Steam Generator Task Force/NRC Meeting

March 3, 2022

Agenda

1:00	Introductions	All Participants
1:10	Opening Remarks	NRC and Industry
1:15	Standard Agenda Items	Industry
	Summary of Recently Published EPRI Reports	
	Status of Industry Guidelines	
	Interim Guidance	
	NEI 03-08 Deviations	
	Recent Operating Experience	
	Industry Response to International OE	
	Alloy 600TT Experience	

Agenda

2:00	Technical Project Update	
	Foreign Object Wear Sizing	Industry
2:30	Industry Adoption of TSTF-577	
	Interpretations Requested by Industry	NRC
3:20	NUREG 2191	
	Industry Comments on Draft	Industry
3:30	Address Public Questions/Comments	
	NRC	

Summary of Recently Published EPRI Reports

EPRI

Phase II Divider Plate Cracking Engineering Study, 1020988, Revised February 2022

- Originally published in 2010
- This report addresses the impact of a degraded divider plate to stub runner weld on plant accident analyses, American Society of Mechanical Engineers (ASME) stress report fatigue limits, alternate repair criteria, and installed plugs and sleeves.
- The report didn’t address welded plugs
- Work was included in the new revision to address welded plugs
- A review of Westinghouse and BWXT welded plugs determined that there is no impact to the plug qualification.
- In an unlikely situation that a steam generator divider plate is completely detached from the tubesheet, it was found that the Framatome’s tapered welded plugs and their welds are good for at least one additional operating cycle after the divider plate weld is failed. Current visual inspections of the channel head are adequate.

Review Meeting Proceedings for PWR Primary Water Chemistry Guidelines – 3002020963, January 2022

- The Guidelines were published in 2014
  - Formally reviewed in 2017 and 2019 with the decision not to revise the document
  - This document records the meeting proceedings from the July 2021 meeting where the decision was made not to revise the document and review again in 2023

Steam Generator Integrity Assessment Guidelines Revision 5, 3002020909, December 2021

- This revision was completed under EPRI's Augmented Quality Program
- January 2023 implementation date
- NRC was sent a copy along with an affidavit on February 24th

Technical Bases for the Integrity Assessment Guidelines, 3002021140, December 2021

- The Integrity Assessment Guidelines, Revision 4, Appendix C was taken out of Revision 5 and expanded for this technical bases document
- More discussion on the default growth rates for SCC
- Discussion on the structural minimum method
- Technical bases for stress corrosion cracking leak rate equations
- Some of the NRC questions on Revision 4 were addressed in this document
- NRC was sent a copy along with an affidavit on February 24th

Automated Analysis Performance Demonstration Database Qualification Program Protocol, 3002020897, December 2021

- Included in the report are a list of specific responsibilities for both the EPRI, as the test administrator, and the testing organization.
- Requirements for control of training and testing materials are defined.
- The protocol identifies how, when, and where training and testing activities are to be performed.
- Retest and requalification requirements are also defined.

Plus Point to X-Probe Amplitude Transfer Function, 3002022466, December 2021

- ETSSs for bobbin coil and plus point detection of stress corrosion cracking are mainly supported by pulled tube data.
- Array probe technology is becoming more popular and there is a need to create/update detection indices
- This document describes a new methodology for expansion of the X-Probe qualification data base without the need for additional pulled tube or laboratory grown stress corrosion cracking by transforming the +Point pulled tube signal amplitudes to estimate equivalent X-Probe signal amplitudes.
- X-Probe signal amplitudes for these flaws can then be included in the qualification bases/A-hat functions. This process strengthens the confidence of the X-Probe POD curve simulations.
- Results of computer-based POD curve simulations for the X-Probe for various SG SCC degradation mechanisms are included.
- Benchmarking against plant data shows excellent performance.

Steam Generator Top-of-Tubesheet Denting: Experience Update, 3002020905, December 2021

- In 2014, EPRI provided a summary of PWR experience with top-of-tubesheet denting
  - Comprehensive documentation on the history, causes, prospects, and prevention of the top-of-tubesheet denting phenomenon.
- Since 2014, additional experience has accumulated at the units that were the subject of the 2014 study. Additionally, there have been experiences of denting at other units that were not included in the prior study.
- Of particular importance is the observation that mitigation activities at some units (sludge pile removal) have essentially halted the progression of denting and that some Alloy 690TT tubes with significant dents have continued to operate without experiencing any stress corrosion cracking.

Eddy Current Examination Technique Extension Justification Requirements, 3002020899, December 2021

- It might be necessary to extend eddy current techniques qualified for a particular application to applications for which they have not been formally qualified. A validation of the extended techniques must be performed and documented. A generic approach endorsed by the industry for technique extension applications is needed.
- This report provides a summary of survey results on how many plants are extending EPRI techniques, the specific applications for these extensions, and which EPRI examination technique specification sheets are being used for plants' steam generator eddy current inspections.
- The objective of this project was to use the survey information to develop a simplified, cost-effective, and, where possible, generic industry-endorsed process to streamline technique extensions.
- The Examination Guidelines, Revision 9 Committee will review this work for new recommendation or requirements

Evaluation of Leak Rate Estimation Methodology with Partial Through-Wall Depth Circumferential Cracking, 3002020900, November 2021

- For circumferential SCC assessments with part through-wall or 100% through-wall depth, the leakage model assumes the full detected length of the crack progresses to 100% through-wall if tearing occurs at Steam Line Break (SLB) conditions.
- This testing project may be used to justify validity of the current approach and provide technical bases in developing an alternative approach.
- Preliminary results indicate the current leakage model is conservative.

Projects and Reports Co-Funded by SGMP and EPRI's Chemistry Program

- PWR Secondary Side Dispersant Application Effects on Flow Accelerated Corrosion: Evaluation of FAC Inspection Data, 3002020918, November 2021
- Evaluating the Impacts of Film-Forming Products on OnLine Cycle Chemistry Instrumentation: Results for Five Film-Forming Products, 3002022349, October 2021
- Hydrazine Alternatives for PWR/PHWR Secondary System: Diethylhydroxylamine for Operational Use, 3002020981, October 2021

Steam Generator Eddy Current Simulation Model, Version 5.0, 3002020898, September 2021

- A computational finite element model for simulating eddy current signal responses from steam generator tube inspections.
  - The software can generate simulated eddy current data representing ID and OD SG degradation of various dimensions for axial and circ notches of constant width, circular and elliptical volumetric flaws, and tight cracks with varying depth profiles.
  - A user-friendly interface allows the user to input desired test parameters (e.g., flaw dimensions, tube dimensions, tube material, probe type, test frequencies, etc.) and then run the model to produce the corresponding eddy current signals.
  - The eddy current signals, representing common SG probe types (i.e., bobbin, rotating and array coils) can be created.
  - The simulated signals that are generated can be used to assist in signal interpretation, determination of probe performance, and for training and testing of data analysts and data analysis systems.

Status of Industry Guidelines

Guideline Title	Current Rev #	Report #	Last Pub Date	Implementation Date(s)	Interim Guidance	Review Date	Comment
SG Integrity Assessment Guidelines	5	3002020909	Dec 2021	1/20/23	None	2025	
EPRI SG In Situ Pressure Test Guidelines	5	3002007856	Nov 2016	8/31/17	None		Data from recent testing is being gathered and reviewed
PWR SG Examination Guidelines	8	3002007572	June 2016	8/31/17	Published 2019 and 2021		Revision in progress
PWR SG Primary-to-Secondary Leakage Guidelines	5	3002018267	Dec 2020	12/22/2021	None	2024	

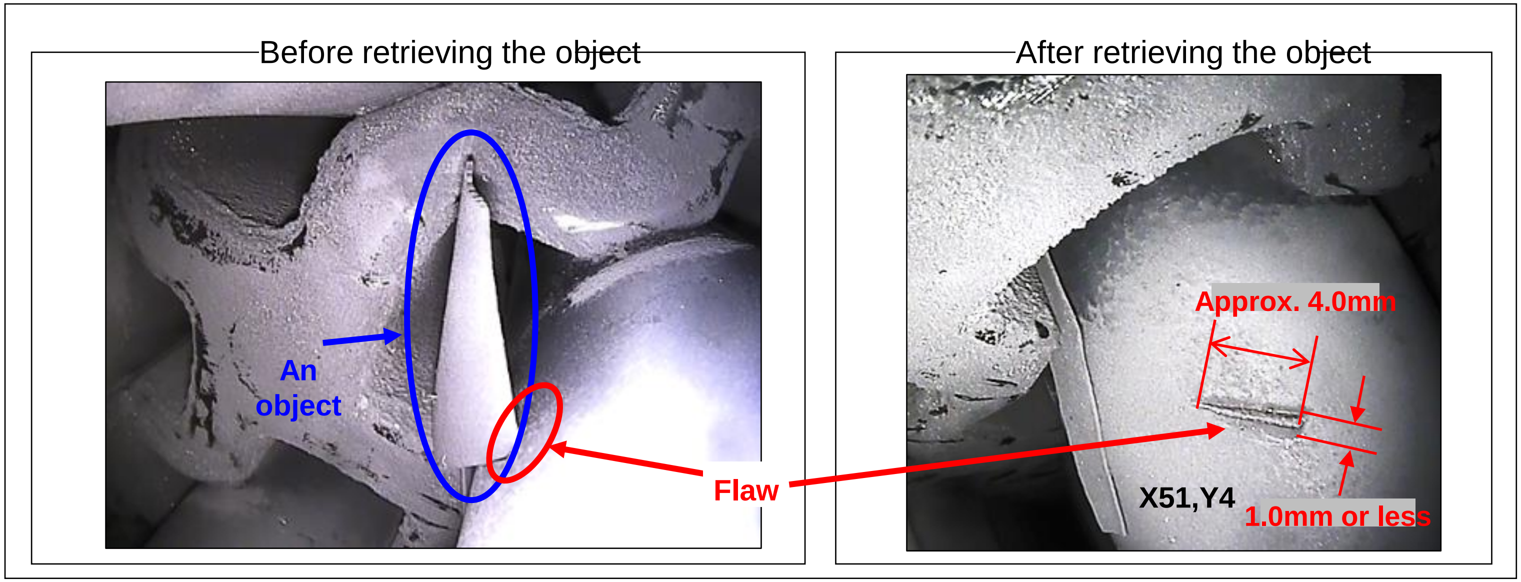
Guideline Title	Current Rev #	Report #	Last Pub Date	Implementation Date(s)	Interim Guidance	Review Date	Comments
Primary Water Chemistry Guidelines	7	3002000505	April 2014	1/28/2015		2023	Decided not to start a revision in 2021
Secondary Water Chemistry Guidelines	8	3002010645	Sept 2017	6/27/2018	Published 2019, 2020	2023	Decided not to start a revision in 2021

There are no deviations to the NEI 03-08 requirements in these guidelines
No interim guidance issued since the last meeting

Recent Operating Experience

International SG Operating Experience

- One international PWR identified hard, dense scale that had spalled off the SG tubes at one unit and assumed by the utility to be the result of tube wear on 4 tubes in 2 SGs
- The utility provided EPRI with information on their OE
- EPRI communicated the details of the OE with SGMP member utilities and with the NRC at the 10/7/2021 SGTF meeting
- The SGMP has begun work to improve our knowledge of the wear mechanism and its relevance to the industry



SGMP Plans to Address SG Secondary Side Tube Deposit Wear

1. **Characterization of SG Tube Scale from Various Plants**
   - Analyze tube scale removed from multiple SGs
   - Determine extent of tube scale that could result in tube wear
   - Determine effectiveness of chemical cleaning to increase scale porosity
2. **Assessment of OD Tube Deposits using Eddy Current Techniques**
   - Determine ECT technique capabilities using standard probe designs
   - Develop procedures for measuring tube deposit attributes
   - Evaluate ECT ability to assess flake-like objects, w/ and w/o wear present

Characterization of SG Tube Scale from Various Plants

Project Objective

- Obtain information on industry tube scale that can be used to allow PWR utilities to gain a better understanding of the deposit flaking mechanism that could lead to tube wear

- Identify possible actions to reduce the potential for tube scale leading to tube wear

Characterization of SG Tube Scale from Various Plants

Project Tasks

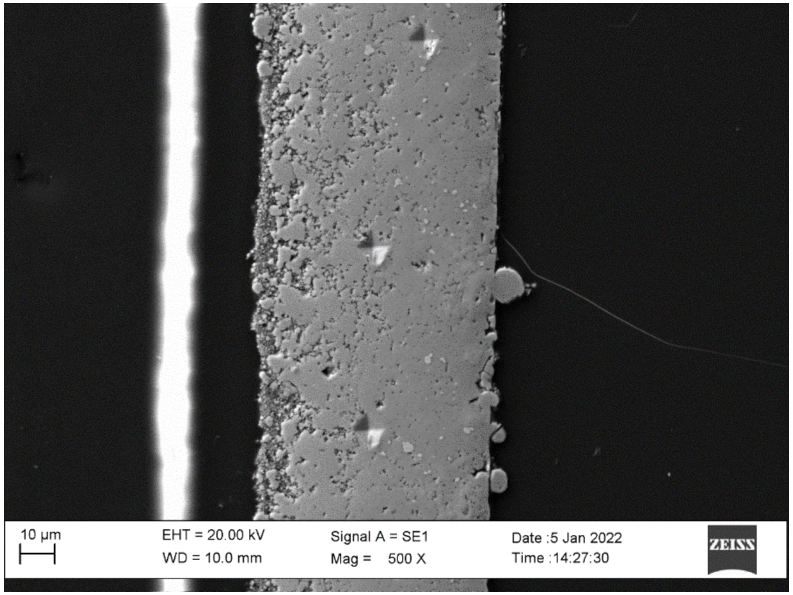
1. Determine the properties of archived SG tube scale samples retrieved over the past decades from several plants
   - Analysis: Hardness, Porosity, Composition, Thickness
   - Samples: 20 units, 2 flakes per unit, 10 measurements per flake (400 measurements total)

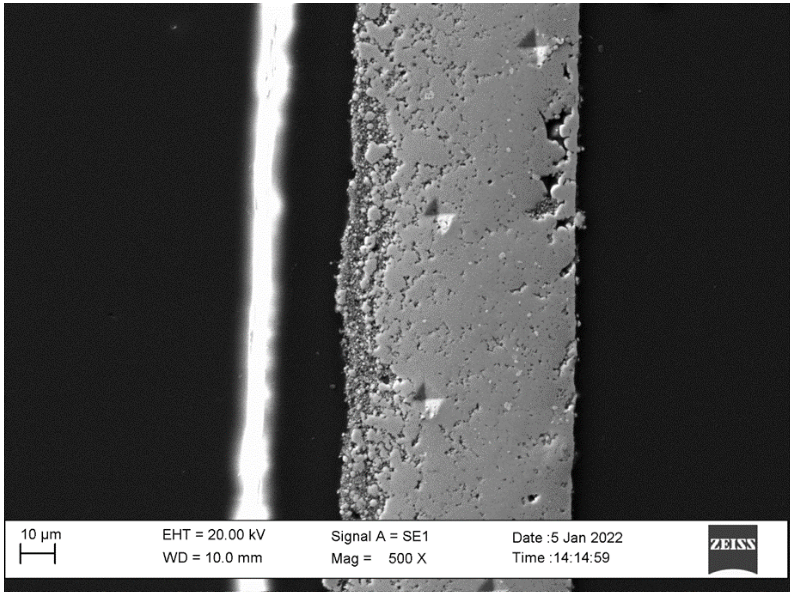
2. Assessment: Correlations among hardness, composition, and porosity

3. Review plant SG chemistry history
   - If possible, include scale samples available before and after a plant performed a SG chemical cleaning

SG Tube Scale Deposit Characterization

- To date, deposit data from 10 of the 20 units has been collected
- Following data collection, data assessment will be performed



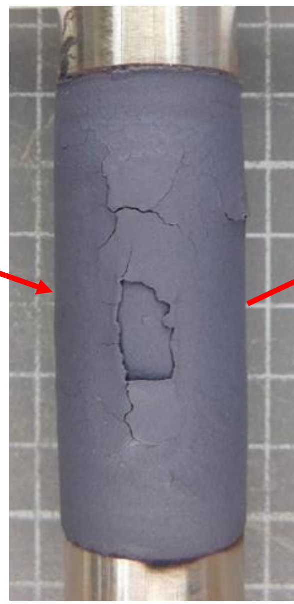


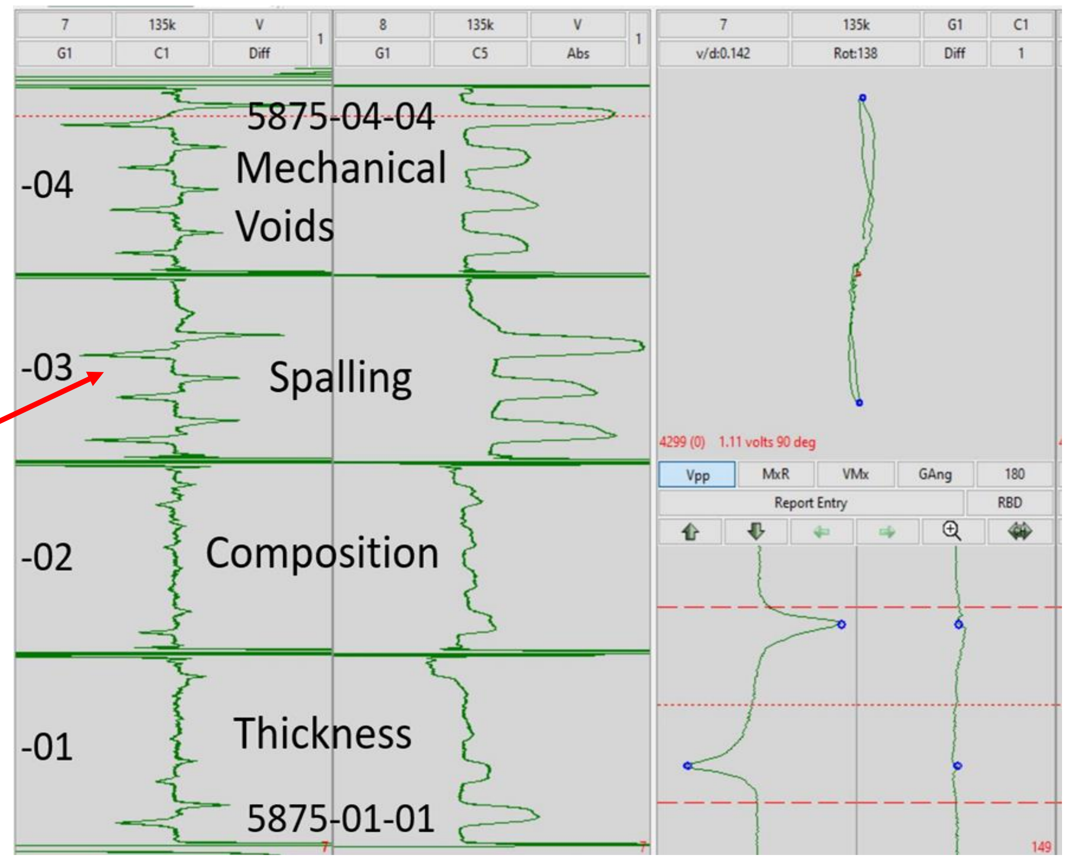
Development of SG Secondary Side Tube Deposit Samples for NDE Evaluation

Project Objective

- Develop a set of tube samples with synthetic OD tube deposits that represent the types of deposits that have been observed in the field.
- Use deposit samples to evaluate and improve the ability of NDE to accurately assess 1) secondary side deposits and 2) flaws in the presence of tube deposits
  - Variables: Deposit composition, thickness, spalling/flaking, voids
  - ECT flaw detection vs. deposit characteristics (using signal injection)
- Provide data to assist in decisions on optimum timing for secondary side cleaning processes

Development of SG Secondary Side Tube Deposit Samples for NDE Evaluation

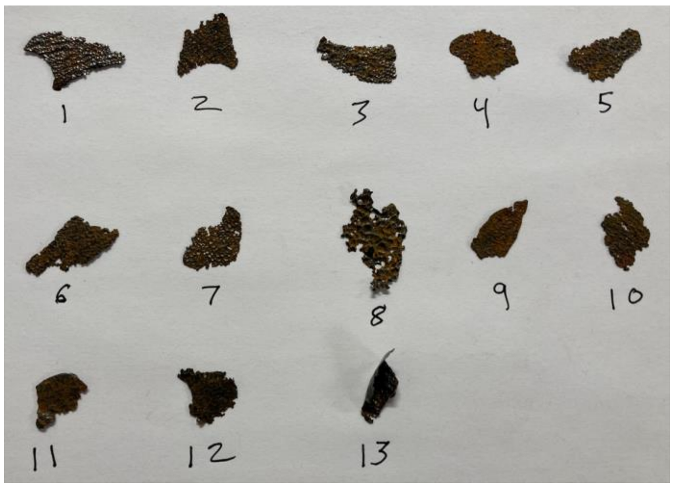




EPRI

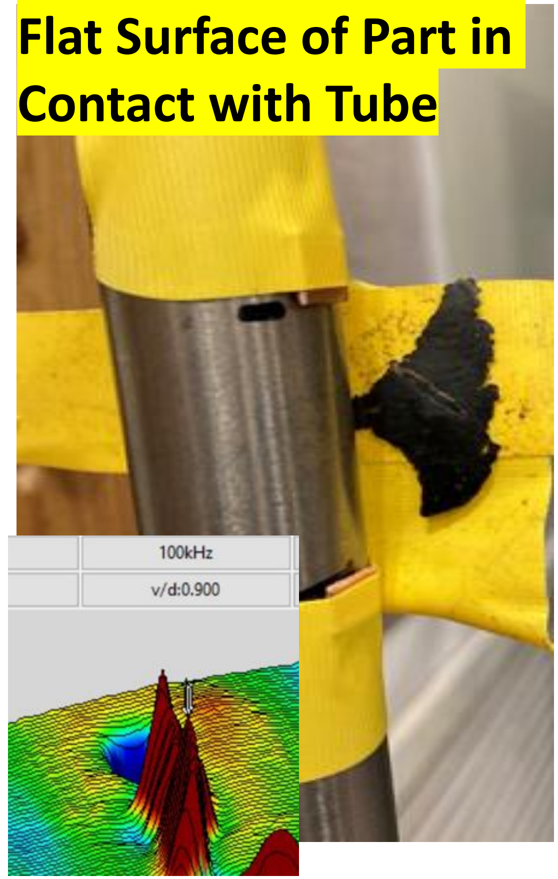
Evaluate ECT ability to assess flake-like objects without wear present

Objects removed from a SG in 2021

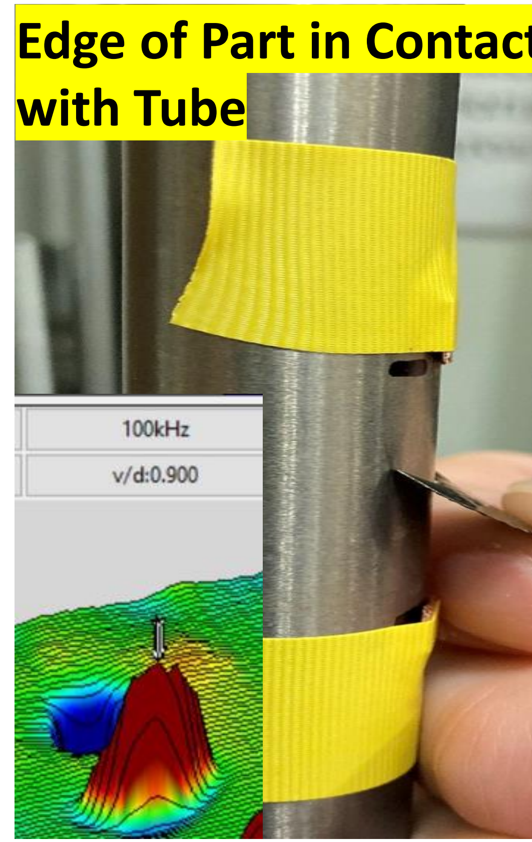


Thickness:
0.010” (0.25mm)

Flat Surface of Part in Contact with Tube



Edge of Part in Contact with Tube



Development of SG Secondary Side Tube Deposit Samples for NDE Evaluation

- **Expected Benefits**
  - A set of tube samples containing well characterized OD tube deposits, that can be used to develop guidance for eddy current data analysis.
  - Provide data to develop a basis for differentiating between tube deposits, sludge rocks and foreign objects.

- **Planned Deliverables**

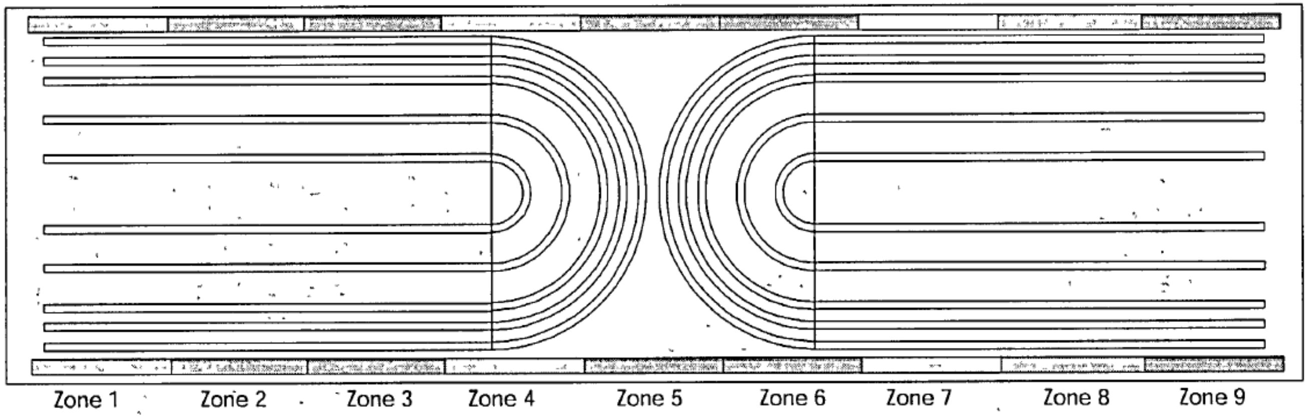
1. **Tube standards** with OD deposits of known dimensions, material composition, mechanical properties and electrical properties
2. **Sludge rocks** with known dimensions, material composition, mechanical properties and electrical properties
3. **Eddy current data** files from tube standards and sludge rocks

Summary

- One international PWR identified hard, dense scale that apparently resulted in tube wear
- The SGMP has begun work to improve our knowledge of the wear mechanism and its relevance to the industry
  - One project is expected to obtain information on industry tube scale that can be used to gain a better understanding of the deposit flaking mechanism that could lead to tube wear
  - Another project is intended to develop a set of tube samples with synthetic OD tube deposits to evaluate and improve the ability of NDE to accurately assess 1) secondary side deposits and 2) flaws in the presence of tube deposits

US Operating Experience

- During Fall 2021 SG inspections, axial SCC was reported on a Row 1 tube in the U-bend at two plants with Alloy 600TT tubing
- The low row tube U-bend and some length (about 40 to 60 inches) of vertical straight section are stress relieved after bending so what drives the crack?



Zones 1 through 9 are heating zones in the furnace. Only zones 4, 5 and 6 were activated for stress relief of the u-bends.

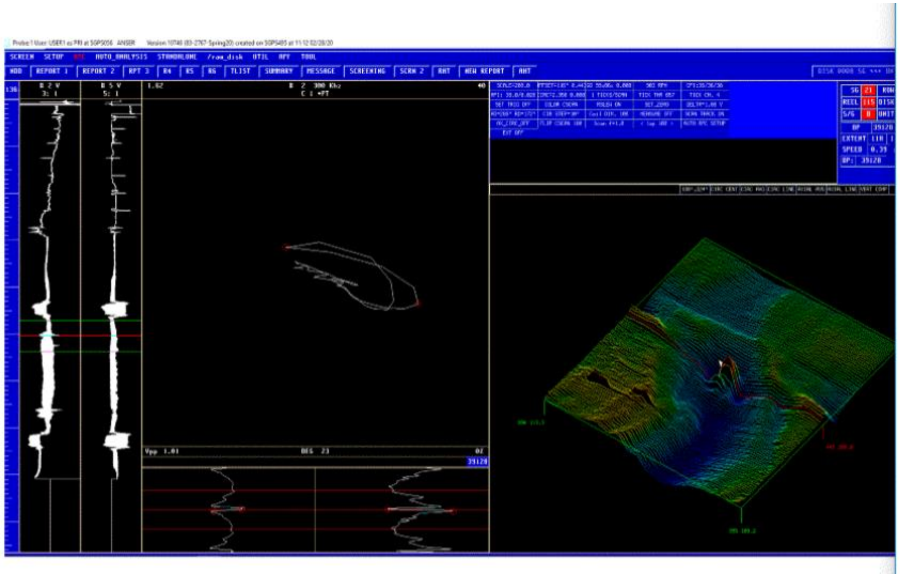
Note: Figure not to scale

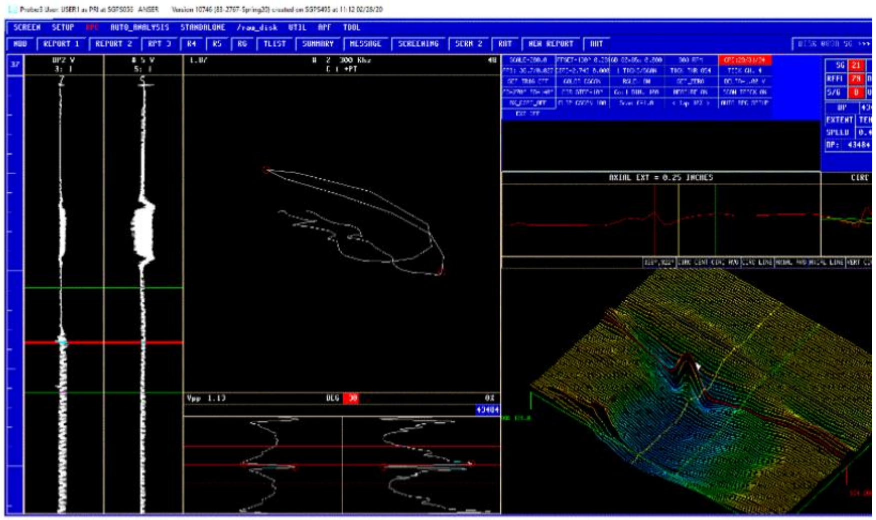
A600TT Tube U-bend SCC: Model D5

- SGB, R1 C25, originally reported in the field as axial PWSCC, slightly above the cold leg bend tangent
- SGMP reviewed the 2021 and prior +Pt graphics and judged that the degradation is axial ODSCC at a ding
- No bobbin data acquired to confirm the ding; ding equivalent bobbin amplitude estimated at about 6 volts based on +Pt residual voltage
- Precursor signals are present in the 2017 and 2014 data; 2012 NDD
  - Very low growth rate is apparent
- Significant noise phase rotation in U-bend complicates the analysis
- A Data Union study was performed which produced very similar results to the 2017 and 2021 plant +Pt data
- The estimated maximum depth in 2021 is 60 to 65%TW from the Data Union study
- This experience is consistent with expectations; very limited additional growth once the driving stress is consumed

Data Union Comparison

- 2012 NDD data was used as host data
- Injected flaw parameters: phase angle consistent with 60%TW ODSCC, amplitude consistent with pulled tube ODSCC data
- Data Union combination on left, Plant data on right



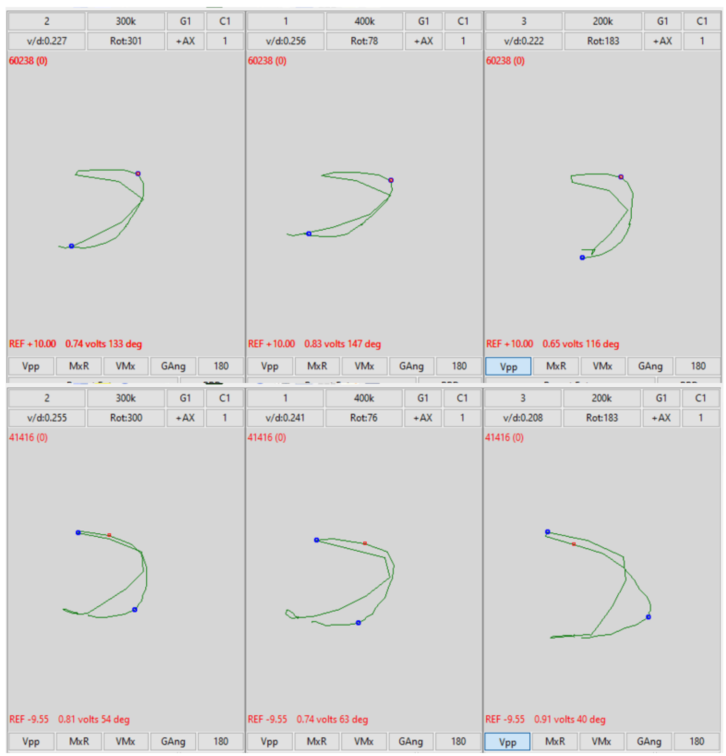


A600TT Tube U-bend SCC: 44F

- SGA, R1 C13, originally reported as axial ODSCC at a ding slightly above cold leg bend tangent; SGMP reviewed the data and concurs with field evaluation
- Precursor signals present in the 2017 and 2010 data; 2004 NDD
- The indication more closely resembles classic axial ODSCC in freespan ding signals; the ding residual (volts) is smaller than the Model D5 thus, less ODSCC phase angle suppression (more rotation)
- No bobbin data acquired to confirm the ding; ding equivalent bobbin amplitude estimated at about 4 volts based on +Pt residual voltage

A600TT Tube U-bend SCC: 44F

- SGMP did not perform a Data Union study for this flaw
- Array probe inspection confirms the indication
- As with the Model D5 experience, a very low growth rate is apparent



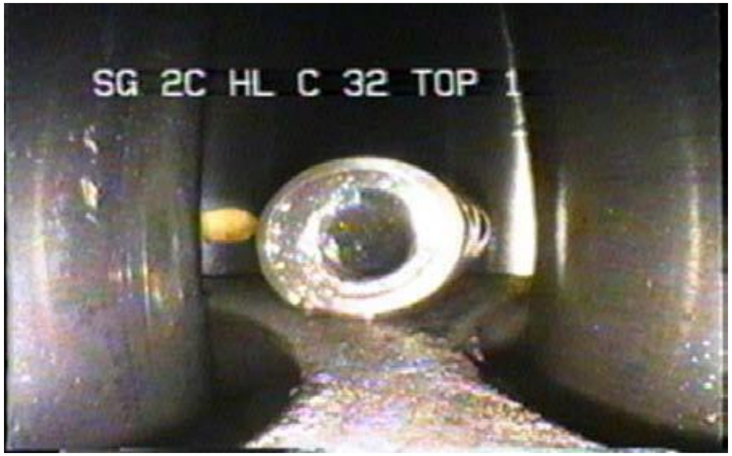
2017 (top) vs 2021
+Pt Signal Response

Conclusions

- These are examples of ODSCC in dings and not representative of U-Bend corrosion
- Both are very short length (<0.25 inch) and shorter than the ding
- One possible cause of the dings is over-insertion during assembly
- Since the ding is introduced after the U-bend stress relief, residual stresses sufficient for ODSCC initiation can be present
- Apparent growth rate is very low and consistent with ding-ODSCC experience

Technical Project Update
Foreign Object Wear Sizing

Secondary Side Depth Sizing



- **Objective**
  - Develop a system capable of determining the depth size of wear scars from the secondary side of a S/G
- **Background**
  - Foreign objects entering the secondary side of the S/G during operation can cause tube OD surface wear damage
  - Design improvements of replacement SGs, including tube materials with improved corrosion resistance, have led to a reduction in the frequency of eddy current inspections

Newly Adopted TSTF-577

- TSTF-577 allows utilities to increase the maximum time between SG tube eddy current inspections
  - Depending on tubing material, the time between inspections can now be as long as 96 EFPM

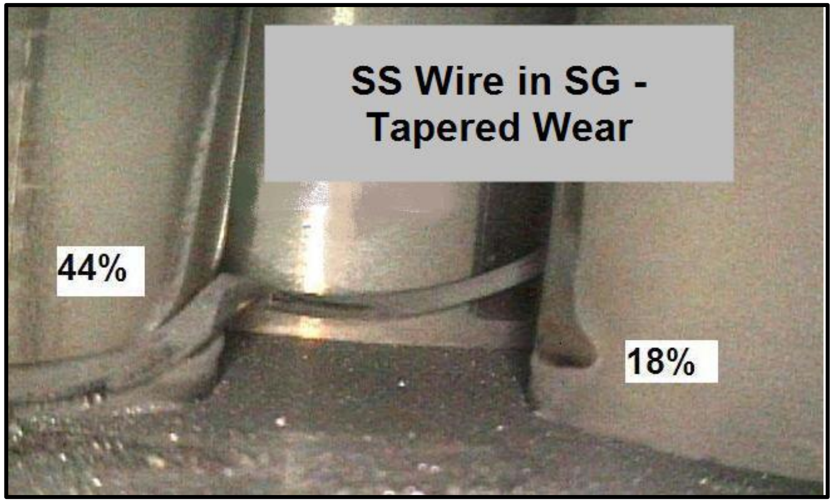
Secondary Side Depth Sizing – Avoid Primary Side Entry

- During outages when SG ECT inspections are not scheduled, SG secondary side visual inspections may be performed to identify and remove foreign objects
  - If tube wear is identified, it becomes essential to determine whether the tube requires repair or if it can be left in service
  - Currently this determination is only possible by opening the primary side and performing ECT to quantify dimensions of the wear flaw (length, width and depth)
- A tool to measure wear from the secondary side of the tube eliminates the need for primary side entry

EPRI

Secondary Side Depth Sizing – Technique Development

- To date, no such NDE technique has been fully developed to perform a secondary side inspection or characterize wear scars
  - Secondary side S/G tube inspection requirements will need to be investigated and established in the EPRI PWR S/G Exam Guidelines

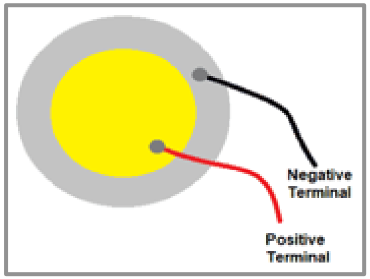


SGMP Research Activities to Develop a Method to Measure Tube Wear Depth

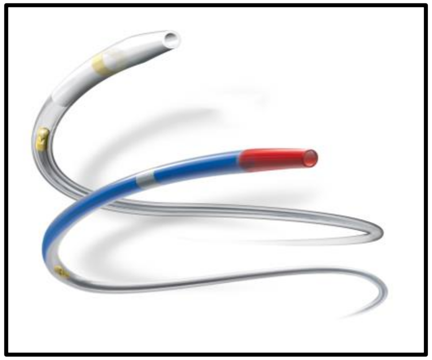
1. Investigate Non-Destructive Testing options for measuring tube wear from the SG secondary side and to determine the feasibility of the testing methods
2. Perform a feasibility study using FOSAR photos and videos to calculate SG tube wear sizing
3. Investigate the capabilities of Eddy Current Array Probe technology from secondary side for depth sizing wear scars in SG tubing

Investigation of potential methods for measuring tube wear from the SG secondary side

Other Technologies Researched



- Various methods of characterizing wear scars from the steam generator's secondary side were studied to determine the best technique for further development:
  - Ultrasonic guided waves
  - Polymer molding
  - Optical micrometer
  - Lasers
  - Piezoelectric Sensors
  - Acoustic Emission Testing
  - Pulsed Magnetic Field Leakage



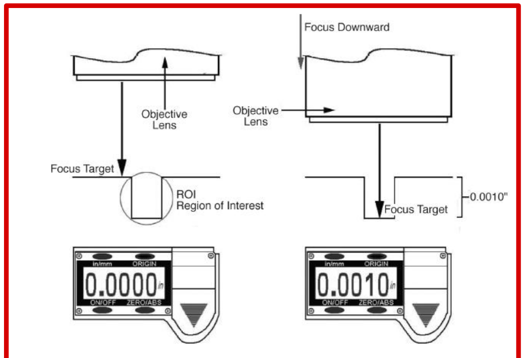
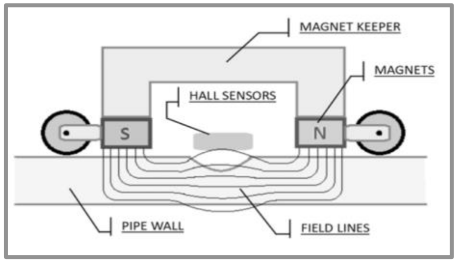
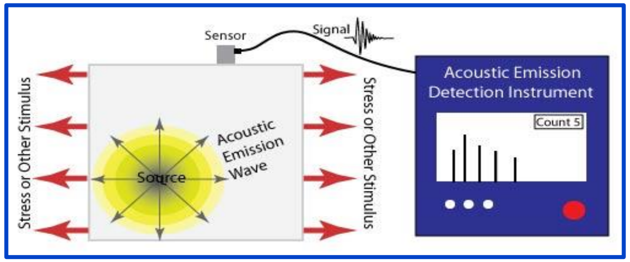


Figure 3-1
Detailed Diagram of How the Optical Micrometer Works





Decision Matrix for Identifying Most Promising NDE Techniques for Measuring Sec Side Tube Wear Depths

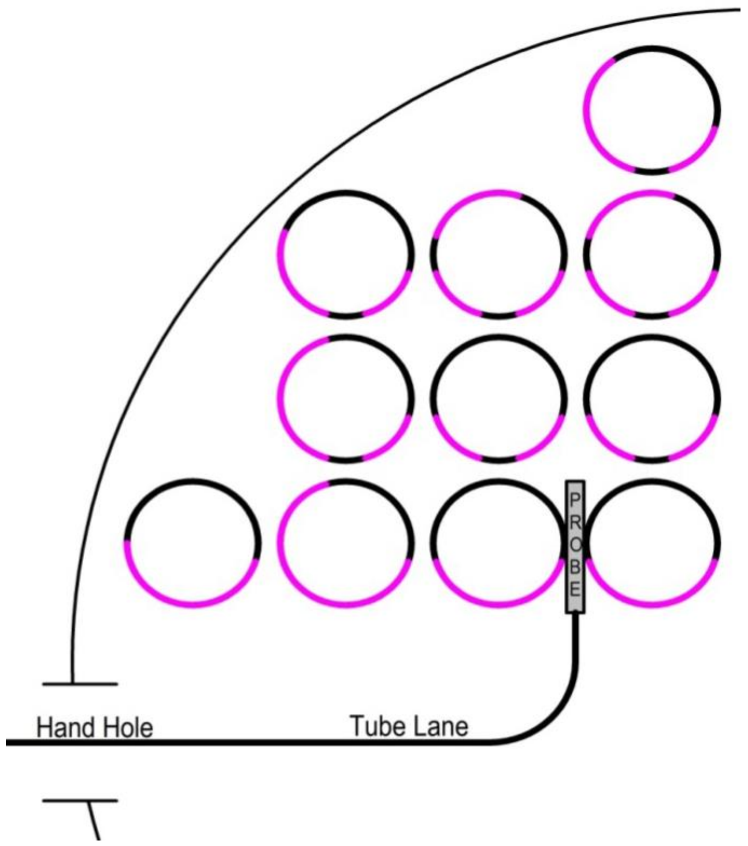
	Weight	Eddy Current Array		Camera & Imaging		Piezoelectric Sensors		Ultrasonic		Acoustic Emission		P-MFL	
Cost	5.00%	10	0.5	4	0.2	10	0.5	6	0.3	5	0.25	7	0.35
Possibility to fit inside SG	55.00%	9	4.95	3	1.65	9	4.95	5	2.75	7	3.85	2	1.1
Accuracy	5.00%	7	0.35	6	0.3	1	0.05	7	0.35	2	0.1	5	0.25
Precision	5.00%	7	0.35	6	0.3	3	0.15	6	0.3	2	0.1	4	0.2
Reliability	15.00%	6	0.9	6	0.9	5	0.75	8	1.2	3	0.45	5	0.75
Time	15.00%	4	0.6	8	1.2	3	0.45	4	0.6	4	0.6	6	0.9
			7.65		4.55		6.85		5.5		5.35		3.55

After researching over 30 potential non-destructive testing methods, an Eddy Current Array technique was chosen as the best method to quantifying flaw parameters

EPRI

SG Tube Access Issues

- Obstacles to Overcome
  - Equipment size limitations due to small tube-to-tube gaps
  - Visual inspection blind spots
  - Robotic delivery system



EPRI

SG Tube Bundle Mockups Fabricated

- The mockups match tube bundle configurations for many operating SGs
  - Square Pitch
  - Triangular pitch
- Having tube bundle mockups available will allow EPRI to test the capability of NDE systems to:
  - Pass through tight gaps between SG tubes
  - Maneuver around tubes to measure wear scars that extend around the tube circumference

EPRI

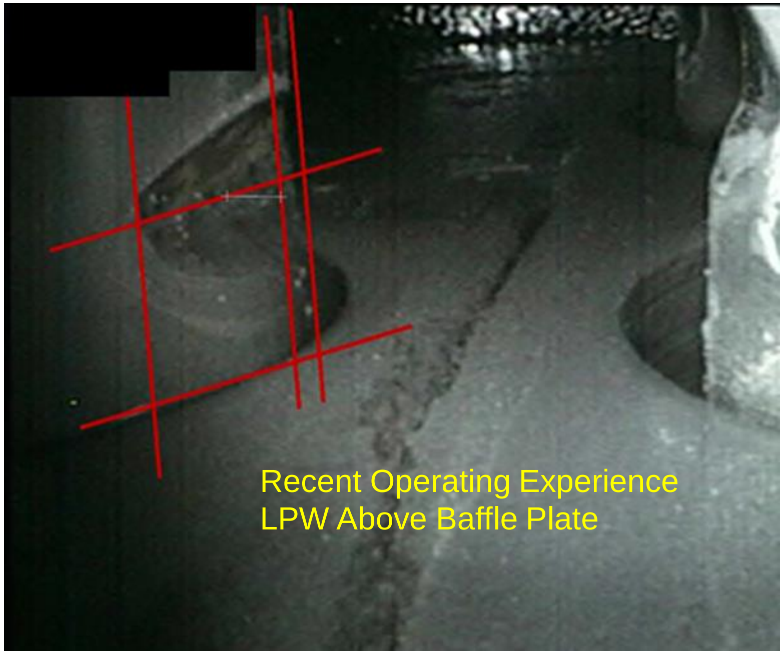
Six Different SG Tube Bundle Mockups were Manufactured

Top and Bottom of Tubesheet Mockups

Feasibility Study Using Photos and Videos to Calculate SG Tube Wear Size

Project Scope

- Develop an analytical process capable of calculating the size of tube wear scars using secondary side photographic images
  - Use data obtained from secondary side inspections (SSI) and Foreign Object Search and Retrieval (FOSAR) activities during scheduled plant outages
  - Perform hand calculations to determine the depth of the tube flaws



Measured Size of Wear Scar #8 from Pic "WS8"

$Scale_{WS8} := \frac{200}{0.4 \times in} = 500.0 \times \frac{1}{in}$ pixcels / inch

$Num\_Pixels_{WS8\_Length} := 40$ $Num\_Pixels_{WS8\_Width} := 107$

$Measured\_Length_{WS8} := \frac{Num\_Pixels_{WS8\_Length}}{Scale_{WS8}} = 0.080 \times in$

$Measured\_Width_{WS8} := \frac{Num\_Pixels_{WS8\_Width}}{Scale_{WS8}} = 0.214 \times in$

$\theta_{WS8} := asin\left(\frac{Measured\_Width_{WS8}}{Tube\_OD}\right) = 16.6 \times deg$

$Measured\_Depth_{WS8} := \left(\frac{Tube\_OD}{2}\right) \times \left(1 - \cos\left(\theta_{WS8}\right)\right) = 0.0156 \times in$ assuming a chord between two circumferential locations (flat bottom)

Actual Size of Wear Scar #8

$Actual\_Depth_{WS8} := 0.0148 \times in$ $Actual\_Width_{WS8} := 0.2047 \times in$ $Actual\_Length_{WS8} := 0.0799 \times in$

%Difference between Measured and Actual Dimensions of Wear Scar #8

$\%Diff\_Depth_{WS8} := \frac{Measured\_Depth_{WS8} - Actual\_Depth_{WS8}}{Actual\_Depth_{WS8}} = 5.3 \times \%$

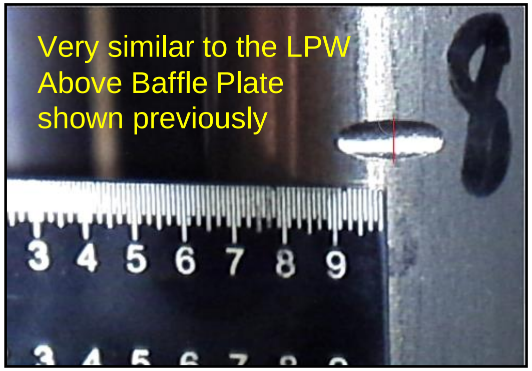
$\%Diff\_Width_{WS8} := \frac{Measured\_Width_{WS8} - Actual\_Width_{WS8}}{Actual\_Width_{WS8}} = 4.5 \times \%$

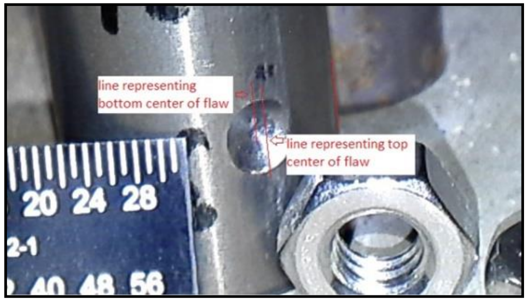
$\%Diff\_Length_{WS8} := \frac{Measured\_Length_{WS8} - Actual\_Length_{WS8}}{Actual\_Length_{WS8}} = 0.1 \times \%$

Test Conditions

SG Mockup Environment

Controlled Environment





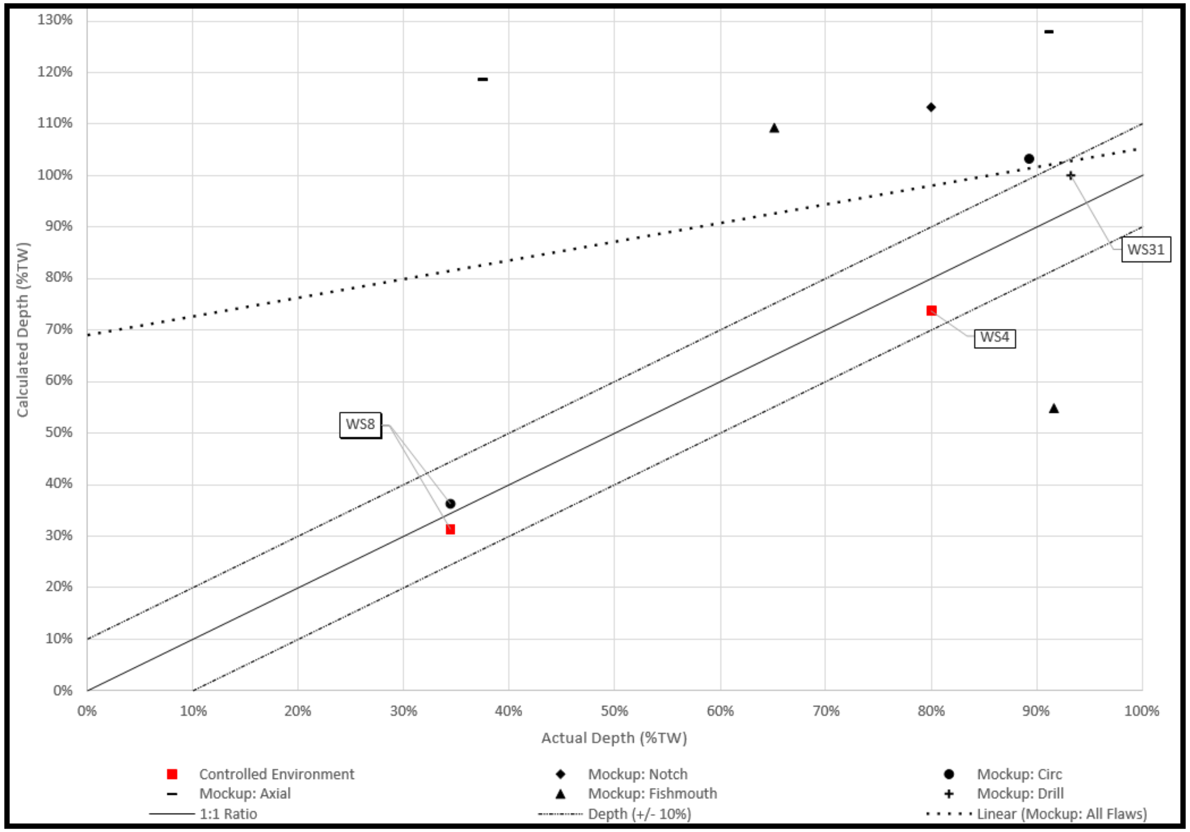
Examples of Mockup Scars Examined

Samples X30370

Feasibility Results: "SG Secondary Side Depth Sizing Technique and Engineering Evaluation" Involving Visual Photos and Hand Calculations

- A wide range of accuracy was observed with the analytical process
  - Dimension of flaw depth, the percent difference ranged from -40% to 217%
  - Length/width dimension, the percent difference ranged from -8% to 16%

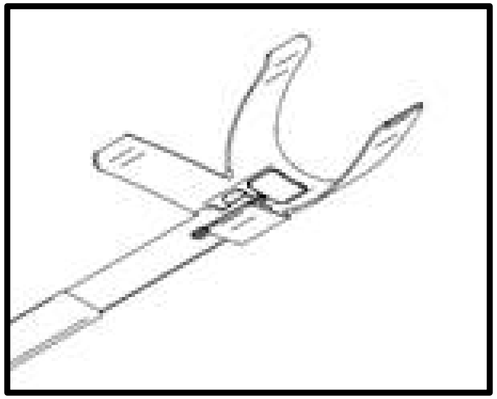
- During this study, it was also realized greater accuracy was obtained when the tube flaw was aligned with the normal camera angle perspective
  - Obstacles
    - Blind spots and tube gaps



Investigate the Capabilities of Eddy Current Array Coil Technology

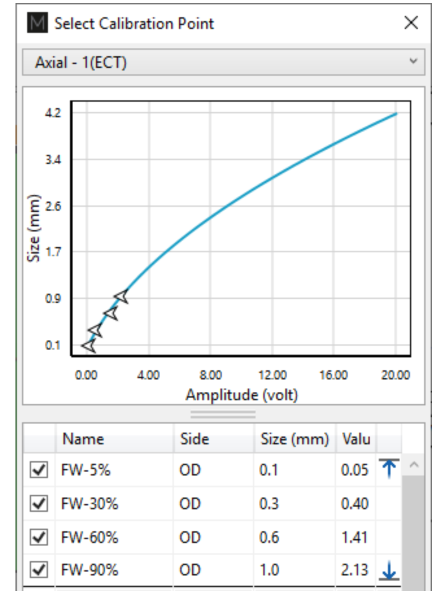
Investigate the Capabilities of Eddy Current Array (ECA) for Depth Sizing Wear Scars in SG Tubing

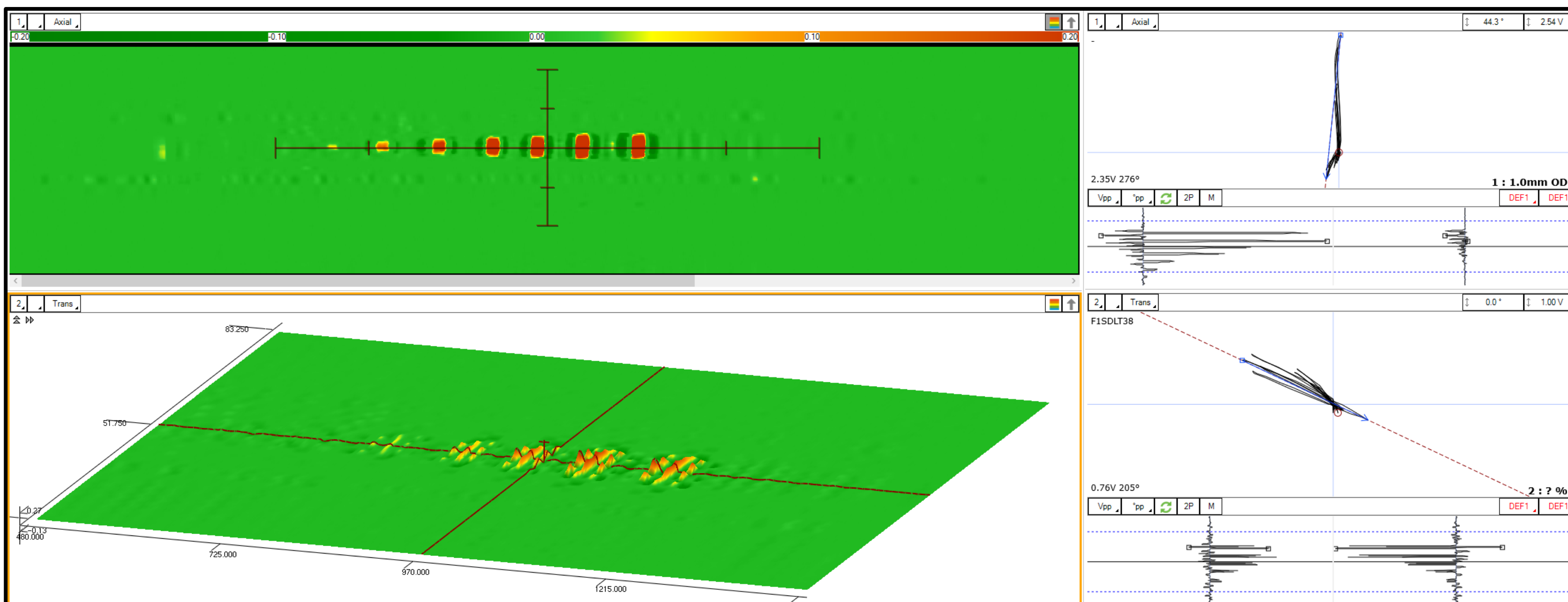
- Eddyfi Tester and Tape Array Probe
  - Most promising approach, current technology used to inspect Fuel Bundle Assembly



Results from Tape Array Probe on Flat Wear - Bench Top Tested at EPRI

- Wear depths between 5% - 90% TW
- All wear scars on the sample were detected

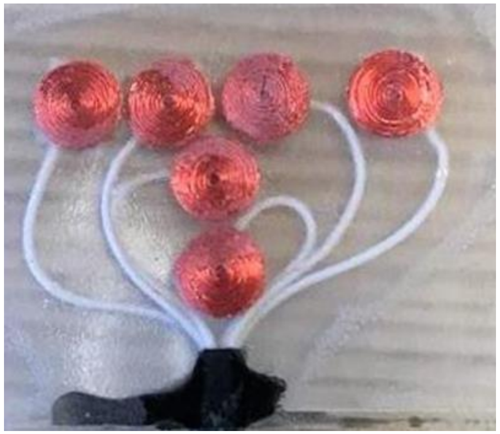




Eddy Current Array Feasibility Study

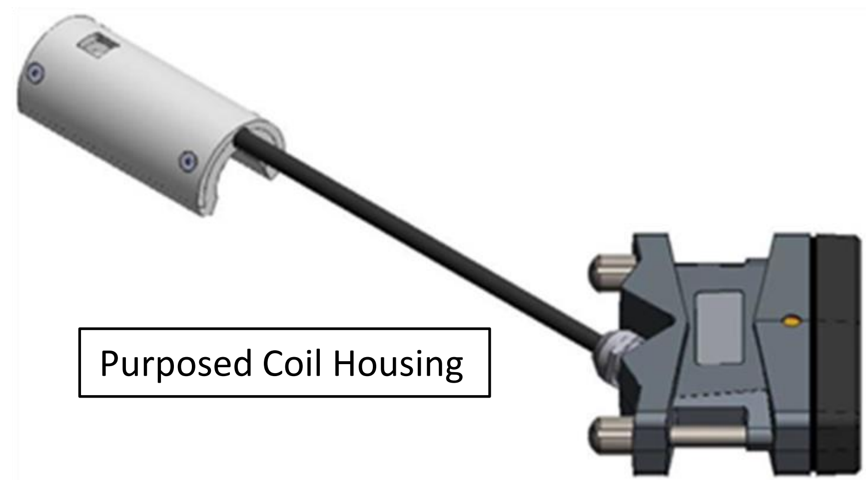
- The main goals for this study:
  - Determine the most appropriate coil size and topology to perform wear depth sizing
  - Develop and produce a prototype Eddy Current Array (ECA) probe for inspection and sizing of tube wear
  - Validate the wear sizing performance of the ECA prototype

Eddy Current Array - Project Status



Single Element Prototype

- A single element prototype was investigated to better assess the effect of the frequency on sizing accuracy
- Coil dimensions were selected to give the highest accuracy without being excessively affected by noise
- For this specific application, defect depth can be sized as lift-off
- The most accurate results are achieved when wear width is at least twice the coil diameter
- Depth sizing of smaller defects will be addressed with another ECA prototype



Purposed Coil Housing

Investigate the Capabilities of Other Technologies

EPRI

Engineering Evaluation on Other Technology

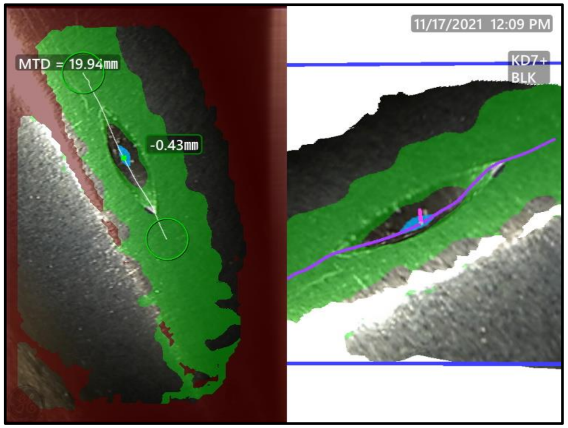
- Investigating other technologies
  - 3D Mapping
    - Uses photos and/or video from existing equipment
    - Technology appears promising

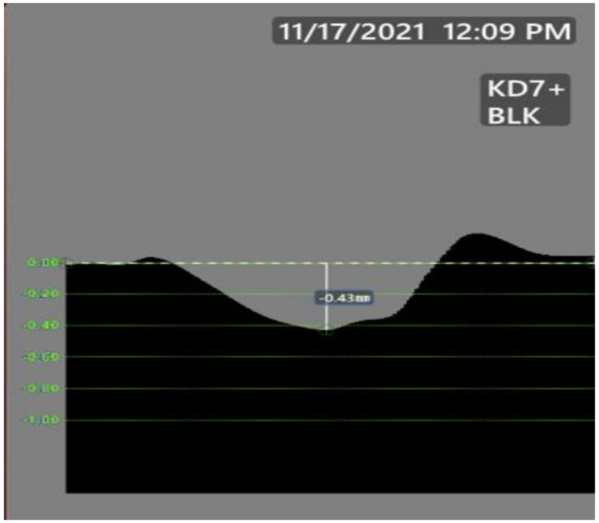
Similar technology to dental imaging

Visual Inspection

Wear Scar Sample

Visual Tool and Probe





Wear Scar Software Results

Summary

- SGMP is actively working to identify a method to accurately measure FO tube wear from the SG secondary side
- Although, some techniques may show promise, a depth sizing accuracy needs to be established and understood such that tube integrity decisions can be made
  - Utilities may request relief from Technical Specification repair limits for foreign object wear with object removed
- Once an accurate wear sizing method has been demonstrated, then the following obstacles would need to be addressed:
  - Equipment size limitations due to small tube-to-tube gaps
  - Accessing visual inspection blind spot
  - Development of a robotic system capable of delivering the test method to the desired tube location

TSTF 577 – Interpretations NRC

NUREG 2191

Revision of NUREG-2191

- NRC plans to issue updated ISG to address inspection of steam generator divider plate assemblies, tube-to-tubesheet welds, heads (channel or lower/upper heads), and tubesheets.
- License renewal applicants may take an exception to the current guidance in NUREG-2191 until ISG is issued.
- Expected publishing date in second half of 2022.
- Once issued, current holders of renewed licenses will treat ISG information as “operating experience” and consider this information to ensure the existing AMPs remain effective

NRC Proposed Wording Change

- Current Wording (page XI.M19-3): In summary, the NEI 97-06 program provides guidance on parameters to be monitored or inspected except for steam generator divider plate assemblies, tube-to-tubesheet welds, heads (channel or lower/upper heads), and tubesheets. For these latter components, visual inspections are performed at least every 72 effective full power months or every third refueling outage, whichever results in more frequent inspections. These inspections of the steam generator head interior surfaces including the divider plate are intended to identify signs that cracking or loss of material may be occurring (e.g., through identification of rust stains).
- Proposed ISG Wording1: In summary, the NEI 97-06 program provides guidance on parameters to be monitored or inspected except for steam generator divider plate assemblies, tube-to-tubesheet welds, heads (channel or lower/upper heads), and tubesheets. For these latter components, visual inspections are performed at least every 72 effective full power months or every third refueling outage, whichever results in more frequent inspections. Inspections of these latter components may be performed every 96 effective full power months for units with technical specifications that allow such intervals, so long as the degradation assessments for these latter components also support such inspection intervals. These inspections of the steam generator head interior surfaces including the divider plate are intended to identify signs that cracking or loss of material may be occurring (e.g., through identification of rust stains).

Industry Comments

- For these latter components, visual inspections are performed at least every 72 effective full power months. ~~or every third refueling outage, whichever results in more frequent inspections.~~ These inspections may be performed every 96 effective full power months for units with technical specifications that allow such periods. ~~so long as the degradation assessments for these latter components also support such inspection intervals.~~
- Comments:
  - This is consistent with TSTF-577
  - Not all plants put the inspection of divider plate assemblies in the degradation assessment

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