Enclosure 1

Calvert Cliffs Nuclear Power Plant Unit 1

Revised Steam Generator Tube Inspection Report

Refueling Outage 25 CC1R25

Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 1 Revised Steam Generator Tube Inspection Report

Introduction

In Reference 1, Constellation Energy Generation (CEG) submitted a request for an amendment to Renewed Facility Operating License No. DRP-53 for the Calvert Cliffs Nuclear Power Plant Unit 1 to adopt Technical Specifications Task Force (TSTF)-577, “Revised Frequencies for Steam Generator Tube Inspections” and Reference 2, Supplement to Application to Revise Technical Specifications to Adopt TSTF-577, "Revised Frequencies for Steam Generator Tube Inspections". Reference 1 and 2 were approved by the Nuclear Regulatory Commission (NRC) in Reference 3. As noted in Reference 2, “CEG will submit SG Tube Inspection Reports meeting the revised TS 5.6.9 requirements within 60 days after implementation of the license amendment at Braidwood.” Based on NRC approval (Reference 3) TSTF-577 was implemented at CCNPP on November 15, 2023.

CCNPP Unit 1 Technical Specification (TS) 5.6.9, “Steam Generator Tube Inspection Report,” states “A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.9, ‘Steam Generator (SG) Program’." This enclosure provides the 180-day report with the revised Unit 1 TS 5.6.9 reporting requirements in accordance with References 3. Each CCNPP Unit 1 TS 5.6.9 reporting requirement is listed below along with the associated information based on the inspection performed during the CCNPP Unit 1 February 2020 refueling outage (CC1R25), which was the last inspection of the CCNPP Unit 1 steam generators (SGs). The 180-Day report will follow the template provided in Appendix G to the Electric Power Research Institute (EPRI) Steam Generator Management Program: Steam Generator Integrity Assessment Guidelines, Revision 5 (Reference 4), which provides additional information beyond the CCNPP Unit 1 TS 5.6.9 reporting requirements.

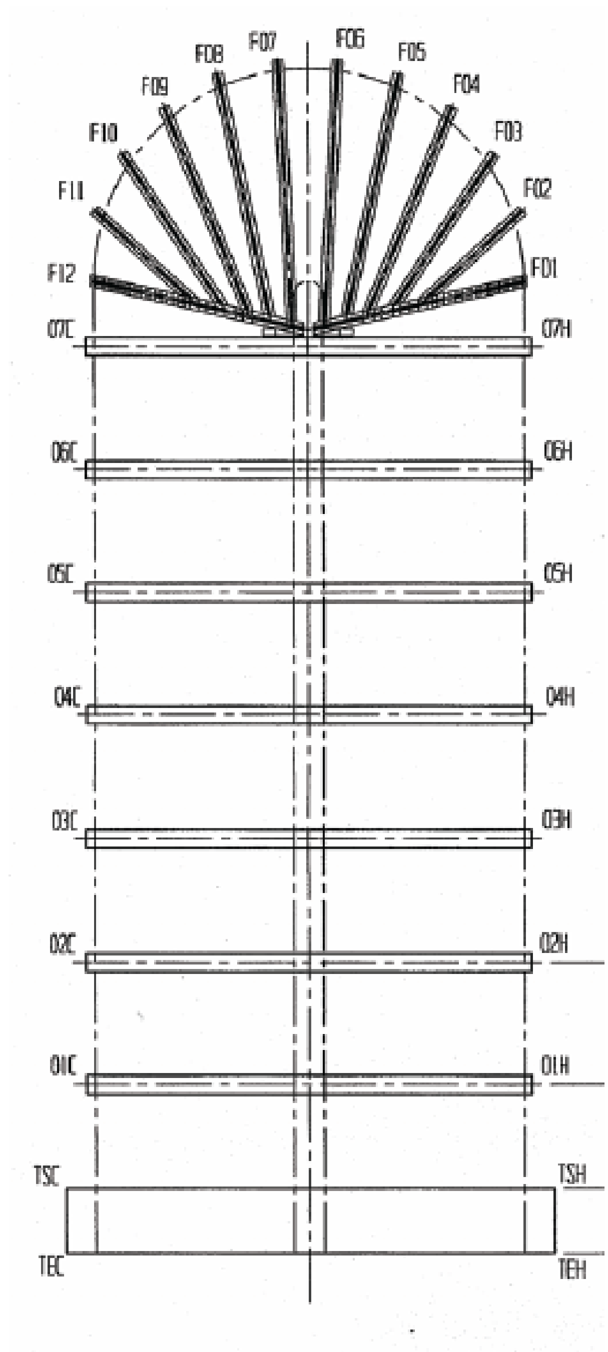
1. Design and operating parameters

Calvert Cliffs Nuclear Power Plant Unit 1 (CCNPP1) has two recirculating steam generators designed and fabricated by Babcock and Wilcox (B&W) of Cambridge, Ontario, Canada. These replacement steam generators (RSG's), SG11 and SG12 were installed in 2002.

Table 1: CCNPP Steam Generator Design and Operating Parameters

SG Model / Tube Material / Number of SGs per Unit	Babcock & Wilcox (Canada) Replacements / Alloy 690TT / 2
Number of tubes per SG / Nominal Tube Diameter / Tube Thickness	8471 / 0.750 in. / 0.042 in
Support Plate Style / Material	Lattice Tube Support Grids and Fan Bars / 410 stainless steel
Last Inspection Date	February 2020
Effective full power months (EFPM) Since Last Inspection	46.2 EFPM [3.85 effective full power years (EFPY)] (from CC1R23 to CC1R25)
Total Cumulative SG EFPY	16.63 EFPY (as of CC1R25)
Mode 4 Initial Entry	March 9th, 2020, from CC1R25
Observed Primary-to-Secondary Leak Rate	No observed leakage
Nominal Thot at Full Power Operation	595°F
Degradation Mechanism Sub-Population	Tubes located on the periphery of the tube bundle are in the highest cross-flow region and were considered in the CC1R25 Degradation Assessment to be more susceptible to foreign object wear.
SG program guideline deviations since last Inspection	None
SG Schematic	See Figure 1

Figure 1: Tube Support Arrangement for CCNPP B&W Replacement SGs



Notes:
TEC - Tube End Cold Leg
TEH - Tube End Hot Leg
TSC – Top-of-Tubesheet Cold Leg
TSH – Top-of-Tubesheet Hot Leg
01C – 07C – Lattice Grid Tube Supports on Cold Leg side
01H – 07H – Lattice Grid Tube Supports on Hot Leg side
F01 – F12 – U-Bend Fan Bar Tube Supports

2. The scope of the inspections performed on each SG (TS 5.6.9.a) and if applicable, a discussion of the reason for scope expansion

Primary Side Eddy Current Scope

The following inspections were performed during CC1R25 to ensure that 100% of the tubes were inspected during the period as required by TS 5.5.8.d.2

- Bobbin Probe Eddy Current Testing (ECT) Examinations:
  - 100% of the in-service tubes will be inspected full length, tube-end hot (TEH) to tube-end cold (TEC), using the bobbin probe.
- Array Probe ECT Examinations:
  - 50% peripheral array (X-Probe) examination on the Hot and Cold Legs from the first support to the tube end for potential foreign objects and associated wear (peripheral locations are where crossflow velocities are the highest)
  - All previous Possible Loose Parts indications (PLPs) (part not removed) plus a one tube bounding examination of such tubes at the elevation of interest
  - One-tube border region around all tubes previously plugged for Loose Part Wear (LPW)
  - One-tube border region around all tubes previously plugged for PLPs
  - All identified bobbin I-codes
  - The ten deepest Fan Bar Wear (FBW) bobbin indications in each SG
  - Ten deepest wear indications detected at lattice supports in each SG (or all if there are less than ten)
  - All Lattice Support Wear (LSW) bobbin indications in each SG
  - All newly identified PLP indications
  - Manufacturing Burnish Marks (MBM), Dents (DNT) and Dings (DNG) that exhibited significant change in the bobbin signal
- Special Interest Examinations
  - All newly reported array probe PLPs
  - Sizing of all loose part wear (LPW) indications

There was no scope expansion required or performed during the CC1R25 eddy current inspections.

Primary Side Visual Inspection Scope

The primary side channel head (hot and cold leg) of both steam generators was visually inspected using a remote operated camera in accordance with CCNPP inspection procedures. The channel head general area and cladding was inspected for the following: through holes or breaches that would expose carbon steel base material under the cladding, rust colored discoloration or stains visible on cladding surface, and channel head cladding degradation such as cracks or significant deformation. The tubesheet, tube ends, and tube plugs were inspected for the following: cracking, degradation, water leakage, boron deposits, and tube sheet or tube end deformation. No degradation was observed in any of these areas in either steam generator.

The divider plate was visually inspected from both hot and cold legs using a remote camera specifically looking for the following: cracks on the divider plate surface, surface deformation, foreign material that may mask any degradation, and any other degradation. Special attention was made when inspecting the weld deposit seat bar, divider plate weld, divider plate corner windows, and the divider plate weld heat affected zone. No degradation was observed in any of these areas in either steam generator.

Secondary Side Inspection Scope

Secondary side inspections were performed with a variety of remote tooling. For each steam generator, a visual inspection (top of tubesheet) was performed after sludge lancing including:

- 100% of the annulus to a minimum of 6 tubes deep
- 100% of the no-tube lane to a minimum of 6 tubes deep
- Blowdown and drain holes
- Shroud supports
- Inspection of tube support structures (1st support only)
- In-bundle inspection of previously identified foreign objects at the top of tubesheet
- In-bundle inspection of ECT-detected PLPs at the top of tubesheet

3. The nondestructive examination techniques utilized for tubes with increased degradation susceptibility (TS 5.6.9.b)

Tubes located on the periphery of the tube bundle are in the highest cross-flow region and were considered in the Degradation Assessment to be more susceptible to foreign object wear, especially near the tubesheet where most foreign objects are located. As a compensatory measure, tubes in this region were tested with an array (X-probe) which has increased sensitivity for detection of foreign objects and foreign object wear close to the tubesheet. This scope encompassed 50% of the hot and cold leg tubes in the high flow region, from the tube end to the 1st tube support (01C/01H).

4. For each degradation mechanism found: The nondestructive examination technique utilized (TS 5.6.9.c.1)

Steam Generator eddy current examination techniques used (see Table 2 below) were qualified in accordance with Appendix H or Appendix I of the EPRI PWR SG Examination Guidelines Revision 8. Each examination technique was evaluated to be applicable to the tubing and the degradation mechanisms found in the CCNPP SGs during CC1R25.

The bobbin probe was used as the primary means of detecting tube degradation except for loose parts/wear located between the Top of Tubesheet (TTS) and the first lattice support in the outermost peripheral tubes (50% scope). At this location, the Array probe was used for the primary means of detection, along with detection of TTS expansion transition Intergranular Attack / Stress Corrosion Cracking (IGA/SCC) and pitting (proactive examinations). The rotating coil probe was used primarily as a diagnostic and sizing tool for indication characterization.

Table 2: Non-Destructive Examination (NDE) Techniques for Sizing Each Existing Degradation Mechanism Found During CC1R25

Location	Degradation Mechanism	Orientation	Probe	EPRI ETSS[1]	EPRI ETSS[1] Rev
Fan Bar (U-bend)	Wear	Vol	Bobbin Array	I-96041.1 I-17909.1	6 1
Lattice Grid (Horz. Support)	Wear	Vol	Bobbin Array	96004.1 I-11956.3	13 3
Foreign Object at top of tubesheet or lattice grid	Wear	Vol	Array +Point	17901.1 27901.1	0 1

1. ETSS – Examination Technique Specification Sheet

5. **For each degradation mechanism found: The location, orientation (if linear), measured size (if available), and voltage response for each indication. For tube wear at support structures less than 20 percent through-wall, only the total number of indications needs to be reported (TS 5.6.9.c.2)**

Three degradations mechanisms were confirmed to be present in the CCNPP Unit 1 SGs. These were: 1) fan bar wear, 2) lattice grid support wear, and 3) foreign object wear. No other degradation mechanisms, including tube-to-tube wear, were detected. Table 3 provides the number of indications reported during the CC1R25 inspection.

Table 3: Number of Indications Detected for Each Degradation Mechanism in CC1R25

Degradation Mechanism	SG11 Indications	SG12 Indications	Total
Fan Bar Wear	158	171	329
Lattice Grid Support Wear	6	2	8
Foreign Object Wear	5	12	17

Table 4 provides a listing of all the fan bar wear indications 20%TW or greater reported during the CC1R25 inspection including the measured depths from the array probe.

Table 4: CC1R25 Fan Bar Wear Indications ≥20%TW

SG	Row	Col	Location	Array Depth (%TW)	Voltage (Bobbin)
SG11	117	79	F06-0.82	25	0.54
SG12	83	77	F07-0.77	25	0.55
SG12	105	89	F07+1.34	20	0.38
SG12	111	89	F07+1.31	22	0.43
SG12	128	80	F07-1.31	22	0.55

1. Flaw length data unavailable for flaws listed above

Eight indications of wear related to the lattice grid supports were reported during the CC1R25 outage. Seven of the eight indications were reported in the previous inspection (CC1R23). All of these indications were inspected with array probes to confirm that the morphologies of the indications were consistent with lattice grid wear and not some other damage mechanism such as foreign object wear. No lattice grid wear indications were reported to be greater than 20%TW. The deepest lattice grid wear indication reported was 14%TW in SG 12.

Table 5 provides a listing of all the foreign object wear indications reported during the CC1R25 inspection including the measured voltages, depths, and measured dimensions from the plus-point probe. Seventeen foreign object wear indications were detected in 15 tubes. Fourteen of the indications were reported in previous outages. All these indications were sized using +Point™ ETSS 27901.1 and had measured depths ranging from 16%TW to 35%TW. Since the parts were no longer present, as expected, there was no noticeable change in the depths of these indications.

All these foreign object wear indications were sized below the plugging limit. Since no objects were present to cause further wear and all wear indications were less than the 40%TW Tech Spec. plugging limit (5.5.9.c), all 15 tubes were returned to service.

Table 5: CC1R25 Foreign Object Wear Indications

SG	Row	Col	Location	Array Voltage	Array Depth (%TW)	Axial Extent (Inches)	Circumferential Extent (Inches)
SG11	69	13	TSH +1.00	0.22	27	0.34	0.38
SG11	70	14	TSH +1.01	0.18	24	0.34	0.38
SG11	70	14	TSH +1.23	0.38	35	0.51	0.51
SG11	113	113	TSH +0.45	0.20	25	0.27	0.41
SG11	126	114	TSH +0.98	0.10	19	0.32	0.38
SG12	5	165	TSH +22.06	0.12	21	0.28	0.26
SG12	18	152	03H -1.78	0.22	27	0.30	0.41
SG12	22	70	TSC +0.24	0.16	23	0.22	0.31
SG12	102	36	TSH +0.45	0.12	20	0.22	0.44
SG12	106	134	TSH +7.08	0.17	24	0.32	0.36
SG12	115	45	TSC +0.36	0.07	17	0.22	0.31
SG12	116	44	TSC +0.51	0.18	24	0.27	0.36
SG12	117	45	TSC +0.25	0.08	18	0.23	0.46
SG12	117	45	TSC +0.26	0.13	21	0.23	0.41
SG12	136	86	TSC +8.54	0.19	25	0.23	0.31
SG12	137	85	TSC +8.55	0.08	18	0.23	0.36
SG12	138	86	TSC +8.35	0.05	16	0.23	0.31

6. **For each degradation mechanism found: A description of the condition monitoring assessment and results, including the margin to the tube integrity performance criteria and comparison with the margin predicted to exist at the inspection by the previous forward-looking tube integrity assessment (TS 5.6.9.c.3). Discuss any degradation that was not bounded by the prior operational assessment in terms of projected maximum flaw dimensions, minimum burst strength, and/or accident induced leak rate. Provide details of any in situ pressure test.**

A condition monitoring (CM) assessment was performed as required by the CCNPP SG program. The tube degradation detected during the CC1R25 inspection was due to fan bar wear, lattice grid wear, and foreign object wear at lattice grid supports. The deepest indication for each mechanism met condition monitoring analytically as shown in Figures 2, 3, and 4. The margin to the structural and condition monitoring limit curve for each detected wear indication can be determined from Figures 2, 3, and 4. The CM limit curves include uncertainties for material properties and NDE depth sizing. The deepest flaws have a depth less than the conservatively determined CM limit for all degradation mechanisms; therefore, the structural integrity performance criterion was met for the operating interval prior to CC1R25. A summary of the CM results from CC1R25 as compared to the Operational Assessment (OA) predictions from the most recent prior inspection (CC1R23) is provided in Table 6.

Figure 2: Condition Monitoring Results for Fan Bar Wear

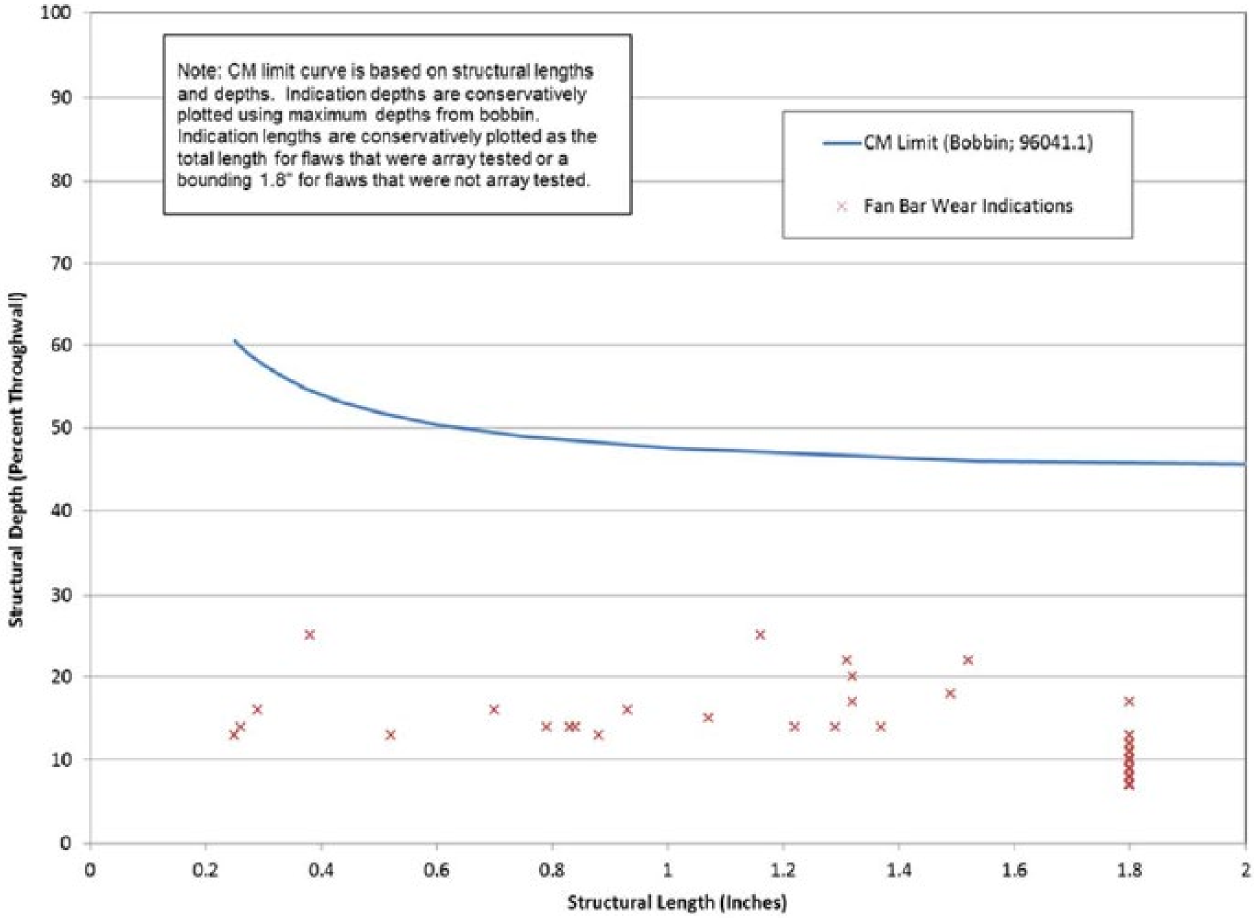


Figure 3: Condition Monitoring Results for Lattice Grid Wear

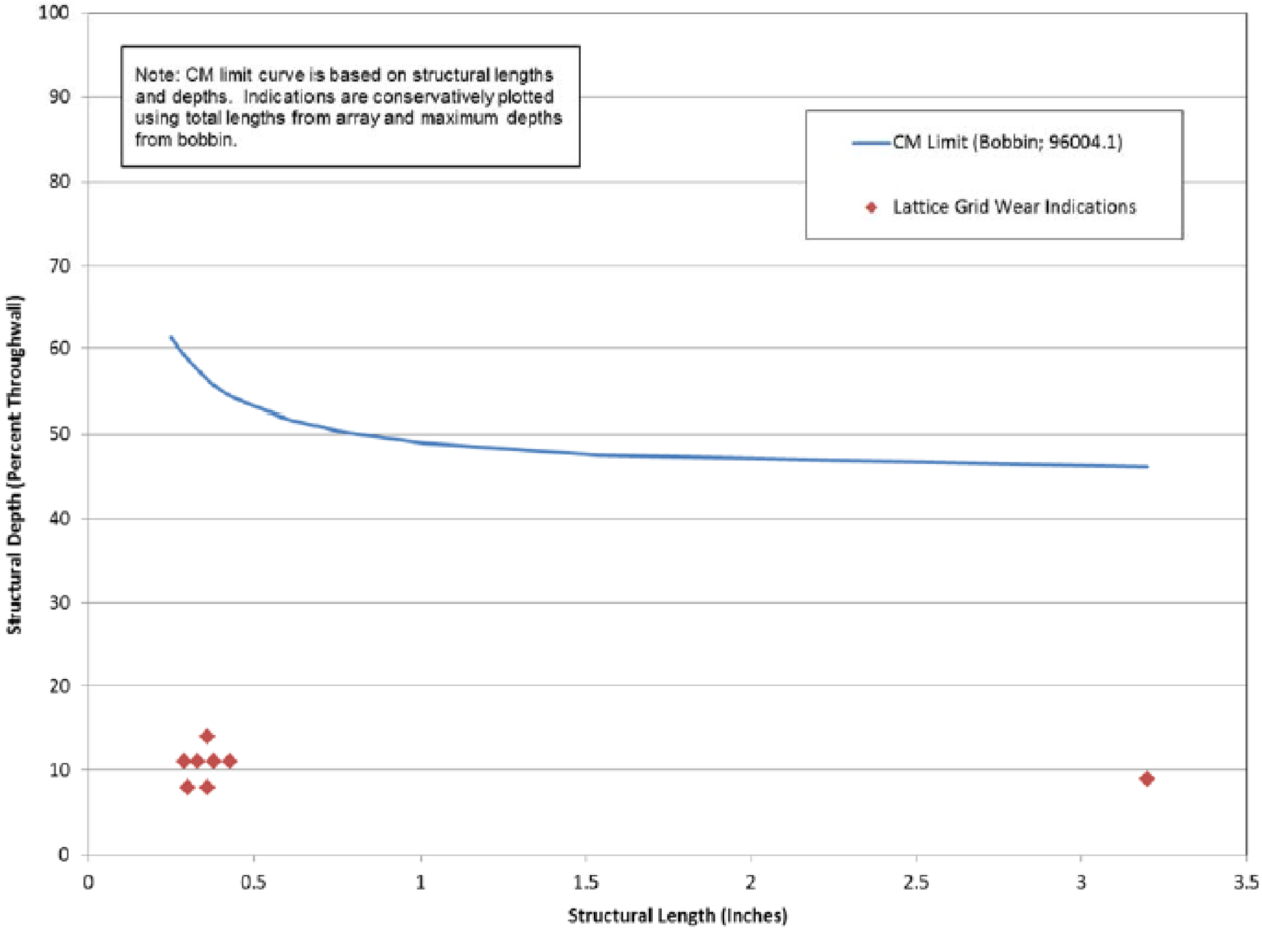


Figure 4: Condition Monitoring Results for Foreign Object Wear

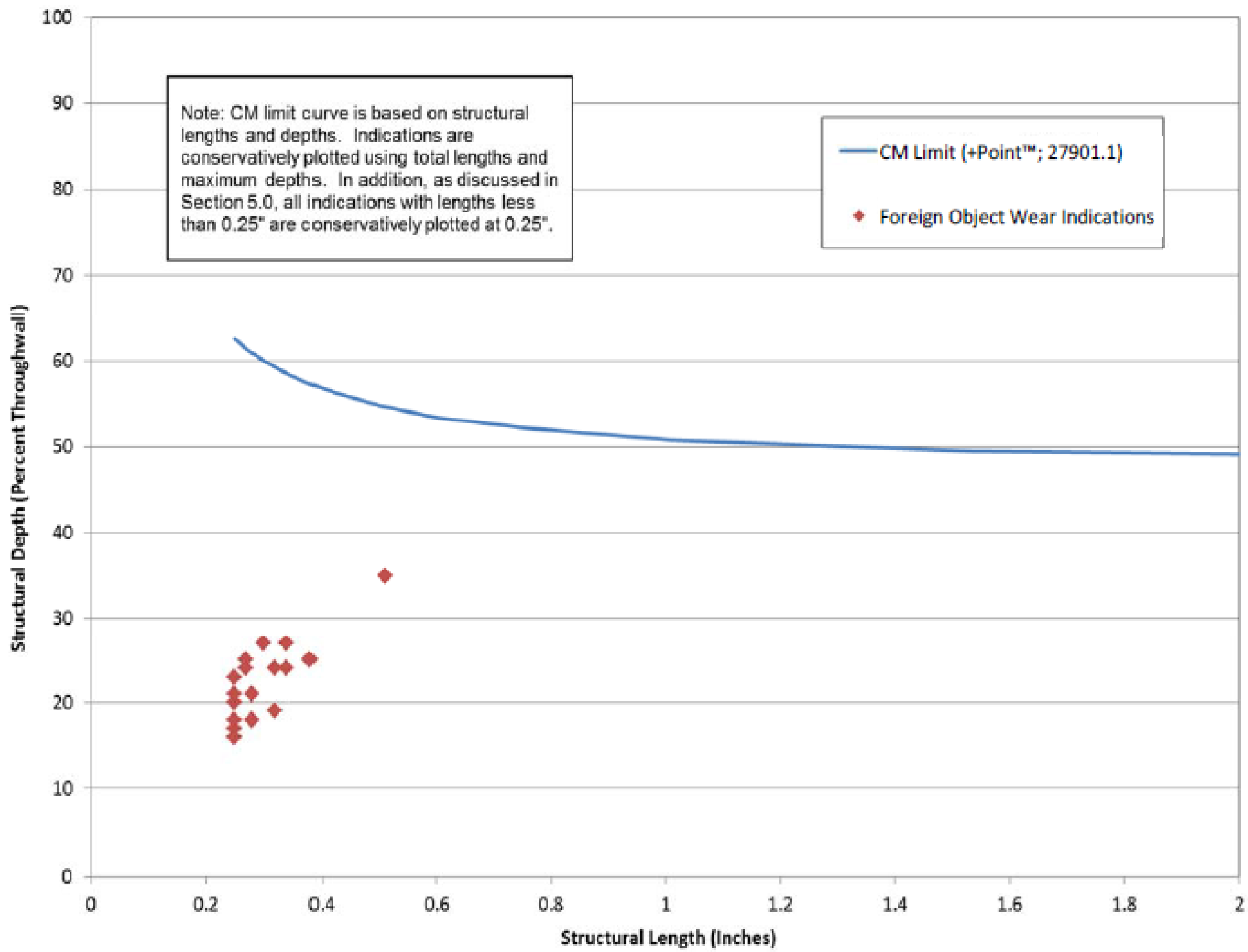


Table 6: Comparison of Prior OA Projections to As-Found Results

Parameter	CC1R25 Projection[1]	CC1R25 As-Found[1]
Inspection Interval	4.0 EFPY	3.85 EFPY
Fan Bar Wear Maximum Depth	39.5 %TW	25 %TW
Lattice Grid Wear Maximum Depth	37.3 %TW	14 %TW
Foreign Object Wear Maximum Depth	< 50.5 %TW	35 %TW[2]

1. NDE Depths are reported for both projected and as found results
2. No new wear associated with previously observed Foreign Object (FO) indications

Volumetric wear indications will leak and burst at essentially the same pressure; therefore, accident-induced leakage integrity is also demonstrated. Operational leakage integrity was demonstrated by the absence of any detectable primary-to-secondary leakage during the operating interval prior to CC1R25. Because tube integrity was demonstrated analytically, in-situ pressure testing was not required nor performed during CC1R25. There were no tube pulls planned or performed during CC1R25.

7. **For each degradation mechanism found: The number of tubes plugged during the inspection outage (TS 5.6.9.c.4). Also, provide the tube location and reason for plugging.**

No tubes required plugging during the CC1R25 SG inspections.

8. **The repair methods utilized, and the number of tubes repaired by each repair method (TS 5.6.9.c.5).**

No tubes were repaired during CC1R25.

9. **An analysis summary of the tube integrity conditions predicted to exist at the next scheduled inspection (the forward-looking tube integrity assessment) relative to the applicable performance criteria, including the analysis methodology, inputs, and results (TS 5.6.9.d). Include the effective full power months of operation permitted for the current operational assessment.**

Summary

Based on application of conservative fan bar, lattice grid, and foreign object wear growth rates, the condition of the CCNPP SG tubes has been analyzed with respect to continued operability of the SGs without exceeding the SG tube integrity performance criteria at the next scheduled SG eddy current inspection no later than CC1R28.

Fan Bar Wear OA

For the fan bar wear OA, the Mixed Arithmetic/Simplified Statistical method from Table 8-1 of the EPRI Steam Generator Integrity Assessment Guidelines (Reference 4) was used. Using this method, a worst-case end-of-cycle (EOC) depth is projected by applying NDE uncertainties and a growth allowance to the deepest flaw returned to service. This projected EOC depth is then compared to an allowable EOC depth which is calculated using a Monte Carlo analysis which incorporates uncertainties in the burst pressure relationship and material properties.

For fan bar wear, the deepest indication returned to service was 25%TW. The NDE sizing parameters for ETSS 96041.1 are a slope of 1.01, an intercept of 0.99, and a standard error of 3.29%TW. Using the slope and intercept, a best estimate real depth of 26.2%TW is obtained for an indication with a measured depth of 25%TW.

The standard error of 3.29%TW from ETSS 96041.1 is the technique uncertainty. Further adjusting this value upward to an upper 95th percentile gives an NDE uncertainty of 5.4%TW (3.29 x 1.645). Adding this uncertainty to the best estimate value of 26.2%TW from the previous paragraph yields a bounding real depth of 31.6%TW returned to service.

This hypothesized real depth of 31.6%TW must then be grown at an upper 95th growth rate for the next 6.0 EFPY and the upper 95th percentile growth rate is 0.8%TW per EFPY. Applying a growth of 4.8%TW (0.8 x 6.0) gives a bounding real depth at the end of the upcoming inspection interval of 36.4%TW.

For an assumed bounding length of 1.8”, the structural limit (SL) for this hypothesized limiting flaw is 49.8%TW (based on the SL for a 3.2” length flaw). The structural limit includes uncertainties for material properties and the burst pressure relationship and is the allowable real depth for a flaw of a given length. Since the projected real depth of 36.4%TW is less than the structural limit of 49.8%TW, there is reasonable assurance that structural integrity will be maintained until the next scheduled inspection (CC1R28).

The projected EOC depth is believed to be very conservative since it pairs the deepest indication returned to service in CC1R25 with upper 95th percentile values for both NDE uncertainties and growth rates. In addition to the conservative depth projection, a fixed length of 1.8 inches was also used. This value is likely very conservative due to the tapered shape of most of the fan bar wear indications. With a tapered flaw shape, the structural lengths of most of these flaws are expected to be less than 1 inch.

Lattice Grid Wear OA

Unlike fan bar wear, there is too little data to calculate a reliable upper 95th percentile growth rate for lattice grid wear. Seven of the eight lattice grid wear indications were reported in the previous inspection. The largest growth rate among these seven indications was 0.26%TW per EFPY (1%TW over 3.85 EFPY). Due to the limited population and the low growth rates of the existing indications, an assumed growth rate of 0.8%TW per EFPY will be used in the OA. This is consistent with the 95th percentile growth rate used for the fan bar wear analysis.

The measured lengths of the lattice grid flaws are all less than 0.43 inches. However, since the “high bar” lattice grids are 3.15 inches tall, a bounding flaw length of 3.2 inches will be used in the analysis.

Using the same Mixed Arithmetic/Simplified Statistical method that was used for the fan bar wear analysis and bobbin ETSS 96004.1, a best estimate real depth is obtained as follows. The deepest lattice grid wear indication returned to service measured 14%TW. The NDE sizing parameters for ETSS 96004.1 are a slope of 0.98, an intercept of 2.89, and a standard error of 4.19%TW. Using the slope and intercept, a best estimate real depth of 16.6%TW is obtained for an indication with a measured depth of 14%TW.

The standard error of 4.19%TW from ETSS 96004.1 is the technique uncertainty. Further adjusting this value upward to an upper 95th percentile gives an NDE uncertainty of 6.9%TW (4.19 x 1.645). Adding this uncertainty to the best estimate value of 16.6%TW from the previous paragraph yields a bounding real depth of 23.5%TW returned to service.

This hypothesized real depth of 23.5%TW must then be grown at an upper 95th growth rate for the next 6.0 EFPY. As discussed above, a growth rate of 0.8%TW per EFPY will be used. Applying a growth of 4.8%TW (0.8 %TW/EFPY x 6.0 EFPY) gives a bounding real depth at the end of the upcoming inspection interval of 28.3%TW.

For a flaw with an assumed bounding length of 3.2 inches, the structural limit is 49.8%TW. Since the projected depth of 28.3%TW is less than this value, there is reasonable assurance that structural integrity will be maintained until the next scheduled inspection.

Tube Wear from Existing, Remaining, and New Foreign Objects OA

The maximum wear rate observed for foreign objects over the previous operating interval can be used to calculate a maximum run time for newly initiated foreign object wear. The deepest new foreign object wear scar was 20%TW, suggesting a growth rate of 5.2%TW/EFPY over the previous operating interval of 3.85 EFPY. Assuming a similar growth rate for a newly initiated wear scar and a structural limit of 52%TW, which is associated with a conservative scar length of 1.0” and a limited circumferential extent of less than 135° a maximum run time can be calculated.

$$Maximum\ Run\ Time\ =\ \frac{Condition\ Monitoring\ Limit}{Growth\ Rate} = \frac{52\%TW}{5.2\%TW/EFPY} = 10\ EFPY$$

The maximum calculated run time of 10 EFPY is longer than the next projected interval of 3 cycles before the next SG inspection (~5.7 EFPY). Provided the steam generators operate for a shorter period than this maximum run time before their next inspection, there is reasonable assurance that foreign object wear associated with the observed parts will not exceed the performance criteria prior to the next inspection of the Calvert Cliffs Unit 1 steam generators.

For those objects not detected or those objects that enter the bundle during operation, there is experience that the plant can operate multiple cycles with foreign objects in the bundle without tube wear exceeding the condition monitoring limit or leakage occurring. As such, there is reasonable assurance that foreign objects will not cause wear that exceeds the structural integrity performance criteria prior to the next tube examination in each steam generator. Because no wear exceeding the structural criteria is expected, there is reasonable assurance that the operational leakage and accident leakage performance criteria will not be exceeded by foreign object wear prior to the next tube examination in each steam generator (CC1R28).

Table 9: Comparison of OA Projections at Next SG Inspection to Structural Limits

Degradation Mechanism (wear)	Maximum depth (%) Predicted at Next Inspection	Structural limit depth (%)
Fan Bar support	36.4	49.8
Lattice Grid support	28.3	49.8
Existing FO Wear	No Growth (FO removed)	52.0
Remaining FOs	All FOs identified capable of wear were removed	
New FOs	<52.0 for 3-cycles (~5.7 EFPY)	

10. The number and percentage of tubes plugged to date, and the effective plugging percentage in each SG (TS 5.6.9.e).

Table 10 shows the number of tubes plugged as of the CC1R25 outage and the percentage of tubes currently plugged (total and effective). No sleeves have been installed in the CCNPP replacement SGs. No tube plugging was required or performed in either SG during CC1R25.

Table 10: Tube Plugging to Date (Number and Percentage per SG) (TS 5.6.9.e)

	SG11	SG12	Total
Plugged prior to CC1R25	2	1	3
Plugged during CC1R25	0	0	0
Total Plugged through CC1R25	2	1	3
Total/Effective Percent Plugged through CC1R25	0.02%	0.01%	0.02%

11. The results of any SG secondary-side inspection (TS 5.6.9.f). The number, type, and location (if available) of loose parts that could damage tubes removed or left in service in each SG.

Secondary Side Scope:

For each steam generator, a visual inspection (top of tubesheet) was performed after sludge lancing including:

- 100% of the annulus to a minimum of 6 tubes deep
- 100% of the no-tube lane to a minimum of 6 tubes deep
- Blowdown and drain holes
- Shroud supports
- Inspection of tube support structures (1st support only)
- In-bundle inspection of previously identified FOs as directed by Engineering
- In-bundle inspection of ECT-detected PLPs as directed by Engineering
- Assessment of sludge height on both HL and CL

Secondary Side Visual Inspections of Tubesheet and FOSAR

Secondary side tubesheet visual inspections were performed following sludge lancing activities in both SGs. High flow regions of the annulus, no tube lane and periphery (a minimum of 6 tubes deep) were visually inspected for foreign material. Additionally, multiple columns for the full depth of the tube bundle interior (“kidney” region) were evaluated for sludge lancing effectiveness and sludge accumulation.

Water lancing was performed in both SGs followed by secondary side visual inspections of the periphery, no-tube lane, and inner bundle passes. The TTS sludge heights were measured from bobbin ECT results. Small regions of hard sludge accumulation less than 1.5 inches in height were identified in the hot and cold legs kidney region of both SGs.

Foreign object search and retrieval (FOSAR) was performed on a variety of foreign objects identified from visual inspections as well as ECT PLP and FO Wear indications as summarized in Table 11. All metallic or potential metallic objects that could cause wear were removed from SG11 and SG12 during CC1R25.

Table 11: Foreign Object Summary

SG	Row	Col	Location	Ref ID	CC1R25 Disposition	Material	Status
11	133	73	TSC[4]	1159	Object identified to be a legacy object #1116 from CC1R23. Object remains fixed in same position as CC1R23. All affected tubes were NDD[1] with ECT. No further actions required in CC1R25.	Machine Curl	Remains in place
11	124	84	TSH[5]	1161	Object identified with visual inspections and determined to be benign. All affected tubes were NDD with ECT. No further actions required in CC1R25.	Flexible mesh like	Remains in place
11	128	104	TSH	1163	Object was removed and confirmed as flexitallic gasket. All affected tubes were NDD with ECT No further actions required at CC1R25.	Flex Gasket	Removed
11	38	152	TSC	1166	Object was removed and confirmed as flexitallic gasket. All affected tubes were NDD with ECT No further actions required at CC1R25.	Flex Gasket	Removed
12	70	148	TSC	1248	Object was removed and confirmed as flexitallic gasket. All affected tubes were NDD with ECT No further actions required at CC1R25.	Flex Gasket	Removed
12	92	142	TSC	1249	Object identified with visual inspections and determined to be benign. All affected tubes were NDD[1] with ECT. No further actions required in CC1R25.	Flexible mesh like	Remains in place
12	129	59	TSC	1254	Object was removed and confirmed as flexitallic gasket. All affected tubes were NDD with ECT No further actions required at CC1R25.	Flex Gasket	Removed
12	34	88	TSH	1256	Object was removed and confirmed as flexitallic gasket. All affected tubes were NDD with ECT No further actions required at CC1R25.	Flex Gasket	Removed
12	134	82	TSH	1258	Object was removed and confirmed as flexitallic gasket. All affected tubes were NDD with ECT No further actions required at CC1R25.	Flex Gasket	Removed
12	113	113	TSC	1262	Object was removed and confirmed as flexitallic gasket. All affected tubes were NDD with ECT No further actions required at CC1R25.	Flex Gasket	Removed
12	117	45	TSC	1263	Object identified as a PLP[2] with WAR[3] by ECT, visual inspection confirmed an object in the same location and object was removed. All bounding tubes were NDD with ECT	Hard Brittle Material	Removed

1. NDD – No Degradation Detected
2. PLP – Possible Loose Part
3. WAR – Wear Indication
4. TSC – Tubesheet Cold
5. TSH – Tubesheet Hot

12. The scope, method, and results of secondary-side cleaning performed in each SG

Prior to the secondary side FOSAR inspections, sludge, scale, foreign objects, and other deposit accumulations at the top of the tubesheet were removed as part of the top of tubesheet water lancing process. The weight of deposits removed from each SG by this cleaning process is provided in Table 12. CCNPP had operated 2 cycles since the last time sludge lancing was performed during CC1R23. A total of 56 lbs. of sludge was removed from both the SGs along with a variety of foreign objects such as flexitallic gaskets, wire and machining remnants.

Table 12: CC1R25 SG Deposit Removal Weights

SG	Weight
11	31 lbs.
12	28 lbs.
Total	59 lbs.

13. The results of primary side component visual inspections performed in each SG.

Visual Inspection of Installed Tube Plugs and Tube-to-Tubesheet Welds

All previously installed tube plugs (3) were visually inspected in both channel heads for signs of degradation and leakage. The tube-to-tubesheet welds were visually inspected during eddy current. No degradation or anomalies were found.

SG Channel Head Bowl Visual Inspections

Each SG hot and cold leg primary channel head was visually examined for evidence of breaches in the cladding or cracking in the divider-to-channel head weld and for evidence of wastage of the carbon steel channel head. No evidence of cladding breaches, wastage, or corrosion in the channel head was identified. Also, no cracking in the divider-plate-to-channel-head weld was identified.

References

1. CEG letter to NRC, RS-22-086, Application to Revise Technical Specifications to Adopt TSTF-577, “Revised Frequencies for Steam Generator Tube Inspections”, dated August 10, 2022 (ML22222A068)
2. CEG letter to NRC, RS-23-050, Application to Revise Technical Specifications to Adopt TSTF-577, "Revised Frequencies for Steam Generator Tube Inspections" (ML23143A136)
3. NRC letter to CEG, “CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2 – ISSUANCE OF AMENDMENT NOS. 346 AND 324 RE: ADOPTION OF TSTF-577, “REVISED FREQUENCIES FOR STEAM GENERATOR TUBE INSPECTIONS,” REVISION 1 (EPID L-2022-LLA-0115)”, dated August 8, 2023 (ML 23188A040)
4. Steam Generator Management Program: EPRI Steam Generator Integrity Assessment Guidelines, Revision 5, EPRI, Palo Alto, CA, December 2021 (EPRI Doc. No. 3002020909)