

Secondary Side Condition Monitoring and Operational Assessment (SS-CMOA)

Background

Westinghouse's Secondary Side Condition Monitoring and Operational Assessment (SS-CMOA) is a tool which satisfies the requirement for a secondary side integrity assessment as specified in Revision 5 of the Electric Power Research Institute Steam Generator Integrity Assessment Guidelines (EPRI SG IAGL). Per the EPRI SG IAGL, a utility's SG program shall include measures to assess the SG secondary side integrity involving the review of chemistry trends, operational parameters, and inspection data. Various secondary side inputs as specified in Section 10 of the EPRI SG IAGL are evaluated in the SS-CMOA over the life of the SGs, including, but not limited to:

- SG design and materials of construction
- SG chemistry and deposit history
- Thermal performance
- SG maintenance parameters

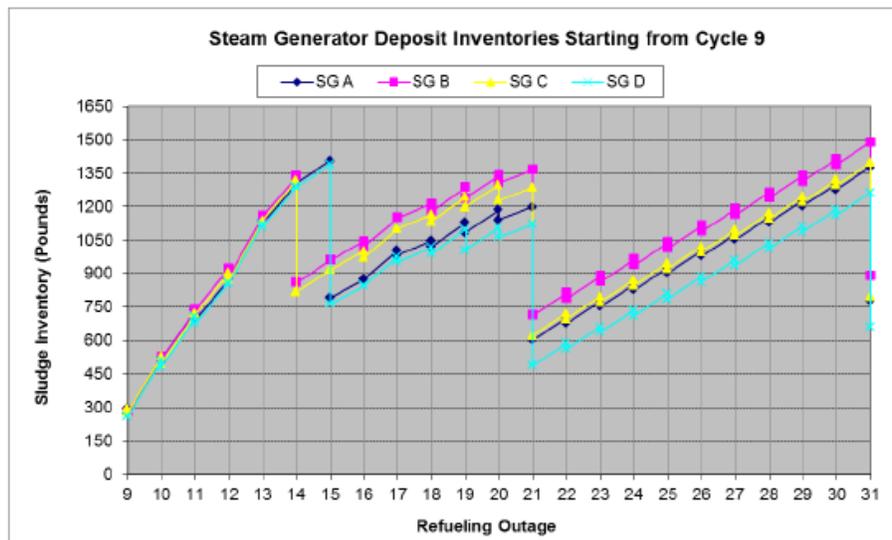
Additionally, this tool assists in developing long-term strategies that align SG operation and performance with utility-specific goals. The SS-CMOA is particularly useful for plants implementing TSTF-577 eddy current testing frequency extensions to support assessment of corresponding extensions in secondary side inspection frequencies.

Description

The SS-CMOA provides technical justification for SG services in accordance with a utility's SG asset management program. The SS-CMOA is performed following completion of SG maintenance activities in a refueling outage.

The SS-CMOA performs the following functions:

- Evaluates and provides measures to maintain secondary side component integrity
- Provides a comprehensive history of secondary side chemistry and SG performance
- Optimizes maintenance and inspection services, including elimination of unnecessary scope
- Evaluates multiple maintenance and operating scenarios for optimized long-term planning
- Highlights strengths in secondary side programs and identifies areas for improvement
- Evaluates abnormal operating conditions and changes in secondary side operations and maintenance scope



SG Deposit Inventory Projection, with Preventive SG Cleaning Strategy

Benefits

The SS-CMOA can provide the following benefits to utilities:

- Satisfies industry requirements for a secondary side integrity assessment
- Supports extended TSTF-577 inspection intervals and technically justifies, where appropriate, reduction in SG inspection and maintenance scope
- Provides technical data for utility personnel to share with management which supports operational and maintenance decisions
- Provides recommended timing for future SG chemical cleanings, aligned with EPRI recommendations
- Evaluates impacts of secondary side water chemistry, SG maintenance, and other operational changes
- Acts as a supporting document during Institute of Nuclear Power Operations (INPO) audits and internal self-assessments
- Serves as a training tool for new utility personnel

Deliverables

The SS-CMOA is provided as a report to the utility which contains:

1. An evaluation of the secondary side operating parameters through the current cycle
2. Performance expectations through subsequent cycles
3. Ten cycles of SG maintenance recommendations (see example table below)

Experience

Various plants utilize the SS-CMOA to comply with EPRI SG IAGL requirements in support of long-term SG operations. At Plant Vogtle, the SS-CMOA has been deemed as a best practice by INPO. Wolf Creek utilizes the SS-CMOA to successfully plan preventive soft chemical cleanings and has reduced inspection scopes and/or extended frequencies at the top of tubesheet, steam drum, and upper tube bundle.

Ten-Cycle SG Outage Recommendations

Service	2R20	2R21	2R22	2R23	2R24	2R25	2R26	2R27	2R28	2R29	2R30
	Spring 2019	Fall 2020	Spring 2022	Fall 2023	Spring 2025	Fall 2026	Spring 2028	Fall 2029	Spring 2031	Fall 2032	Spring 2034
Secondary Inspections											
Upper Internals											
Steam Drum Inspection		1, 2, 3, 4						1, 2, 3, 4**			
Tube Bundle											
Top of tubesheet (TTS) In-Bundle Inspection	1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4
7 th Tube Support Plate (TSP7) Inspection					2				2		
TTS FOSAR	1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4
Maintenance Cleaning											
Sludge Lancing with Post-Cleanliness Inspections	1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4
Full-Bundle Advanced Scale Conditioning Agent (ASCA) Soft Chemical Cleaning*											
TTS ASCA							TBD				
Other Services											
Scale Profiling			4				4				4
Additional Rotating Pancake Coil (+Point™) Data Collection to Assess Quatrefoil Blockage			As Planned				TBD				TBD
Sludge Analysis	1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4
Steam Drum Inspection Report		1, 2, 3, 4						1,2,3,4**			
SS-CMOA Update***	1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		1, 2, 3, 4		

*A full-bundle ASCA is tentatively planned for 2R33.

**The steam drum inspection frequency of inspecting all four SGs every six cycles would be confirmed or modified in the 2R20 Steam Drum Inspection Report.

***A 'skip' SS-CMOA may also be performed to assess operating conditions in outages when secondary services are skipped.