Ameren MISSOURI | Callaway Energy Center

Pre-Submittal Meeting for Callaway Plant

June 24, 2020

License Amendment Request
to Defer Steam Generator Eddy Current Testing

Agenda

- Background
- Technical Specifications (TS) Requirement
- Callaway Plant Steam Generator Design Parameters
- Prior Inspection Scope
- Current Planned Inspection Scope
- Current Condition and Review of Applicable Degradation Mechanisms
- Callaway Plant Condition Monitoring
- Callaway Plant Operational Assessment
- Timeline for Submittal
- Questions/Comments

Participants

- Stephanie Banker – Vice-President, Engineering
- Roger Wink – Manager, Regulatory Affairs
- Tom Elwood – Supervising Engineer, Regulatory Affairs / Licensing
- David Brownawell - Engineer, Regulatory Affairs / Licensing
- Carissa Richardson – Engineer, Steam Generator Program
- Joseph Howard – Engineer, Chemistry
- Steve Sample – Operating Supervisor, Operations
- Craig Kelley – Tube Integrity Engineering, Framatome

Background

COVID-19 Risk During Callaway SG Inspections

- Callaway Plant plans to submit a License Amendment Request (LAR) to limit the risk of exposure to site/local supplemental workers resulting from the COVID-19 pandemic for upcoming Callaway Plant refuel outage (RFO 24, fall 2020)
- Personnel from other states would be required to travel to Callaway Plant to support the RFO 24 steam generator inspections
- The nature of the work prevents meeting CDC recommendations for social distancing (e.g., craft support for closure assembly and disassembly, platform construction, robot manipulations)
- Adjacent work inside the containment bioshield includes performing maintenance on all four Reactor Coolant Pumps (RCPs), installing an RCP vibration modification and replacing one RCP seal; as well as installation of permanent shielding around the CVCS regenerative Heat Exchanger.

Technical Specification (TS) Requirement

TS 5.5.9.d.2 states:

> After the first refueling outage following SG installation, inspect each SG at least every 72 effective full power months or at least every third refueling outage (whichever results in more frequent inspections).

Callaway requests approval of a one-time license amendment to defer the required upcoming steam generator inspection from RFO 24, which is scheduled to start in the fall of 2020, to RFO 25, scheduled for the spring of 2022.

Callaway is not requesting changes to any other TS requirements or deviations from NEI/EPRI “Mandatory” or “Needed” requirements or relaxation of any Structural Integrity Performance Criteria.

Callaway SG Design Parameters

Four (4) Replacement Framatome Model 73/19T Steam Generators

Replaced during RFO 14 (2005)

Tube Information:

- Number of Tubes per SG: 5872
- Tube Material: Alloy I-690 TT
- Nominal OD and Thickness: 0.750” x 0.043”

Tube Support Plate (TSP) Information:

- TSP Material: 410-SS
- TSPs: trefoil
- Tubes hydraulically expanded full length of the tubesheet

RFO 21 (2016) Primary Work Scope on A/B/C/D Steam Generators

- 100% of all in-service tubes, full length tube-end to tube-end eddy current testing (ECT)
- As-Found and as-Left visual inspections of Primary Channel Heads (Hot and Cold Legs)
- Primary Bowl inspections in both Hot and Cold Legs
- Visual inspection of all plugs installed in Callaway SGs
- EVT-1 on SG-A primary nozzle inner radius. The area of interest consisted of all accessible surfaces of the nozzle inside radius section.

Prior Inspection Scope

RFO 21 (2016) Secondary Work Scope on A/B/C/D Steam Generators

- Top of Tube Sheet (TTS) Water lancing in all four SGs
- Post-lancing Foreign Object Search and Retrieval (FOSAR) performed in all four SGs
- Visual inspections of steam drums in SG-A and SG-D

Planned Upcoming Inspection Scope

Upcoming inspection scope is the same as the scope for RFO 21 (2016) with the exception that the two secondary side inspections not performed in RFO 21 (SG-B and SG-C) will be performed in lieu of the inspections on SG-A and SG-D.

Current Condition and Review of Applicable Degradation Mechanisms

Callaway Plant Degradation Mechanisms

Type	Mechanism	Detection Strategy
Existing	AVB Wear	• 100% full length Bobbin probe examinations
	TSP Wear	• 100% full length Bobbin probe examinations
Potential	Appui Wear	• 100% full length Bobbin probe examinations
	Foreign Object Wear	• Hot leg array probe examinations of TTS periphery and no-tube lane • 20% Sample array probe examinations of sludge pile region • 100% full length Bobbin probe examinations
Relevant	Pitting at TTS	• 20% Sample array probe examinations of sludge pile region • 100% full length Bobbin probe examinations

Current Condition and Review of Applicable Degradation Mechanisms

Callaway Summary of Degradation Detected During RFO 21 (2016)

Degradation	SG A		SG B		SG C		SG D		Total	
	Tubes	Indications	Tubes	Indications	Tubes	Indications	Tubes	Indications	Tubes	Indications
AVB	72	160	47	97	106	240	22	46	247	543
TSP	41	56	23	29	19	30	9	16	92	131
Total	111(1)	216	70	126	124(2)	270	30(3)	62	335(1) (2) (3)	674

Notes:

1. **SGA Tubes 110-66 and 111-73 have both AVB and TSP wear.**
2. **SGC Tube 110-72 has both AVB and TSP wear.**
3. **SGD Tube 88-72 has both AVB and TSP wear.**
4. **25 tubes were plugged as a result of the Steam Generator tube inspection performed in RFO 21. None of these tubes were in jeopardy of exceeding minimum wall thickness requirements; they were plugged as a preventative measure.**

Current Condition and Review of Applicable Degradation Mechanisms

Callaway Cumulative Tube Plugging Status

Outage	SGA	SGB	SGC	SGD	Total
Pre-Service	1	0	0	0	1
RFO 15 (2007)	0	0	0	0	0
RFO 18 (2011)	10	6	12	1	29
RFO 21 (2016)	9	0	14	2	25
Total Tubes Plugged	20	6	26	3	55
Total Tubes	5872	5872	5872	5872	23488
Total Percentage	0.341%	0.102%	0.443%	0.051%	0.230%
Limit (%)	10.0%	10.0%	10.0%	10.0%	10.0%

Callaway Plant Condition Monitoring

- Since the SGs were replaced in RFO 14 (2005) there has been no measured primary-to-secondary leakage.
- There have been no thermal, hydraulic, or chemistry excursions at Callaway that could have impacted SG tube integrity since RFO 21 (2016).
- The most recent secondary side visual examinations at Callaway identified no objects in the SGs and only a small number of foreign objects in the lancing strainers, none of which pose a threat to tube integrity.

Callaway Plant Operational Assessment

- An updated Operational Assessment (OA) has been completed. This OA reviewed all existing degradation mechanisms and evaluated detected, undetected, and potentially newly initiated flaws. Potential and relevant degradation mechanisms were also reviewed. The operational assessment supports deferral of Callaway SG inspections until the next refueling outage (RFO 25, in 2022).
- This OA determined that the Technical Specification performance criteria are expected to be satisfied throughout the additional cycle to RFO 25.
- This is based in part on recent Operating Experience, which supports a longer inspection period for plants with SG tubes made of Thermally Treated Alloy 690, as well as prior inspection condition monitoring results.

Timeline for Submittal

- License Amendment Request to be submitted as soon as practicable after pre-submittal meeting.
- Approval of License Amendment and issuance of Safety Evaluation is requested as soon as practicable to allow for finalizing the RFO 24 outage scope and make necessary schedule adjustments, which will depend heavily on this amendment request.
- Scheduled start date for Callaway RFO 24 is October 5, 2020.


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