	91
413	45	92
414	45	93
415	45	97
416	45	98
417	45	99
418	45	102
419	45	103
420	45	104
421	45	106
422	45	107

TUBE COUNT	ROW	TUBE
423	45	108
424	45	109
425	45	112
426	45	114
427	45	117
428	46	60
429	46	66
430	46	69
431	46	76
432	46	77
433	46	86
434	46	87
435	46	88
436	46	96
437	46	103
438	46	109
439	46	113
440	47	12
441	47	62
442	47	78
443	47	88
444	47	92
445	47	93
446	47	94
447	47	98
448	47	101
449	47	104
450	47	105
451	47	107
452	47	117
453	47	119
454	48	61
455	48	63
456	48	69
457	48	74
458	48	90
459	48	91
460	48	99
461	48	110
462	48	112
463	48	118
464	49	51
465	49	63
466	49	82
467	49	88
468	49	95
469	49	99
470	49	100
471	49	104
472	49	106
473	49	110
474	49	111
475	50	58

A-OTSG

TUBE COUNT	ROW	TUBE	TUBE COUNT	ROW	TUBE	TUBE COUNT	ROW	TUBE
476	50	88	529	56	57	582	65	49
477	50	99	530	56	80	583	65	56
478	50	110	531	56	108	584	65	59
479	50	111	532	56	118	585	65	101
480	50	112	533	57	5	586	66	60
481	50	115	534	57	7	587	66	62
482	50	116	535	57	85	588	66	63
483	50	119	536	57	87	589	66	79
484	51	24	537	57	96	590	66	95
485	51	57	538	57	97	591	66	97
486	51	59	539	57	112	592	66	98
487	51	76	540	57	113	593	66	102
488	51	93	541	57	124	594	66	103
489	51	94	542	58	7	595	66	109
490	51	95	543	58	28	596	67	20
491	51	97	544	58	62	597	67	50
492	51	103	545	58	74	598	67	54
493	51	107	546	58	85	599	67	78
494	51	108	547	58	110	600	67	92
495	51	110	548	58	111	601	67	97
496	51	111	549	58	122	602	67	101
497	51	115	550	58	123	603	67	102
498	51	116	551	59	19	604	67	103
499	51	118	552	59	48	605	68	51
500	51	120	553	59	87	606	68	97
501	51	121	554	59	94	607	69	55
502	52	59	555	59	97	608	69	58
503	52	62	556	59	100	609	69	60
504	52	64	557	59	105	610	69	62
505	52	91	558	59	109	611	69	66
506	52	101	559	59	120	612	69	70
507	52	107	560	59	121	613	69	71
508	52	115	561	60	65	614	69	74
509	52	117	562	60	91	615	69	93
510	52	120	563	60	96	616	69	103
511	53	108	564	60	97	617	70	50
512	53	115	565	60	110	618	70	51
513	53	116	566	60	115	619	70	55
514	53	117	567	60	118	620	70	57
515	53	120	568	61	16	621	70	113
516	53	121	569	61	54	622	71	51
517	53	122	570	61	62	623	71	60
518	53	123	571	61	64	624	71	64
519	54	49	572	61	81	625	71	91
520	54	92	573	61	89	626	72	18
521	54	101	574	62	69	627	72	49
522	54	109	575	62	94	628	72	50
523	54	113	576	62	109	629	72	51
524	55	10	577	63	62	630	72	52
525	55	77	578	63	100	631	72	57
526	55	83	579	64	94	632	72	62
527	55	96	580	64	103	633	72	94
528	55	110	581	65	24	634	73	24

A-OTSG

TUBE COUNT	ROW	TUBE
635	73	26
636	73	47
637	73	53
638	73	54
639	73	55
640	73	60
641	73	64
642	74	46
643	74	49
644	74	57
645	74	62
646	74	64
647	74	74
648	75	61
649	75	63
650	75	84
651	75	89
652	78	30
653	78	36
654	78	57
655	78	67
656	79	18
657	79	29
658	79	56
659	79	63
660	79	64
661	79	66
662	79	70
663	79	71
664	79	79
665	79	85
666	79	92
667	80	8
668	80	9
669	80	13
670	80	58
671	80	62
672	80	64
673	80	65
674	80	66
675	80	67
676	81	8
677	81	20
678	81	38
679	81	48
680	81	64
681	81	67
682	81	70
683	81	73
684	81	102
685	82	8
686	82	10
687	82	59
688	82	60
689	82	63
690	83	10
691	83	49
692	83	50
693	84	52
694	84	73
695	85	4
696	85	6
697	85	8
698	85	45
699	85	47
700	85	48
701	85	86
702	86	9
703	86	71
704	86	72
705	86	73
706	86	75
707	87	62
708	87	70
709	88	66
710	89	79
711	90	46
712	90	59
713	91	65
714	91	70
715	91	72
716	91	82
717	91	83
718	91	84
719	91	85
720	91	87
721	91	109
722	92	61
723	92	67
724	92	80
725	92	114
726	92	122
727	92	123
728	93	92
729	93	107
730	93	108
731	93	111
732	93	116
733	93	117
734	93	121
735	94	73
736	94	97
737	94	98
738	94	113
739	94	118
740	94	122
741	94	123
742	94	125
743	95	66
744	95	69
745	95	74
746	95	82
747	95	110
748	95	112
749	95	117
750	95	119
751	96	56
752	96	64
753	96	109
754	96	115
755	96	116
756	97	62
757	97	66
758	97	72
759	97	99
760	97	109
761	97	113
762	97	114
763	97	116
764	97	117
765	97	122
766	98	60
767	98	64
768	98	66
769	98	85
770	98	94
771	98	114
772	98	115
773	98	118
774	98	120
775	98	122
776	98	123
777	99	72
778	99	78
779	99	81
780	99	97
781	99	110
782	99	115
783	99	116
784	99	122
785	99	123
786	100	9
787	100	64
788	100	65
789	100	74
790	100	77
791	100	78
792	100	80
793	100	96

A-OTSG

TUBE COUNT	ROW	TUBE	TUBE COUNT	ROW	TUBE	TUBE COUNT	ROW	TUBE
794	100	108	847	110	102	900	126	28
795	100	109	848	111	97	901	126	72
796	100	110	849	111	99	902	126	74
797	100	114	850	111	101	903	126	80
798	100	117	851	112	6	904	126	87
799	100	121	852	112	42	905	126	94
800	101	96	853	112	90	906	127	14
801	101	101	854	112	95	907	127	81
802	101	109	855	112	99	908	127	92
803	101	112	856	112	104	909	128	80
804	101	114	857	112	112	910	128	89
805	101	115	858	113	107	911	128	90
806	101	120	859	113	111	912	129	34
807	101	121	860	114	85	913	129	69
808	102	70	861	114	90	914	129	80
809	102	82	862	114	99	915	129	90
810	102	114	863	114	104	916	130	88
811	102	115	864	114	105	917	131	19
812	102	120	865	114	106	918	132	17
813	103	102	866	114	108	919	132	73
814	103	107	867	114	109	920	133	5
815	103	112	868	114	110	921	133	42
816	103	113	869	114	111	922	133	51
817	104	82	870	115	76	923	133	59
818	104	101	871	115	102	924	133	61
819	104	105	872	115	109	925	134	11
820	105	64	873	116	88	926	134	14
821	105	114	874	116	92	927	134	59
822	105	115	875	116	99	928	134	60
823	106	53	876	116	101	929	134	71
824	106	91	877	116	105	930	134	80
825	106	98	878	116	106	931	135	56
826	106	101	879	116	108	932	137	7
827	106	108	880	116	109	933	137	11
828	107	93	881	117	96	934	137	49
829	107	103	882	118	96	935	137	55
830	107	104	883	120	72	936	137	73
831	107	107	884	120	73	937	139	38
832	107	108	885	120	79	938	139	45
833	107	109	886	121	69	939	139	56
834	107	112	887	121	71	940	139	57
835	107	115	888	121	73	941	139	58
836	107	116	889	121	83	942	139	66
837	108	48	890	121	96	943	140	9
838	108	93	891	121	98	944	140	58
839	108	111	892	122	71	945	140	60
840	108	112	893	122	79	946	140	65
841	108	113	894	122	80	947	141	53
842	109	6	895	122	99	948	141	54
843	109	25	896	123	80	949	141	55
844	109	68	897	124	78	950	141	56
845	109	102	898	124	96	951	141	58
846	110	98	899	125	95	952	142	30

A-OTSG

TUBE COUNT	ROW	TUBE
953	142	50
954	143	53

TUBE COUNT	ROW	TUBE
955	144	25
956	144	46

TUBE COUNT	ROW	TUBE
957	145	43

B-OTSG

TUBE COUNT	ROW	TUBE	TUBE COUNT	ROW	TUBE	TUBE COUNT	ROW	TUBE
1	4	25	53	17	15	105	29	7
2	6	12	54	17	22	106	29	7
3	6	34	55	17	25	107	29	94
4	7	20	56	17	26	108	29	96
5	7	34	57	17	43	109	29	97
6	7	44	58	17	76	110	30	8
7	7	47	59	18	12	111	30	8
8	8	11	60	18	14	112	30	9
9	8	12	61	18	16	113	30	12
10	8	23	62	19	6	114	30	12
11	9	12	63	19	12	115	30	97
12	9	15	64	19	18	116	31	8
13	9	18	65	19	47	117	31	9
14	9	48	66	19	60	118	31	9
15	10	15	67	20	31	119	31	18
16	10	19	68	20	55	120	31	88
17	10	34	69	21	20	121	31	97
18	10	49	70	21	27	122	31	99
19	10	52	71	21	50	123	32	9
20	11	9	72	22	12	124	32	12
21	11	11	73	22	16	125	32	13
22	11	12	74	22	28	126	32	14
23	11	20	75	22	64	127	32	38
24	11	21	76	22	79	128	32	53
25	11	23	77	23	16	129	32	102
26	11	51	78	23	21	130	33	5
27	12	16	79	23	23	131	33	9
28	12	29	80	24	19	132	33	13
29	12	36	81	24	33	133	33	15
30	12	55	82	24	84	134	33	23
31	13	19	83	25	5	135	33	26
32	13	20	84	25	5	136	34	23
33	13	56	85	25	11	137	34	27
34	14	19	86	25	24	138	34	28
35	14	20	87	25	28	139	34	39
36	14	30	88	25	29	140	34	56
37	14	66	89	25	58	141	35	6
38	15	8	90	26	93	142	35	11
39	15	13	91	26	94	143	35	61
40	15	16	92	27	6	144	35	104
41	15	19	93	27	10	145	35	106
42	15	21	94	27	19	146	36	102
43	15	35	95	27	85	147	36	104
44	15	45	96	27	95	148	36	105
45	15	49	97	28	4	149	36	107
46	15	58	98	28	6	150	37	7
47	16	11	99	28	7	151	37	12
48	16	20	100	28	30	152	37	103
49	16	24	101	28	66	153	38	13
50	16	25	102	28	83	154	38	104
51	17	10	103	28	95	155	38	111
52	17	13	104	28	97	156	39	11

B-OTSG

TUBE COUNT	ROW	TUBE
157	39	27
158	39	31
159	39	70
160	39	86
161	39	108
162	40	15
163	41	38
164	41	46
165	41	102
166	41	111
167	41	113
168	42	13
169	42	31
170	42	54
171	42	63
172	42	106
173	42	111
174	43	14
175	43	28
176	43	47
177	43	107
178	43	108
179	43	110
180	43	111
181	44	7
182	44	12
183	44	14
184	44	29
185	44	32
186	44	109
187	45	8
188	45	15
189	45	29
190	45	32
191	45	85
192	46	6
193	46	14
194	46	15
195	46	16
196	47	14
197	47	25
198	47	33
199	48	14
200	48	31
201	48	34
202	48	50
203	48	62
204	49	9
205	49	16
206	49	17
207	49	23
208	49	58
209	49	59

TUBE COUNT	ROW	TUBE
210	49	62
211	50	6
212	50	113
213	50	115
214	50	115
215	50	120
216	50	122
217	51	112
218	51	116
219	51	117
220	51	117
221	51	119
222	51	120
223	51	122
224	52	7
225	52	13
226	52	30
227	52	53
228	52	110
229	52	111
230	52	114
231	52	116
232	52	120
233	53	5
234	53	119
235	53	120
236	54	6
237	54	16
238	54	108
239	54	114
240	54	115
241	55	4
242	55	25
243	55	47
244	55	115
245	55	121
246	55	122
247	55	123
248	55	123
249	56	5
250	56	5
251	56	17
252	56	26
253	56	53
254	56	55
255	56	118
256	56	121
257	57	5
258	57	13
259	57	16
260	57	71
261	57	122
262	57	125

TUBE COUNT	ROW	TUBE
263	58	17
264	58	114
265	58	117
266	58	119
267	58	120
268	59	38
269	59	113
270	59	117
271	59	121
272	59	122
273	60	26
274	60	116
275	60	122
276	60	126
277	60	127
278	61	121
279	61	123
280	62	34
281	62	123
282	63	26
283	63	37
284	63	121
285	64	27
286	65	69
287	65	121
288	66	4
289	66	9
290	66	10
291	66	16
292	66	50
293	66	111
294	66	120
295	67	52
296	68	26
297	69	10
298	69	22
299	69	54
300	69	107
301	70	50
302	71	4
303	71	42
304	71	43
305	71	51
306	71	67
307	72	39
308	72	105
309	72	122
310	73	77
311	73	104
312	74	40
313	74	108
314	75	53
315	75	57

B-OTSG

TUBE COUNT	ROW	TUBE
316	75	61
317	78	34
318	78	50
319	78	57
320	79	67
321	80	111
322	81	85
323	82	8
324	82	50
325	83	126
326	84	9
327	84	54
328	84	59
329	85	9
330	85	41
331	85	53
332	85	58
333	85	86
334	86	8
335	86	13
336	86	55
337	86	60
338	87	7
339	87	107
340	88	9
341	88	49
342	89	7
343	89	7
344	89	8
345	89	9
346	89	21
347	89	41
348	90	7
349	90	8
350	90	11
351	90	13
352	90	20
353	92	7
354	92	8
355	92	21
356	92	24
357	92	126
358	93	6
359	93	7
360	93	7
361	93	20
362	93	30
363	94	21
364	94	29
365	97	7
366	97	8
367	97	122
368	98	6
369	98	7
370	98	48
371	98	123
372	98	124
373	99	2
374	99	5
375	99	5
376	99	6
377	99	6
378	99	20
379	99	124
380	100	5
381	100	12
382	100	31
383	101	4
384	101	9
385	102	5
386	102	106
387	103	4
388	103	5
389	103	31
390	104	5
391	104	18
392	105	3
393	105	4
394	105	4
395	106	9
396	106	10
397	107	2
398	107	3
399	107	10
400	107	104
401	108	10
402	109	1
403	109	13
404	110	2
405	110	30
406	110	34
407	111	12
408	111	18
409	111	64
410	112	1
411	112	2
412	112	13
413	113	31
414	114	12
415	114	17
416	114	101
417	115	7
418	115	8
419	115	12
420	115	27
421	115	32
422	115	40
423	115	43
424	116	9
425	116	27
426	116	92
427	117	18
428	117	25
429	117	26
430	117	73
431	117	77
432	117	87
433	117	88
434	117	89
435	117	102
436	117	103
437	118	17
438	119	26
439	119	32
440	119	33
441	119	40
442	119	87
443	119	88
444	120	8
445	120	13
446	120	26
447	120	30
448	120	36
449	120	65
450	120	100
451	121	18
452	121	23
453	121	25
454	121	26
455	121	28
456	121	31
457	121	38
458	121	87
459	121	89
460	122	5
461	122	12
462	122	17
463	122	26
464	122	29
465	122	32
466	122	36
467	122	38
468	122	57
469	122	61
470	122	76
471	122	87
472	122	88
473	122	89
474	123	6

B-OTSG

TUBE COUNT	ROW	TUBE
475	123	6
476	123	10
477	123	11
478	123	17
479	123	18
480	123	22
481	123	28
482	123	30
483	123	37
484	123	74
485	124	16
486	124	26
487	124	29
488	124	98
489	125	4
490	125	6
491	125	11
492	125	19
493	125	23
494	125	29
495	125	39
496	125	69
497	125	73
498	125	82
499	125	83
500	125	95
501	126	10
502	126	25
503	126	26
504	126	30
505	126	31
506	126	62
507	126	63
508	126	70
509	126	71
510	126	72
511	126	79
512	126	83
513	127	10
514	127	15
515	127	19
516	127	24
517	127	34
518	127	37
519	127	62
520	127	63
521	127	75
522	127	80
523	127	83
524	127	85
525	127	89
526	128	6
527	128	8

TUBE COUNT	ROW	TUBE
528	128	9
529	128	10
530	128	12
531	128	17
532	128	18
533	128	19
534	128	23
535	128	24
536	128	37
537	128	69
538	128	78
539	128	81
540	128	84
541	129	6
542	129	10
543	129	12
544	129	20
545	129	23
546	129	27
547	129	29
548	129	68
549	129	70
550	129	76
551	129	77
552	129	79
553	129	80
554	130	5
555	130	9
556	130	10
557	130	22
558	130	23
559	130	27
560	130	28
561	130	31
562	130	36
563	130	40
564	130	74
565	130	78
566	130	79
567	131	7
568	131	11
569	131	14
570	131	16
571	131	18
572	131	20
573	131	21
574	131	22
575	131	23
576	131	25
577	131	30
578	131	35
579	131	45
580	131	58

TUBE COUNT	ROW	TUBE
581	131	63
582	131	68
583	131	74
584	131	77
585	131	78
586	131	84
587	132	9
588	132	13
589	132	14
590	132	23
591	132	26
592	132	28
593	132	29
594	132	30
595	132	33
596	132	46
597	132	55
598	132	61
599	132	71
600	132	73
601	133	8
602	133	9
603	133	12
604	133	13
605	133	14
606	133	15
607	133	16
608	133	16
609	133	20
610	133	29
611	133	44
612	133	47
613	133	66
614	133	72
615	133	74
616	133	75
617	133	75
618	133	76
619	134	7
620	134	15
621	134	16
622	134	16
623	134	18
624	134	20
625	134	22
626	134	22
627	134	25
628	134	28
629	134	32
630	134	40
631	134	53
632	134	65
633	134	72

B-OTSG

TUBE COUNT	ROW	TUBE
634	134	73
635	134	74
636	135	12
637	135	13
638	135	14
639	135	15
640	135	16
641	135	23
642	135	26
643	135	27
644	135	33
645	135	53
646	135	59
647	135	69
648	135	70
649	135	72
650	136	4
651	136	8
652	136	14
653	136	19
654	136	21
655	136	27
656	136	27
657	136	40
658	136	46
659	136	56
660	136	61
661	136	65
662	136	70
663	136	71
664	136	72
665	136	74
666	136	75
667	137	8
668	137	9
669	137	10
670	137	11
671	137	14
672	137	17
673	137	17
674	137	18
675	137	24
676	137	25
677	137	28
678	137	29
679	137	39
680	137	40
681	137	66
682	137	67
683	137	68
684	137	69
685	138	6
686	138	9

TUBE COUNT	ROW	TUBE
687	138	9
688	138	10
689	138	11
690	138	13
691	138	14
692	138	14
693	138	16
694	138	17
695	138	21
696	138	23
697	138	25
698	138	30
699	138	31
700	138	37
701	138	38
702	138	63
703	138	69
704	138	70
705	139	7
706	139	10
707	139	12
708	139	12
709	139	13
710	139	14
711	139	16
712	139	17
713	139	18
714	139	22
715	139	26
716	139	27
717	139	30
718	139	37
719	139	41
720	139	43
721	139	48
722	139	50
723	139	64
724	140	7
725	140	9
726	140	10
727	140	11
728	140	12
729	140	15
730	140	16
731	140	18
732	140	19
733	140	20
734	140	20
735	140	22
736	140	23
737	140	24
738	140	33
739	140	36

TUBE COUNT	ROW	TUBE
740	140	47
741	140	48
742	140	56
743	140	60
744	140	63
745	141	7
746	141	7
747	141	9
748	141	9
749	141	10
750	141	14
751	141	17
752	141	18
753	141	18
754	141	19
755	141	19
756	141	27
757	141	33
758	141	34
759	141	35
760	141	36
761	141	40
762	141	49
763	142	12
764	142	16
765	142	17
766	142	17
767	142	18
768	142	21
769	142	26
770	142	27
771	142	32
772	142	33
773	142	34
774	142	45
775	142	47
776	142	49
777	143	7
778	143	11
779	143	12
780	143	13
781	143	14
782	143	15
783	143	16
784	143	18
785	143	20
786	143	21
787	143	24
788	143	25
789	143	30
790	143	32
791	143	41
792	143	42

B-OTSG

TUBE COUNT	ROW	TUBE
793	143	44
794	143	46
795	143	47
796	144	11
797	144	12
798	144	13
799	144	14
800	144	15
801	144	18
802	144	22
803	144	23
804	144	26
805	144	27
806	144	42
807	144	43
808	145	8
809	145	10
810	145	12
811	145	17
812	145	19
813	145	21
814	145	25
815	145	26
816	145	28
817	145	38
818	145	43
819	146	12
820	146	14
821	146	18
822	146	23
823	146	26
824	146	29
825	146	30
826	147	10
827	147	13
828	147	16
829	147	21
830	147	23
831	147	33
832	148	15
833	148	17
834	148	25

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT C

REVISION OF REFUELING OUTAGE 12 (12R), MODE 4 REPORT, TABLE 3

Table 3 numbers below are from the Refueling Outage 12 (12R) MODE 4 Report (Table 3 of letter 3F1001-03, dated October 19, 2001). It was not known at the time, but the numbers in that document were based on a non-conservative TEC leak rate table used for determining total leakage. It was not until after the 13R inspection and the preparation of the *revised* TEC calculation that this discrepancy was identified. Using the corrected leak rates in the revised 12R TEC calculation allows for a better comparison with Refueling Outage 13 (13R) as-found leakage. Below, CR3 is providing Table 3 with the previous non-conservative information and the revised Table 3. The information in the revised Table 3 supersedes the Table 3 provided in the 12R MODE 4 Report.

Any under-prediction calculated using the 13R accident leakage tables (letter 3F1003-07, dated October 31, 2003) should use the upper tubesheet leakage rate from 13R because the lower tube end leakage could not have been predicted.

Table 3 provided in the MODE 4 Report of 12R:

Table 3 Cycle 13 Projected Accident Leakage (MSLB) for TECs

OTSG	Projected Accident Leakage		
	Leakage Contribution at Room Temperature From In-Service TEC Assuming 100% TW	Leakage Contribution at Room Temperature from Undetected 100% TW Indications Based on POD of 0.84	Total Leakage at Room Temperature for Accident Conditions
A	0.564 gpm	0.109	0.673 gpm
B	0.556 gpm	0.154	0.710 gpm

Revised Table 3 of 12R MODE 4 Report:

Revised Table 3: Cycle 13 Projected Accident Leakage (MSLB) for TECs

OTSG	Projected Accident Leakage		
	Leakage Contribution at Room Temperature From In-Service TEC Assuming 100% TW	Leakage Contribution at Room Temperature from Undetected 100% TW Indications Based on POD of 0.84	Total Leakage at Room Temperature for Accident Conditions
A	0.626 gpm	0.120	0.746 gpm
B	0.625 gpm	0.169	0.794 gpm

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT D

CR3 CORRECTIVE ACTIONS FROM 13R DISCUSSED DURING THE APRIL 26, 2005 MEETING, AND SUPPLEMENTAL DATA REQUESTED BY THE NRC STAFF

<u>Corrective Actions</u>

1. **Revised the Once-Through Steam Generator (OTSG) Program Manual. The changes included:**

   a. Added information related to use of the appropriate Tube End Crack (TEC) leak rate table.

   b. Added guidance to ensure accounting of new TEC beyond Probability of Detection (POD).

   c. Added a requirement for vendor notification for use of correct leak rate table prior to the outage.

2. **Revised the OTSG Inspection Procedure. The changes included:**

   a. Added signature confirmation that the correct leak rate table was utilized.

   b. Ensured Refueling Outage 13 (13R) leakage assessment used the correct leak rate table. Added requirement to evaluate the need for repairs made to account for rate of new TEC found in the current outage.

   c. Repaired TEC in 13R to gain margin for Refueling Outage 14 (14R).

   d. Revised Refueling Outage 12 (12R) TEC calculation to correct errors.

3. **Will re-evaluate the method to account for rate of new TEC for Refueling 15 (15R) projection. The projection will be based upon:**

   a. Refueling Outage 14R as-found data as compared to previous outage trends. A more precise prediction can be made with multiple data points.

   b. Lessons learned from NRC Requests for Additional Information (RAIs).

   c. The status of License Amendment Request #290, Revision 0, "Probabilistic Methodology to Determine the Contribution to Main Steam Line Break Leakage Rates for the Once-Through Steam Generator from the Tube End Crack Alternate Repair Criteria."

4. **CR3 will establish a requirement for the Plant Nuclear Safety Committee approval of the methodology utilized for projecting the next operating cycles Main Steam Line Break (MSLB) leakage value and the basis for projecting TEC values beyond the Probability of Detection (POD) amount, and the as-left results for the upcoming operating cycle.**

5. **CR3 will perform a review of RAIs from recent submittals to identify process improvements. CR3 recognizes that more early face-to-face communications will be required when addressing complex issues.**

APRIL 8, 2005, NRC RAI QUESTION - a)

a) A justification for reducing the expected number of indications in the lower tubesheet by a factor of 15. Since a similar reduction factor could have been applied following the initial detection of indications in the upper tubesheet, discuss whether such a reduction was actually observed in the upper tubesheet.

RESPONSE - a)

This question addresses information provided in the response to Question 1b), Attachment A, Reference 1, that has been deleted from the response provided in this letter. The deleted information addressed a technique for predicting leakage attributed to Tube End Cracks for the next Refueling Outage (14R). The deleted information was not used during the 13R OTSG inspection and will not be used during the 14R inspection. Thus, Question a) above is no longer applicable.

APRIL 8, 2005, NRC RAI QUESTION - b)

b) A justification for reducing the number of indications expected to find in zone 6 given that some of the zone 6 tubes were plugged or repaired. This justification should include the following: i) the number of non-repaired or non-plugged tubes in each zone since 10R (i.e., the number of tubes in which tube end cracks (TECs) could initiate and contribute to leakage), ii) the number of actual TEC indications (tubes) detected in each zone since 11R, iii) the number of projected TEC indication in each zone since 11R, iv) the number of as-left TEC indications (tubes) since 11R, v) the number of new TEC indications (tubes) found in each zone since 11R, vi) the average number of TEC indications per tube per zone since 11R, vii) the percentage of tubes that developed new TECs since 11R.

RESPONSE – b First Part)

This question addresses information from the response to Question 1b), Attachment A, Reference 1, that has been deleted from the response. The deleted information addressed a technique for predicting leakage attributed to Tube End Cracks for the next Refueling Outage (14R). The deleted information was not used during the 13R OTSG inspection and will not be used during the 14R inspection. Thus, the first part of Question b) is no longer applicable.

RESPONSE – b.i)

Prior to 2003, the lower tube ends were not inspected for TEC and no indications were identified. Therefore, the data for 1997, 1999, and 2001 only have TEC information for the upper tube end. All data prior to 13R (2003) is from the Upper Tube End.

CR3 Non-Repaired (Plugged or Re-rolled) Tubes at the End of an Outage					
OTSG/Zone	Mid-Cycle (1997) Upper Tube End	11R (1999) Upper Tube End	12R (2001) Upper Tube End	13R(2003) Upper Tube End	13R (2003) Lower Tube End
A-Zone 1	7071	6790	6768	6747	7017
A-Zone 2	4065	3960	3950	3944	4058
A-Zone 3	1905	1860	1856	1836	1902
A-Zone 4	1021	1007	1001	969	977
A-Zone 5	505	500	499	421	414
A-Zone 6	813	580	559	470	737
B-Zone 1	6600	6081	5965	5918	6522
B-Zone 2	4078	3880	3834	3797	4066
B-Zone 3	1894	1851	1832	1822	1884
B-Zone 4	1015	1001	988	984	1011
B-Zone 5	503	499	490	430	495
B-Zone 6	807	620	581	453	757

RESPONSE – b.ii)

CR3 TEC Indications & Tubes Detected (As-Found) in Each Zone				
OTSG/Zone	11R (1999) Indications/Tubes Upper Tube End	12R (2001) Indications/Tubes Upper Tube End	13R (2003) Upper Tube End Indications/Tubes	13R (2003) Lower Tube End Indications/Tubes
A-Zone 1	191/117	318/233	450/353	0/0
A-Zone 2	188/140	341/251	419/317	4/1
A-Zone 3	136/93	225/159	273/192	0/0
A-Zone 4	79/55	137/102	172/129	1/1
A-Zone 5	26/21	42/37	58/49	0/0
A-Zone 6	343/184	57/50	95/75	2/2
B-Zone 1	165/102	152/122	163/120	0/0
B-Zone 2	198/160	262/213	334/267	14/14
B-Zone 3	179/134	280/204	351/255	45/43
B-Zone 4	66/54	123/91	137/110	30/28
B-Zone 5	22/19	56/45	59/52	14/13
B-Zone 6	274/151	101/82	129/104	12/10

RESPONSE – b.iii)

The number of projected TEC indications has not been provided. Corrective Action 3 in this attachment will use data from Refueling Outage 14, and previous outages, to re-evaluate the method to account for new TEC and to adjust projections for 15R.

RESPONSE – b.iv)

CR3 Number of As-Left TEC Indications (Tubes) Since 11R (1999)				
OTSG/Zone	**11R (1999) Indications/Tubes Upper Tube End**	**12R (2001) Indications/Tubes Upper Tube End**	**13R (2003) Upper Tube End Indications/Tubes**	**13R (2003) Lower Tube End Indications/Tubes**
A-Zone 1	180/110	318/233	449/352	0/0
A-Zone 2	187/139	340/250	418/316	4/1
A-Zone 3	131/91	225/159	233/179	0/0
A-Zone 4	79/55	137/102	121/106	1/1
A-Zone 5	25/20	42/37	0/0	0/0
A-Zone 6	21/21	56/49	0/0	2/2
B-Zone 1	68/49	120/91	149/107	0/0
B-Zone 2	177/142	247/204	329/262	14/14
B-Zone 3	173/128	277/201	346/251	45/43
B-Zone 4	61/51	96/79	135/109	30/28
B-Zone 5	21/18	37/37	0/0	14/13
B-Zone 6	49/49	63/63	0/0	9/7

RESPONSE – b.v)

CR3 Number of New TEC Indications (Tubes) Since 11R (1999)			
OTSG/Zone	Number in 12R (2001 As-Found) that were not in 11R (1999 As-Left) Indications/Tubes Upper Tube End	Number in 13R (2003 As-Found) that were not in 12R (2001 As-Left) Upper Tube Ends Indications/Tubes	Number in 13R (2003 As-Found) Inspections that were not performed in 12R (2001) Lower Tube Ends Indications/Tubes
A-Zone 1	138/123	132/120	0/0
A-Zone 2	154/112	79/67	4/1
A-Zone 3	94/68	48/33	0/0
A-Zone 4	58/47	35/27	1/1
A-Zone 5	17/17	16/12	0/0
A-Zone 6	36/29	39/26	2/2
B-Zone 1	84/73	43/29	0/0
B-Zone 2	85/71	87/63	14/14
B-Zone 3	107/76	74/54	45/43
B-Zone 4	62/40	41/31	30/28
B-Zone 5	35/27	22/15	14/13
B-Zone 6	52/33	66/41	12/10

RESPONSE – b.vi)

CR3 Average Number of As-found TEC Indications per Tubes Since 11R				
OTSG/Zone	11R (1999) Indications per Tube Upper Tube End	12R (2001) Indications per Tube Upper Tube End	13R (2003) Upper Tube End Indications per Tube	13R (2003) Lower Tube End Indications per Tube
A-Zone 1	1.63	1.36	1.27	N/A
A-Zone 2	1.34	1.36	1.32	4.00
A-Zone 3	1.46	1.42	1.42	N/A
A-Zone 4	1.44	1.34	1.33	1.00
A-Zone 5	1.24	1.14	1.18	N/A
A-Zone 6	1.86	1.14	1.27	1.00
B-Zone 1	1.62	1.25	1.36	N/A
B-Zone 2	1.24	1.23	1.25	1.00
B-Zone 3	1.34	1.37	1.38	1.05
B-Zone 4	1.22	1.35	1.25	1.07
B-Zone 5	1.16	1.24	1.13	1.08
B-Zone 6	1.81	1.23	1.24	1.2

RESPONSE – b.vii)

This table only presents new TEC for the upper tube end since there were no lower TEC identified prior to 2003.

CR3 Percent of tubes with New TECs Since 11R (1999)		
OTSG/Zone	New TEC tubes (12R – 11R) divided by potential 11R non-repaired tubes) -Percent (%)- Upper Tube End	New TEC tubes (13R – 12R) divided by potential 12R non-repaired tubes) -Percent (%)- Upper Tube End
A-Zone 1	1.8%	1.8%
A-Zone 2	2.8%	1.7%
A-Zone 3	3.7%	1.8%
A-Zone 4	4.7%	2.7%
A-Zone 5	3.4%	2.4%
A-Zone 6	5.0%	4.7%
B-Zone 1	1.2%	0.5%
B-Zone 2	1.8%	1.6%
B-Zone 3	4.1%	2.9%
B-Zone 4	4.0%	3.1%
B-Zone 5	5.4%	3.1%
B-Zone 6	5.3%	7.1%

APRIL 8, 2005, NRC RAI QUESTION - c)

c) An assessment of the potential that the number of TEC indications is increasing at an increasing rate such that projections based on historical experience need to be adjusted.

RESPONSE - c)

An assessment of the potential that the number of TEC indications is increasing at an increasing rate has not been performed. Corrective Action 3 in this attachment will use data from Refueling Outage 14 and previous outages to re-evaluate the method to account for new TEC and to adjust projections for 15R.

APRIL 8, 2005, NRC RAI QUESTION - d)

d) The basis for the new TEC leakage values of 0.274 gpm and 0.535 gpm in steam generators A and B, respectively in light of the information discussed above.

RESPONSE - d)

This question addresses information from the response to Question 1.b), Attachment A, Reference 1, that has been deleted from the response. The deleted information addressed a technique for predicting leakage attributed to Tube End Cracks for the next Refueling Outage (14R). The deleted information was not used during the 13R OTSG inspection and will not be used during the 14R inspection. Thus, Question d) is no longer applicable.

APRIL 11, 2005, NRC RAI QUESTION

Upon further review of the March 30, 2005, there appear to be other inconsistencies in reported values. For example, the "new" leakage for the upper tubesheet reported in the March 30, 2005, letter does not appear to be based on values provided in previous reports. "New leakage" is defined as the difference between the "as found" leakage during one outage (13R in this case) and the "as-left" leakage in the prior outage (12R in this case). On pages 6 and 8 of 30 of Attachment A to the March 30, 2005 letter, the "new leakage" is reported as 0.261 gpm for steam generator A and 0.411 gpm for steam generator B. However, the "as-found" leakage for 13R is reported in the licensee's letter dated October 31, 2003 (ML033090110) as 1.102 gpm and 0.932 gpm for steam generators A and B, respectively. The "as-left" leakage for 12R was reported in the March 30, 2005 letter as 0.626 gpm and 0.625 gpm for steam generators A and B, respectively. The difference between these as-found and as-left leakage values (0.306 gpm and 0.477 gpm in steam generators A and B, respectively) do not match those reported in the March 30, 2005, letter. In addition, the number of indications in zone 6 reported in the body of the text of the March 30, 2005 letter (pages 7 and 9 of Attachment A) do not appear to match those reported in Tables 1 and 2.

RESPONSE

This question addresses information from the response to Question 1.b), Attachment A, Reference 1, that has been deleted from the response. The deleted information addressed a technique for predicting leakage attributed to Tube End Cracks for the next Refueling Outage (14R). The deleted information was not used during the 13R OTSG inspection and will not be used during the 14R inspection. Thus, this question is no longer applicable.

REFERENCE

1. PEF to NRC letter dated March 30, 2005, "Crystal River Unit 3 – Response to NRC Request for Additional Information Regarding Once-Through Steam Generator Tube Inservice Inspection Conducted During Refueling Outage 13"