NRC / EPRI Steam Generator Task Force Meeting

August, 17 2016

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Agenda

8:30 am ***Introductions*** ***NRC and Industry***

Opening Remarks ***NRC and Industry***

EPRI SGMP Steam Generator Task Force Update ***(Industry)***

- Status of In-Plane Fluid Elastic Instability Tests
- ASME Section III Design Criteria vs SGMP Integrity Assessment Guidelines
- Accident Induced Leakage Limits vs Design Licensing Basis
- Sizing Flaws in U-Bend Area of SG Tubing
- Guidance for Including Primary-to-Secondary Leakage in Degradation Assessments
- Guidance Added to Guideline Documents Regarding Recent Alloy 690 TT Operating Experience

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Agenda

- Summary of Recently Issued SGMP Technical Reports
- Status of Industry Guidelines
  - Detailed Discussion of Guidelines Recently Published
- Interim Guidance
- NEI 03-08 Deviations
- Recent Operating Experience

9:30 am ***Break***

9:45 *am* **NRC Discussion / Items of Interest** **(NRC)**

11:00 am ***Address Public Questions/Comments*** ***(NRC)***

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Status of In-Plane Fluid Elastic Instability Tests

Helen Cothron

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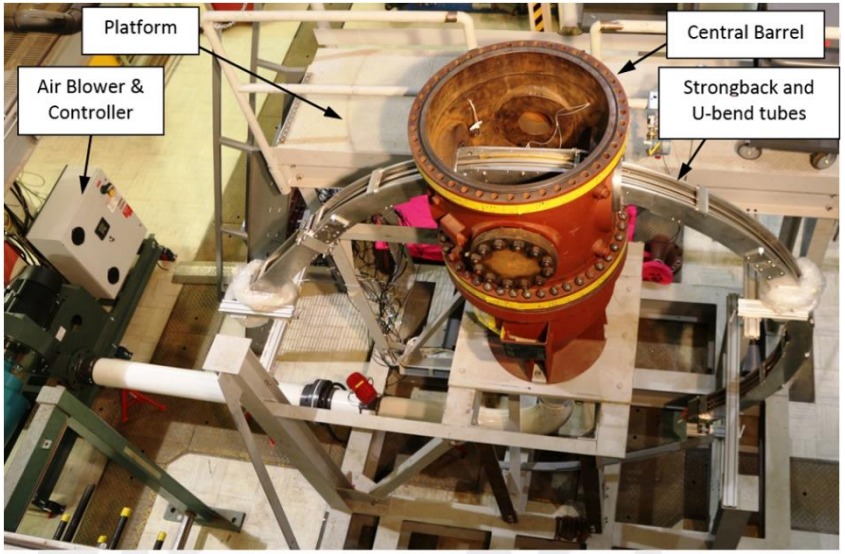
Investigation into the Onset of In-Plane Fluid-Elastic (FEI) Instability

- SGMP began a project in 2015 to investigate the onset of in-plane fluid-elastic instability
- A series of tests are being conducted at Canadian Nuclear Labs
  - Air Flow tests
    - Develop a basic understanding of in plane vibration
  - Two-Phase Freon Tests
    - Use two support configurations and the most relevant two-phase flow conditions, demonstrate in-plane fluid-elastic instability



The MSUB test rig set up for air flow tests.

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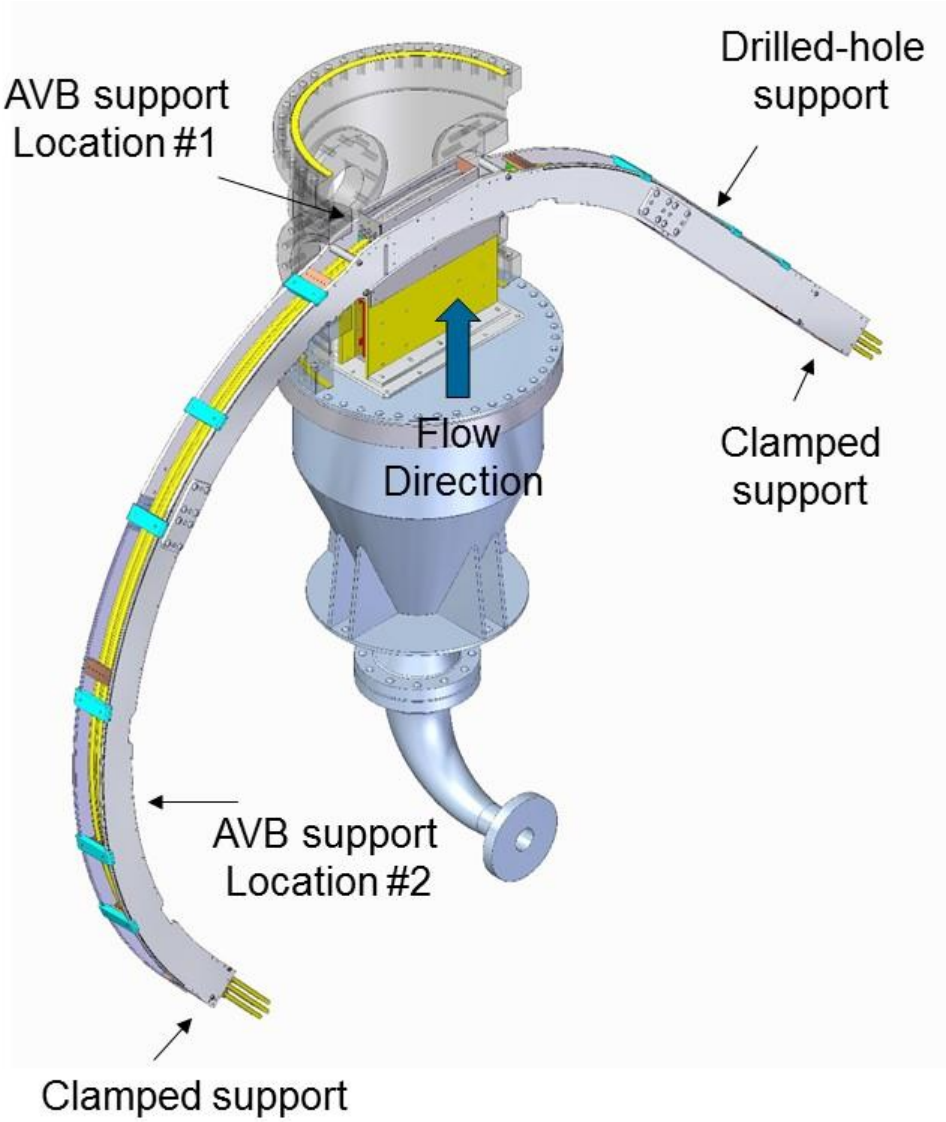
Status

- Air Flow tests complete
  - Explored the following variables:
    - AVB diametral gap (0.040”, 0.020”, 0.010”, 0.005”)
    - One vs two AVB supports
    - Full flexible bundle vs. three vs. seven flexible tubes
    - Tubes centered in the AVB gaps vs. lightly preloaded or offset



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Preliminary Observations from Air Tests

- Demonstrated in-plane tube vibration in air flow tests for several AVB gap sizes with one and two AVB supports
- Coupling of tube motion is required for FEI in air tests
  - In-plane FEI could not be initiated in a single flexible tube with fixed adjacent tubes
  - Initiation is significantly delayed with reduced numbers of flexible tubes.
- Small preload forces between tubes and AVBs are sufficient to suppress initiation of in-plane tube vibration in air flow tests.
- Tube wear work rates were strongly influenced by position of tube within the AVB support gap (e.g., centered versus offset to one side)

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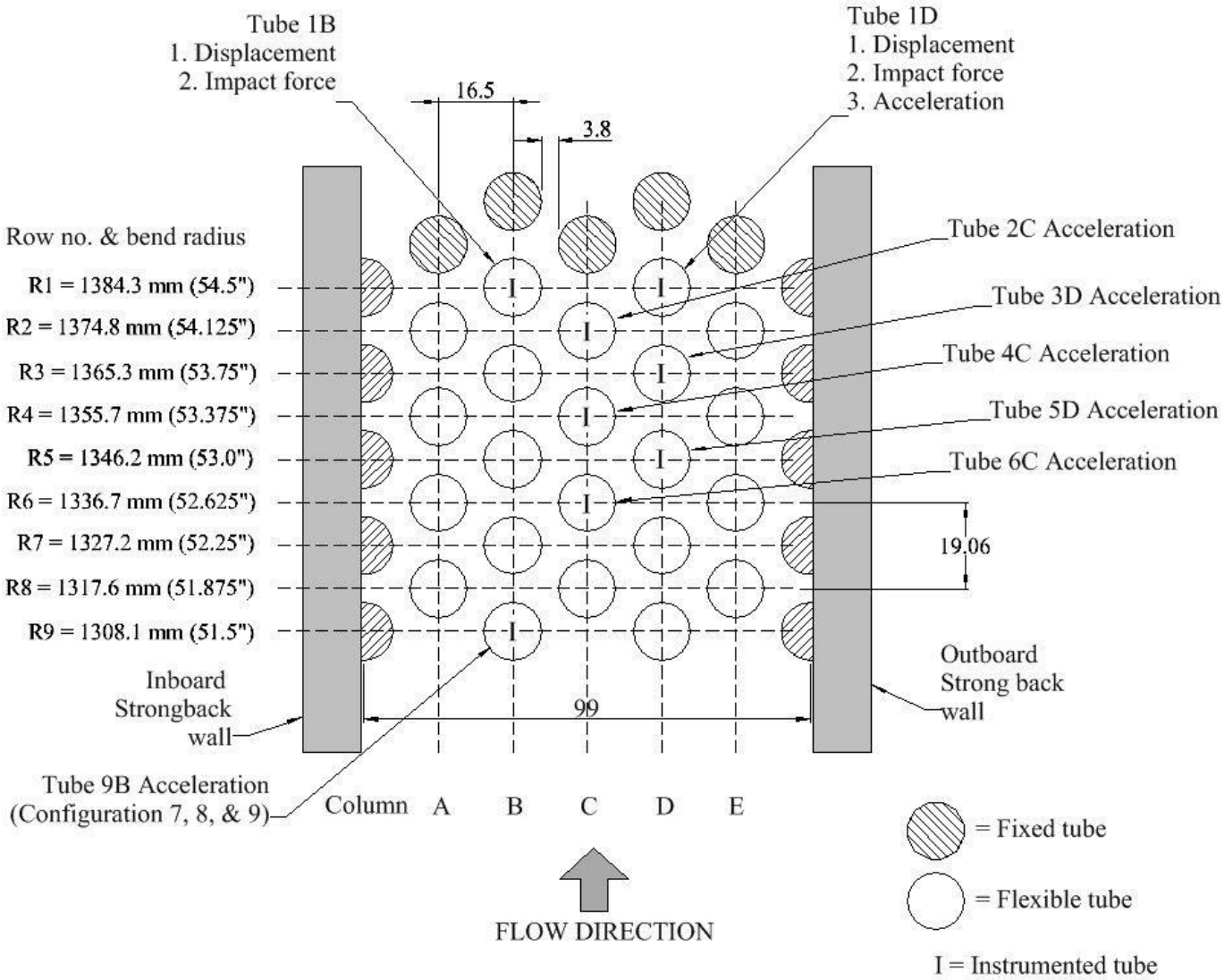
Tube Bundle Layout



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9 Air Flow Tests Completed Prior to Hold Point

Test Series No.	Tube Support Condition (AVB Cassette)			Number of Flexible Tubes	Tube Support Location
	Diametral Clearance (in)	Tube to Support Setup	Dry or Wetted		
1	N/A	N/A	N/A	All	n.a.
2	0.040"	Centered	Dry	All	#1
3	0.040"	Centered	Dry	One (C4)	#1
4	0.040"	Centered	Dry	All	#1, #2
5	0.020"	Centered	Dry	All	#1
6	0.020"	Centered	Dry	All	#1, #2
7	0.005"	Centered	Dry	All	#1
8	0.005"	Centered	Dry	All	#1, #2
9	0.005"	Centered	Dry	One (C4)	#1

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6 Additional Tests Performed After Hold Point

Test Series No.	Tube Support Condition (AVB Cassette)			Number of Flexible Tubes	Tube Support Location
	Diametral Clearance (in)	Tube to Support Setup	Dry or Wetted		
10	0.010”	Centered	Dry	One (C4)	#1
11	0.010”	Centered	Dry	All	#1
12	0.010”	Light Preload	Dry	One (C4)	#1
13	0.010”	Light Preload	Dry	All	#1
14	0.010”	Centered	Dry	Three (2C, 3D, 4C)	#1
15	0.010”	Centered	Dry	Seven (2C, 3B, 3D, 4C, 5B, 5D, 6C)	#1

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Schedule

- Air Tests complete
- Final report is under review
- Expert panel will finalize the two-phase Freon configuration and test matrix after reviewing final test report
- Prepare for Freon Tests
  - Some design is complete
  - Further design, fabrication, setup, and commissioning testing will be completed 2017
  - Freon tests conducted early 2018

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International R&D Efforts Related to SG Tube Vibration

- EPRI is developing Triton to improve estimates of secondary side conditions and reduce uncertainty in analyses of tube vibration, wear, and fatigue life
- ASME Task Group on Flow-Induced Vibration (Section III) is working on a revision to N-1330 to clarify potential for in-plane FEI
- International research community is engaged, e.g., new test rigs and projects, analytical studies

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Focus Areas for Ongoing Research Activities

- Experiments to obtain data on in-plane FEI in two-phase cross-flow
  - Effect of tube spacing (P/D)
  - Frequency `tuning' of tubes in array
  - Influence of out-of-plane tube vibration on in-plane FEI
- Measurement of fluid forces that lead to FEI
- Effectiveness of tube supports for in-plane tube vibration
  - Tube-to-support clearance (gap)
  - Influence of tube-to-support preload and friction
  - Work rates for in-plane tube motion
- Thermal-hydraulic conditions in the 'environment' between tube and support
- Fretting-wear coefficients for tube and support material couples

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Several Examples of Recent Studies

- Nakamura et al. (2013 & 2016) – Effects of tube array parameters (arrangement, P/D) on in-plane FEI
- Hirota et al. (2013) – Experimental data on ratio of K_{IP}/K_{OOP} for tube arrays with a range of P/D values and effect of tube supports
- Olala and Mureithi (2014) – Measurement of fluid forces in two-phase crossflow and modeling of in-plane FEI
- Mureithi et al.(2015) – Variability in Connors' constant (K) from frequency differences between tubes
- Keogh and Meskell (2015) – Measurement of local pressure forces that affect in-plane FEI
- Piteau et al. (2016) – Developed an approach to measure fluid-elastic force coefficients and the influence of tube frequency
- Alvarez-Briceno et al. (2015) – Experimental study on the influence of void fraction on vibration amplitude, resonance frequencies and damping

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International Research Activities

- International research activities have several limitations:
  - Tests are typically done using straight tube arrays rather than U-bends
  - Anti-vibration bar supports are not included in test rigs
  - Measurement of tube interaction with supports and the effects on damping
  - Testing done with single-phase and air-water flows
- EPRI testing is designed to address these weaknesses by testing a U-bend array with AVB supports in a more realistic two-phase flow environment.

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ASME Section III Design vs SGMP Integrity Assessment Guidelines

Russ Cipolla

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NRC Questions

- Is there an inconsistency in the ASME Code?
  - Apparent language differences between NB-1110 and NB-3121?
- Is there an inconsistency between the IAGL and the ASME Code?
- How are NB-1110 and NB-3121 applied during the design of the steam generator?

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Are there inconsistencies among the Integrity Assessment Guidelines, Appendix C and the ASME Code NB-1110 and NB-3121

- **Page C-15 of Appendix C, under C.5.2.1 Original Design, states:**

"However, as stated in Subsection NB-1110, …(the ASME Section III rules) do not cover deterioration that may occur in service as a result of corrosion, radiation effects, or instability of the material."

- **Section III of the ASME Code, Subsection NB-3121 Corrosion (part of Subsection NB-3120, Special Considerations) states:**

"Material subject to thinning by corrosion, erosion, mechanical abrasion, or other environment effects shall have provision made for these effects during the design or specified life of the component by a suitable increase in or addition to the thickness of the base metal over that determined by the design formulas. Material added or included for these purposes need not be of the same thickness for all areas of the component if different rates of attack are expected for the various areas. It should be noted that the tests on which the design fatigue curves (Figs. I-9.0) are based did not include tests in the presence of corrosive environments which might accelerate fatigue failure."

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SGMP Integrity Assessment Guidelines

- **Purpose of Appendix C**
  - Appendix C of the IAGL, gives the basis for the structural integrity performance criteria margins and the connection with ASME Code (Section III and Section XI)
  - Appendix C explains how the safety factors for tube integrity were derived from the relevant Section III design requirements
  - The statement in C.5.2.1 was to point out that Section III does not specify design requirements to account for environmental effects that may cause deterioration during service operation

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ASME Section III Design Philosophy

- ASME Section III design procedures do not directly address environmental effects from service operation
- Section III provides guidance to the design organization on material selection
  - Code can not anticipate all possible service applications
  - Places the responsibility on the Owner and Designer
- The language in NB-1110 and NB-3121 is intentional and has existed in Section III since the 1971 edition. It serves the purpose to make clear that:
  - The scope of NB of Section III does not cover degradation of material (ASME Section XI covers this subject for operating plants)
  - It is the responsibility of the Owner to select material suitable for the conditions stated in the Design Specifications (NCA-3250)

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Answers to NRC Questions

- There is not an inconsistency in the ASME Code design. Various Subsections in Section III state that scope of NB of Section III does not cover degradation.
- There is not an inconsistency between the Integrity Assessment Guidelines and the ASME Code. Technical basis of the safety factors in the structural integrity performance criteria were developed from design margins in the ASME Code.
- NB-1110 and NB-3121 provide guidance to the design organization on environmental effects during service operation. It is the Owner's responsibility through the Design Specification to address service environmental conditions that impact tubing integrity.

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Accident Induced Leakage Limits

Greg Kammerdeiner

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NRC Observation

- The NRC staff responsible for steam generator tube integrity recently recognized that assumptions may be made during the accident analyses which draw into question what is the appropriate accident induced leakage limit.

Current Regulation – RG 1.183

For facilities that have not implemented alternative repair criteria (see Ref. E-1, DG-1074), the primary-to-secondary leak rate in the steam generators should be assumed to be the leak rate limiting condition for operation specified in the technical specifications. For facilities with traditional generator specifications (both per generator and total of all generators), the leakage should be apportioned between affected and unaffected steam generators in such a manner that the calculated dose is maximized.

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New Draft Revision of RG 1.183 to Clarify

- *For facilities that have not implemented alternative repair criteria (ARC) (see Ref. F-1), the primary-to-secondary leak rate in the steam generators should be assumed to be the leak rate limiting condition for operation specified in the technical specifications. For facilities with traditional steam generator specifications (both per generator and total of all generators), the leakage should be apportioned between faulted and unaffected steam generators in such a manner that the calculated dose is maximized. For example, for a four-loop facility with a limiting condition for operation of 500 gallons per day (gpd) for any one generator not to exceed 1 gallon per minute (gpm) from all generators, it would be appropriate to assign 500 gpd to the faulted generator and 313 gpd to each of the unaffected generators*

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Example for a 4-Loop Plant

During a steam line break, a licensee may assume during the first 30 minutes of an accident that a certain amount of primary-to-secondary leakage is coming from the faulted steam generator and that the unaffected steam generators are leaking at the normal operating primary-to-secondary leakage limit.

The primary-to-secondary leakage from the faulted steam generator would go directly to the atmosphere. The primary-to-secondary leakage from the unaffected steam generators (used to cool down the plant) would go to the secondary coolant (an indirect path to the atmosphere). Following the 30 minutes, the licensee may assume that all primary-to-secondary leakage is coming from the faulted steam generator.

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NRC Question

Assume that 0.3 gpm was assumed to come from the faulted steam generator during the first 30 minutes and that the normal operating leakage limit was 0.1 gpm. The analysis also assumes 0.3 gpm primary-to-secondary leakage in the unaffected steam generators for the first 30 minutes. Total 0.6 gpm

After the first 30 minutes, in order to maximize the calculated doses it was then assumed that 0.6 gpm was assumed to come from the faulted steam generator and no primary-to-secondary leakage was coming from the unaffected steam generator(s).

For the faulted steam generator, is the accident induced leakage limit 0.3 gpm or 0.6 gpm? In cases like the above, how do plants ensure they operate within their design/licensing basis? Do the industry guidelines address this?

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Answer to NRC Question

- Leakage assessments in accordance with RG 1.183 (alternate source term) are not specifically addressed in the Integrity Assessment Guidelines
- The Integrity Assessment Guidelines has a requirement to meet Tech Spec leakage limit
- Section 6.7 of the Integrity Assessment Guidelines instruct utilities on determining accident-induced leakage limit
  - Review all design basis accidents to determine which assume leakage
  - The leakage assumed defines the limit for that event
  - The loads imposed on the tubes during these events can vary

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Answer to NRC Question

- If same leak rate is assumed in each design basis accident:
  - One AILPC limit shall be established using assumed leak rate combined with highest accident loading condition
- If same leak rate is not assumed in each design basis accident, the guidelines give two options:
  - The loading condition on the tubing for each accident can be evaluated along with the assumed leak rate to define an AILPC limit for each accident, or
  - The lowest leak rate assumption can be combined with the highest tube loading condition to define one bounding AILPC limit.

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Sizing Flaws in the U-Bend Area of SG Tubing

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Preliminary Results of Testing Performed at Argonne National Lab

- Flaws that were thought to be larger based on eddy current testing did not always fail first
  - A smaller flaw based on eddy current testing failed first. Analysis of these results is still ongoing.
- This raised a question about sizing of flaws in the U-bend. Specifically, in the U-bend region, the tube is thicker on the intrados and thinner on the extrados. If a calibration standard with nominal wall thickness is used (a straight calibration tube) to size flaws, how does this affect the sizing of a flaw in the U-bend region where the wall thickness varies from nominal (particularly for the low radius tubes).

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NRC Question

- How are flaws sized in the U-bend?
  - ETSS 96511.2 for PWSCC
  - ETSS 10411.1 for ODSCC
- How are the difference in wall thickness accounted for?
  - The wall thickness variation is not accounted for in the development of ETSSs
- Has any analysis or testing been performed to determine what effect this varying wall thickness in the U-bend region has on sizing of flaws (assuming a calibration standard based on nominal wall thickness is used)?
  - Yes, see next two slides

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Circumferential EDM Notches - 0.043” Wall ECT Data Compared to 0.040” Wall Data (Using 0.043” Calibration)

ETSS 96511.2 PWSCC Plus Point (300 kHz Phase)

ID Circ	0.043 Wall Std		96511.2
Met % TW	Phase	Volts	% TW Est
21	13	.44	23
40	15	1.46	28
58	18	2.63	35

ID Circ	0.040 Wall Std		96511.2
Met % TW	Phase	Volts	% TW Est
20	14	.31	25
39	14	1.18	25
61	19	2.50	38

ETSS 10411.1 ODSCC Plus Point (Only Amplitude Based Technique)

OD Circ	0.043 Wall Std		10411.1
Met % TW	Phase	Volts	% TW Est
21	96	.07	23
43	96	.37	58
59	89	.81	75
100	34	20.0	100

OD Circ	0.040 Wall Std		10411.1
Met % TW	Phase	Volts	% TW Est
20	91	.09	29
39	82	.41	60
61	74	1.20	83
100	30	21.76	100

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Axial EDM Notches - 0.043” Wall ECT Data Compared to 0.040” Wall Data (Using 0.043” Calibration)

ETSS 96511.2 PWSCC Plus Point (300 kHz Phase)

ID Axial	0.043 Wall Std		96511.2
Met % TW	Phase	Volts	% TW Est
21	11	.66	18
43	15	1.86	28
61	21	3.44	44

ID Axial	0.040 Wall Std		96511.2
Met % TW	Phase	Volts	% TW Est
20	12	.41	21
39	15	1.64	28
61	21	3.32	44

ETSS 10411.1 ODSCC Plus Point (Only Amplitude Based Technique)

OD Axial	0.043 Wall Std		10411.1
Met % TW	Phase	Volts	% TW Est
21	105	.06	20
38	91	.30	54
59	79	.99	79
100	33	20.0	100

OD Axial	0.040 Wall Std		10411.1
Met % TW	Phase	Volts	% TW Est
20	83	.07	23
39	77	.43	61
61	73	1.12	81
100	31	21.15	100

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Guidance for Including Primary-to-Secondary Leakage in Degradation Assessments

Jim Stevens

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Requirement for Including Primary-to-Secondary Leakage in the Degradation Assessment

- The guidelines do not require addressing low-level leakage in the Degradation Assessment
- Leakage is directly addressed in the Condition Monitoring and Operational Assessment

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Integrity Assessment Guidelines

- Section 9, Primary-to-Secondary Leakage Assessment includes requirements for operational leakage
  - Compare leakage at normal operation to operational leakage performance criteria
  - If operational leakage is not predicted by the OA and leakage occurs, assessment strategies shall be modified accordingly
  - Nine action steps are required to be followed during an inspection outage following operational leakage greater than 5 gallons per day including a requirement to update and revise the DA, CM, and OA as necessary

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Primary-to-Secondary Leakage Guidelines Notification Requirements

- The PSL GLs Revision 4 include the following response step as a "Recommendation" when entering the "increased monitoring" condition (when leakage is ≥5 gpd, but below Action Level 1 at 30 ≥ gpd):

  Routinely trend leakage from radiochemical data and report trends to plant management.

- Utility procedures generally also include addition of any PSL leakage into corrective action programs

- Primary-to-Secondary Leak Guidelines will undergo revision starting in late 2016. This topic will be discussed by the guideline committee to determine if or what changes will be made to ensure low level leakage is being communicated

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Guidance Added to Guideline Documents Regarding Recent Alloy 690 TT Operating Experience

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New Section in Integrity Assessment Guidelines Regarding Data Exploration

- During the course of a SG examination and concurrent with the CM process, intermediate inspection results should be explored in order to extract useful information that may otherwise be missed, such as tube-to-tube wear or foreign object wear.
- A comprehensive review of the locations and characteristics of all detected eddy current indications may be an effective diagnostic tool for evaluating inspection data. This comprehensive review may include:
  - Plotting all locations where indications have been detected both radially within the SG tube bundle and axially along the tube length
  - Reviewing all indications together or looking at subsets of various types of indications

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New Section in Integrity Assessment Guidelines Regarding Data Exploration (cont.)

- Determining an eddy current indication's angular position in the tube can be accomplished by, but not limited to, placing a magnet or energized probe in an adjacent tube. For example, positioning a magnet probe into an adjacent tube near the area of interest, while scanning the signal with a rotating coil in the tube of interest, allows a determination of the angular position of the signal. This can also be accomplished by placing an energized array probe in an adjacent tube while scanning the signal with another array probe in the tube of interest, as the energized array probe creates crosstalk in the tube of interest.
- Plotting changes in signal amplitudes to determine if the indications are changing with time
- Performance of the comprehensive review may, for example, reveal a clustering of eddy current indications or another pattern that may warrant additional attention (e.g., migration of a loose part left in a SG or the tube-to-tube wear phenomenon).

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New Section in Integrity Assessment Guidelines Regarding Data Exploration (cont.)

- This review could also look at changes in indication patterns in the current inspection relative to previous inspections to ascertain if discrete areas are changing or expanding relative to history. Also for indications assessed as possible corrosion degradation on tube OD surface, this review could look at patterns of indications relative to historical OD sludge maps to assess if change/increase in secondary side deposits may be contributing to new/changed degradation

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Administrative Procedure Revision

- A draft checklist for utility emergent issue phone calls has been developed and will be incorporated in the next revision of the Administrative Procedures

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Standing Discussion Topics

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Recently Issued SGMP Technical Reports

- *Generic Elements of U-Bend Tube Vibration Induced Fatigue Analysis for Westinghouse Model 44F Steam Generators*
  - SGMP Technical Report 3002007562 (April 2016)
- *Generic Elements of U-Bend Tube Vibration Induced Fatigue Analysis for Westinghouse Model 51F Steam Generators*
  - SGMP Technical Report 3002007565 (May 2016)
- *Model Assisted Probability of Detection Using R (MAPOD-R) Version 2.0*
  - EPRI Software 3002007857 (May 2016)
- *Steam Generator Integrity Assessment Guidelines, Rev 4*
  - SGMP Technical Report 3002007571 (June 2016)
- *PWR Steam Generator Examination Guidelines, Rev 8*
  - SGMP Technical Report 3002007572 (June 2016)

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Recently Issued SGMP Technical Reports

- *Assessment of Lead Induced Stress Corrosion Cracking Inhibitor Effectiveness*
  - SGMP Technical Report 3002007860 (June 2016)
- *Correlating Primary-to-Secondary Leakage with Probability of Burst*
  - SGMP Technical Report 3002007607 (June 2016)
- *Alternatives to Hydrazine for PWR Secondary Chemistry Control – Evaluation of Diethylhydroxylamine (DEHA)*
  - SGMP Technical Report 3002007608 (June 2016)
- *Steam Generator Management Program: Steam Generator Foreign Object Handbook, Revision 1*
  - SGMP Technical Report 3002007858 (July 2016)

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SGMP Industry Document Status and Revision Schedule

Guideline Title	Current Rev #	Report #	Last Pub Date	Imple-mentation Date(s)	Interim Guidance	Review Date	Comments
SG Integrity Assessment Guidelines	4	3002007571	June 2016	8/31/17		2020	
EPRI SG In Situ Pressure Test Guidelines	4	1025132	Oct 2012	10/10/13	SGMP-IG-15-01	TBD	Rev 5 in progress
PWR SG Examination Guidelines	8	3002007572	June 2016	8/31/17		2020	
PWR SG Primary-to-Secondary Leakage Guideline	4	1022832	Sept. 2011	4/11/2012 7/11/2012	None	2015	Revision will begin 2016

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SGMP Industry Document Status and Revision Schedule

Guideline Title	Current Rev #	Report #	Last Pub Date	Imple-mentation Date(s)	Interim Guidance	Review Date	Comments
PWR Primary Water Chemistry Guidelines	7	3002000505	April 2014	1/28/2015	None	2018	
PWR Secondary Water Chemistry Guidelines	7	1016555	Feb 2009	8/20/09 11/20/09	SGMP-IG-13-01 SGMP-IG-14-01	TBD	Rev 8 in progress
Steam Generator Management Program Administrative Procedures	4	3002005168	March 2015	12/9/15	None	N/A	
Steam Generator Degradation Specific Flaw Handbook	2	3002005426	Nov 2015	N/A	None	N/A	

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Integrity Assessment Guidelines and Examination Guidelines Revisions

- Early revisions of the SGMP Guidelines predated NEI 03-08
  - Included “shall” requirements that met both the definition of needed and good practice elements of NEI 03-08
- SGMP guidelines contain many more needed elements than the other materials programs
- Recent revisions of guidelines include a review of the definitions of each element in NEI 03-08
  - Results in fewer needed elements and more good practice elements
- Important elements to ensure safety remain as needed requirements
- Administrative, repetitive, and prescriptive requirements have been reduced to good practice elements

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Integrity Assessment Guidelines, Revision 4

- Published June 2016 – Implementation Date August 2017
- Additional Guidance
  - Updated operating experience
    - Alloy 600TT cracking
    - U-Bend mispositioning
    - Channel head degradation
    - Tube fouling and fatigue issues
    - Wear in replacement steam generators

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Integrity Assessment Guidelines, Revision 4

- Additional Guidance
  - Inspection scope and expansion when small numbers of indications are identified
  - Growth rates for Alloy 600TT fleet
  - Guidance for performing tube integrity assessments when less than 100% inspection in performed
  - Guidance for determining if fully probabilistic assessment is needed

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Steam Generator Examination Guidelines, Revision 8

- Published June 2016 – Implementation Date August 2017
- Additional Guidance
  - Preservice inspection requirements for tubes, sleeves, plugs and other repairs remain unchanged
  - Deleted all in service inspection requirements
    - Referenced Tech Specs for minimum inspection requirements
    - Referenced Tube Integrity documents (DA & OA) for additional requirements on sample plan and sample expansion

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Steam Generator Examination Guidelines, Revision 8

- Additional Guidance
  - New appendix (L) on automated data analysis
    - Introduced new guidance on allowing a single integrated auto analysis process with multiple algorithms versus two party data analysis on a single technique for alloys with no service-induced cracking
    - Human performance requirements for setting up automated analysis systems
    - Review requirements to the resolution process when employing a single automated analysis system
  - New appendix (N) on noise measurement and monitoring guidance

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Steam Generator Examination Guidelines, Revision 8

- Additional Guidance
  - Site Validation
    - Extending generic technique applicability requires a technical basis
    - Guidance for technique selection within families of ETSS's
  - Guidance on Demonstration/Qualification of non ET/UT techniques
  - Guidance on eliminating noise when sizing or doing historical comparisons

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NEI 03-08 Deviations

- Three long-term deviations
  - Two Steam Generator Examination Guidelines, R7
    - Single party auto analysis
  - Steam Generator Integrity Assessment Guidelines, R3
    - Use of site-specific sizing indices
- Two short term deviations
  - Steam Generator Examination Guidelines, R7
    - PSI prior to hydro
  - Secondary Water Chemistry Guidelines, R7
    - Exceeding control parameters during initial startup

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Operating Experience

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Indication in Alloy 690TT Tubing

- US plant with volumetric indication in Alloy 690TT tubing has completed a direct causal investigation
  - Shared with the industry through the INPO Operating Experience Database
  - The most probable causes are false call or pitting corrosion
  - The plant is conservatively considering pitting corrosion in their degradation assessment for future inspections

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NRC Discussions/Items of Interest

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Acronyms

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Acronyms

- AVB – Anti Vibration Bar
- EPRI – Electric Power Research Institute
- ETSS – Examination Technique Specification Sheet
- FEI – Fluid Elastic Instability
- IG – Interim Guidance
- IP – In Plane
- N/A – Not Applicable
- NEI – Nuclear Energy Institute
- NRC – Nuclear Regulatory Commission
- OOP – Out of Plane

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Acronyms

- PSI – Preservice Inspection
- PWR – Pressurized Water Reactor
- SG – Steam Generator
- SGMP – Steam Generator Management Program
- TBD – To Be Determined
- TSP – Tube Support Plate

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