Engineered Systems & Solutions

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

Background

Designed as a diagnostic planning tool, Westinghouse's Secondary Side Condition Monitoring and Operational Assessment (SS-CMOA) is a living document that evaluates the secondary side of the steam generator (SG) and interfacing systems. Various secondary side inputs are evaluated in the SS-CMOA over the life of the SG, including, but not limited to:

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

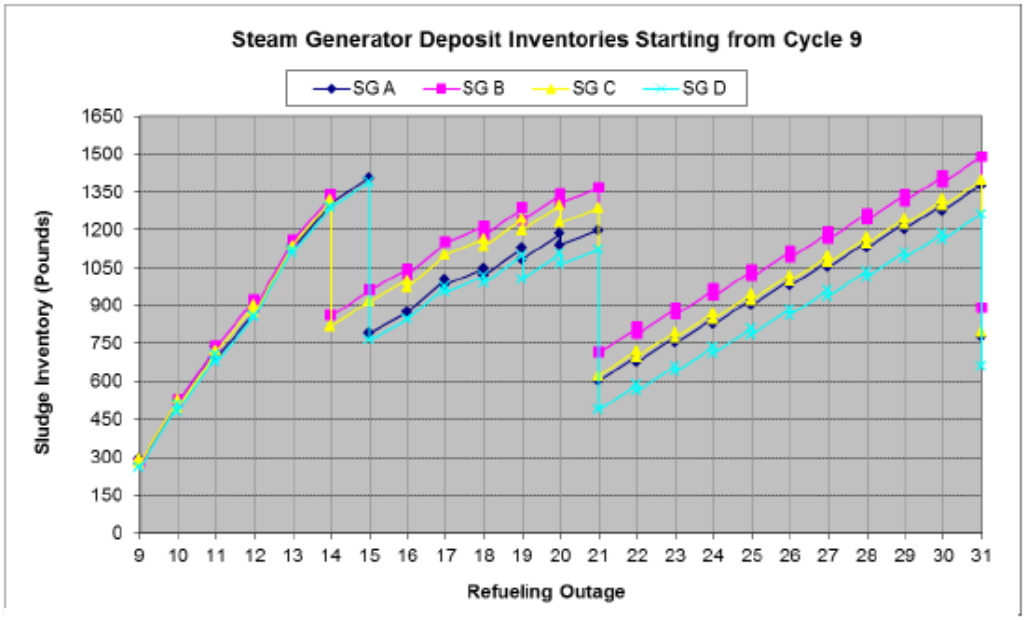
This tool assists in developing long-term strategies that align SG operation and performance with utility-specific goals.

Description

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

The SS-CMOA performs the following functions:

- Supports decisions made by the SG management team
- Optimizes services and identifies unnecessary scope
- Evaluates multiple maintenance and operating scenarios for optimized long-term planning
- Highlights strengths in secondary side programs and identifies areas for improvement
- Satisfies Chapter 10 of the Electric Power Research Institute (EPRI) Steam Generator Integrity Assessment Guidelines, which specifies the requirement to include measures to maintain the SG secondary side integrity in a utility's SG Program
- Provides diagnostic feedback for evaluating abnormal operating conditions and changes in maintenance scope
- Provides a comprehensive history of secondary side chemistry and SG performance



SG Deposit Inventory Projection, Considering the Long-term SG Cleaning Strategy

Westinghouse

Benefits

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

- Supports cost savings initiatives by technically justifying, where appropriate, reduction or elimination of SG inspections, advanced SG cleaning, and other SG maintenance services
- Provides technical data for utility personnel to share with management to support operational and maintenance decisions
- Serves as a convenient reference in Degradation Assessments as well as tube integrity Condition Monitoring and Operational Assessments
- 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

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

Over a dozen plants have utilized the SS-CMOA to support their long-term SG operations. Several customers perform the SS-CMOA every time SG outage maintenance scope is completed.

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
7th 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.*

utility which contains:

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