Topical Report: U.S. Industry Performance Monitoring Plan for Steam Generator and Pressurizer Nozzle Inner Radii, Nozzle to Shell Weld, & Pressure Vessel Weld Examinations

Pre-Submittal Meeting

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Topics

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INTRODUCTION

Introduction (1/4)

- The objective of this topical report is to present a comprehensive performance monitoring inspection plan, for the U.S. industry, for optimizing Pressurized Water Reactor (PWR) Steam Generator (SG) and Pressurizer (PZR) component examinations

Introduction (2/4)

- There are 61 operating PWR units, currently, in the United States (U.S.) nuclear industry
- All units perform periodic examinations of their associated Steam Generator (SG) and Pressurizer (PZR) components, per ASME Code requirements
- On average, plant operating age is ~40 years, so over 2400 years of operating experience
- Initial survey of fleet (circa 2018) was performed to compile fleet-wide inspection data history
  - 47 plant in total responded; 44 US, 3 International
  - No rejectable indications reported in survey data
  - No rejectable indications exist in the 14 U.S. plants that did not respond, we know this by virtue of industry OE reporting practices and absence of submittal of such events to the NRC

Vessel Type	ASME Item Nos.
PWR Steam Generator	C2.21, C2.22
	B2.31, B2.32, B2.40, B3.130, C1.10, C1.20, C1.30
	C2.21
PWR Pressurizer	B2.11, B2.12, B2.21, B2.22, B3.110

Introduction (3/4)

- Research was performed to provide technical bases for optimizing these examinations using:
  - Survey(s) of U.S. PWR reactor fleet for:
    - Inspection history
    - Operating history
    - Component design parameters
  - Modern day engineering and probabilistic fracture mechanics analyses tools
  - Statistical analyses for relevance of population and occurrence
  - Assessment of operating conditions and transients
  - Assessment of primary and secondary degradation mechanisms
  - Sensitivity analyses
- Analyses were performed for 80 years of operation with the benchmark safety margin of 1.0×10^{-6} failures per year
- All PSI/ISI scenarios for the SG and PZR component materials were within the bounds of the safety margin

Introduction (4/4)

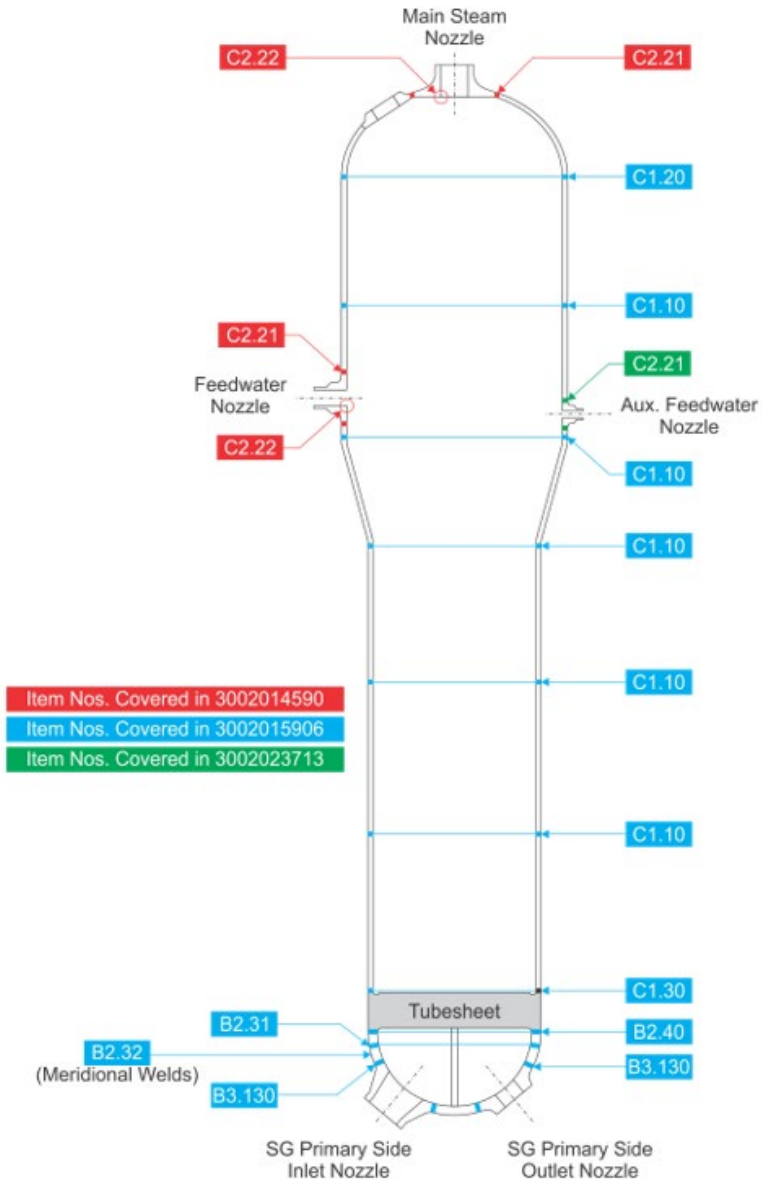
- The U.S. started with pilot plant applications to assess feasibility of the technical bases (listed below) and “Request for Alternative” process
- Steam Generator (SG) and Pressurizer (PZR) component technical bases:
  - **EPRI 3002014590** - *Technical Bases for Inspection Requirements for PWR Steam Generator Feedwater and Main Steam Nozzle-to-Shell Welds and Nozzle Inside Radius Sections*
  - **EPRI 3002015906** - *Technical Bases for Inspection Requirements for PWR Steam Generator Class 1 Nozzle-to-Vessel Welds and Class 1 and Class 2 Vessel Head, Shell, Tubesheet-to-Head and Tubesheet-to-Shell Welds*
  - **EPRI 3002023713** - *Technical Bases for Inspection Requirements for PWR Steam Generator Auxiliary Feedwater Nozzle-to-Shell Welds*
  - **EPRI 3002015905** - *Technical Bases for Inspection Requirements for PWR Pressurizer Vessel Head, Shell –to-Head and Nozzle-to-Vessel Welds*

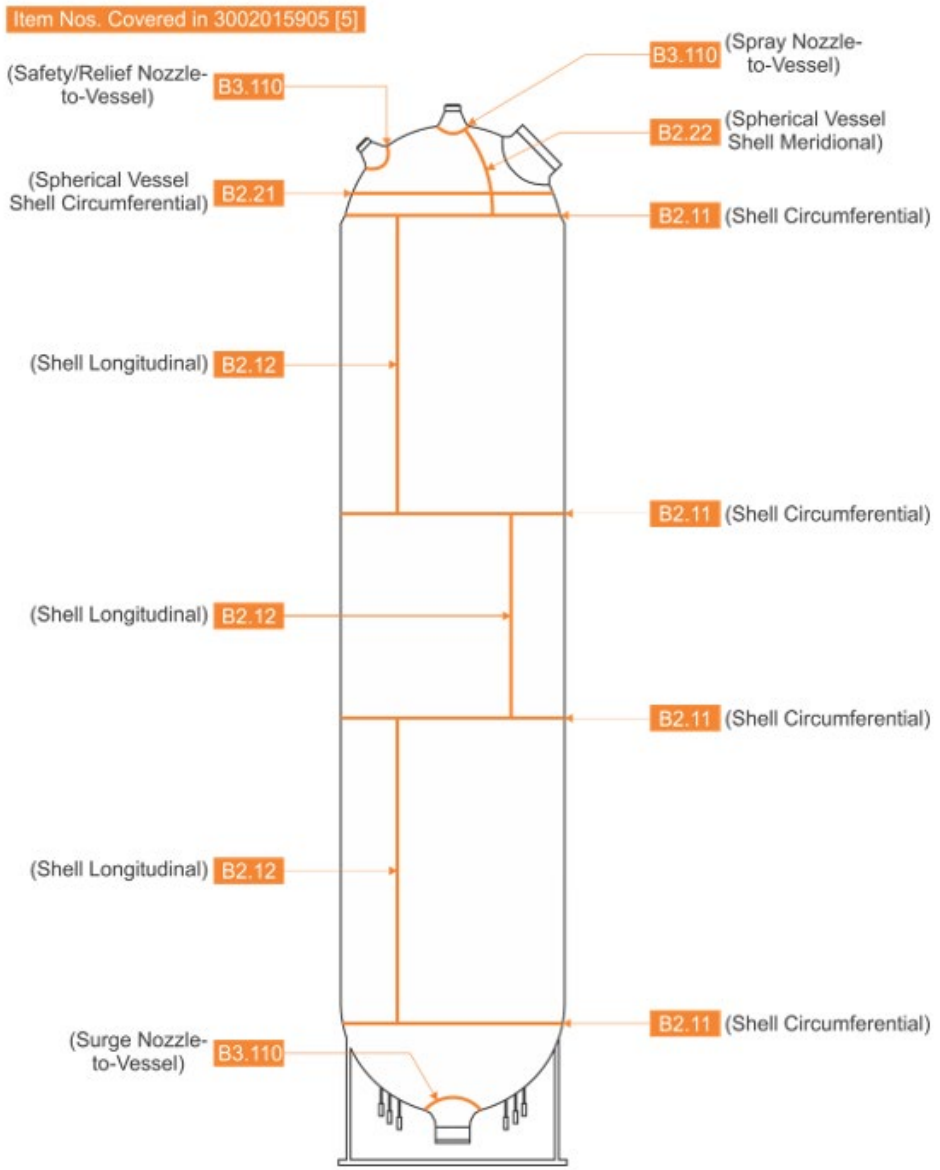
CURRENT ASME CODE SECTION XI EXAMINATION REQUIREMENTS

Current ASME Code Examination Requirements (1/2)

- The inspection requirements for SG and PZR components are specified in IWB-2500 and IWC-2500 for Class 1 and Class 2 components (respectively) in ASME Code, Section XI, generically:
  - Nozzle to Shell Welds
  - Nozzle Inner Radius
  - Pressure Vessel cylinder and head welds
- The prescribed item numbers and quantities are subject to examination within the 10-year in-service inspection interval
- The item numbers and quantities vary plant to plant, based on design

Current ASME Code Examination Requirements (2/2)

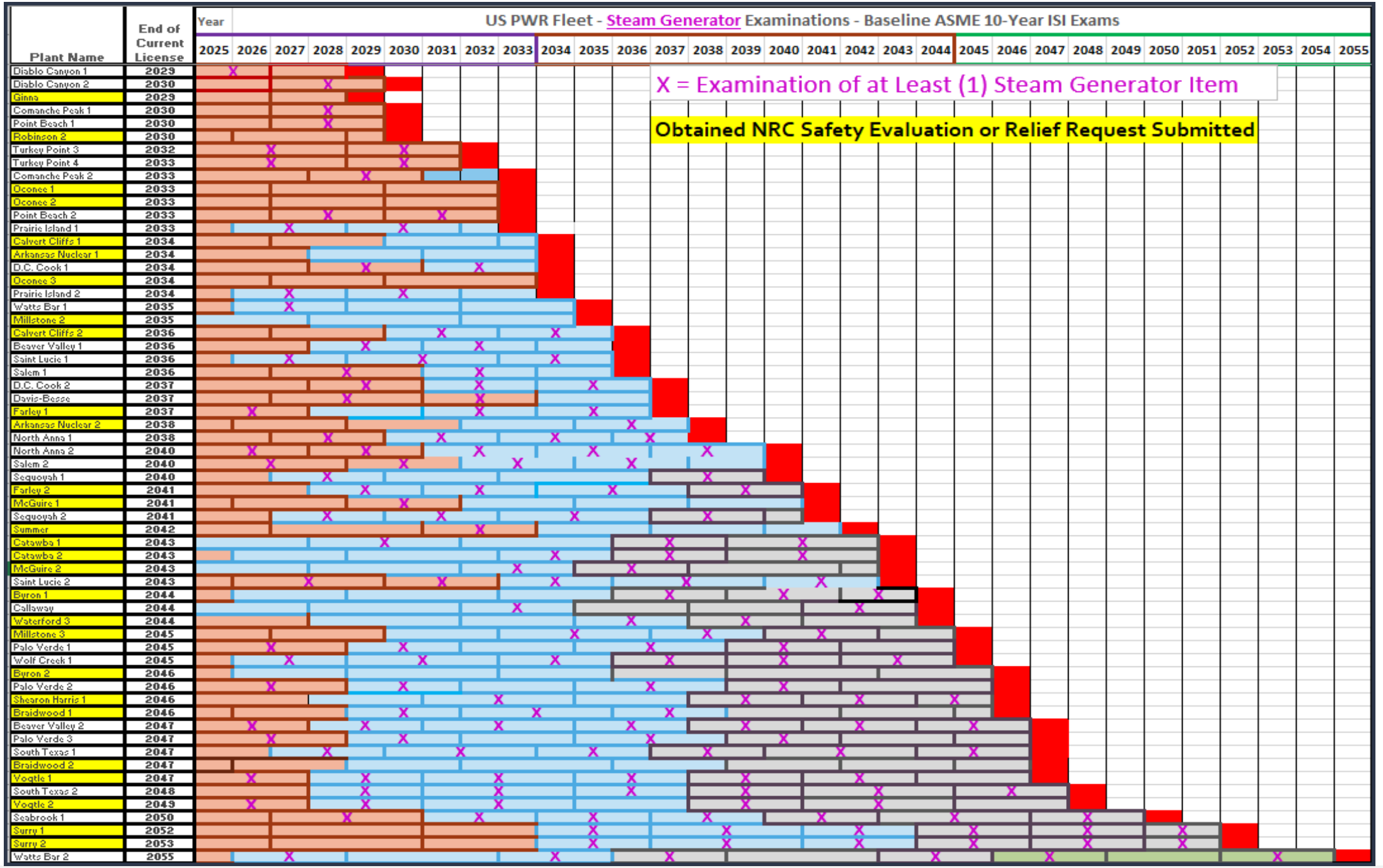


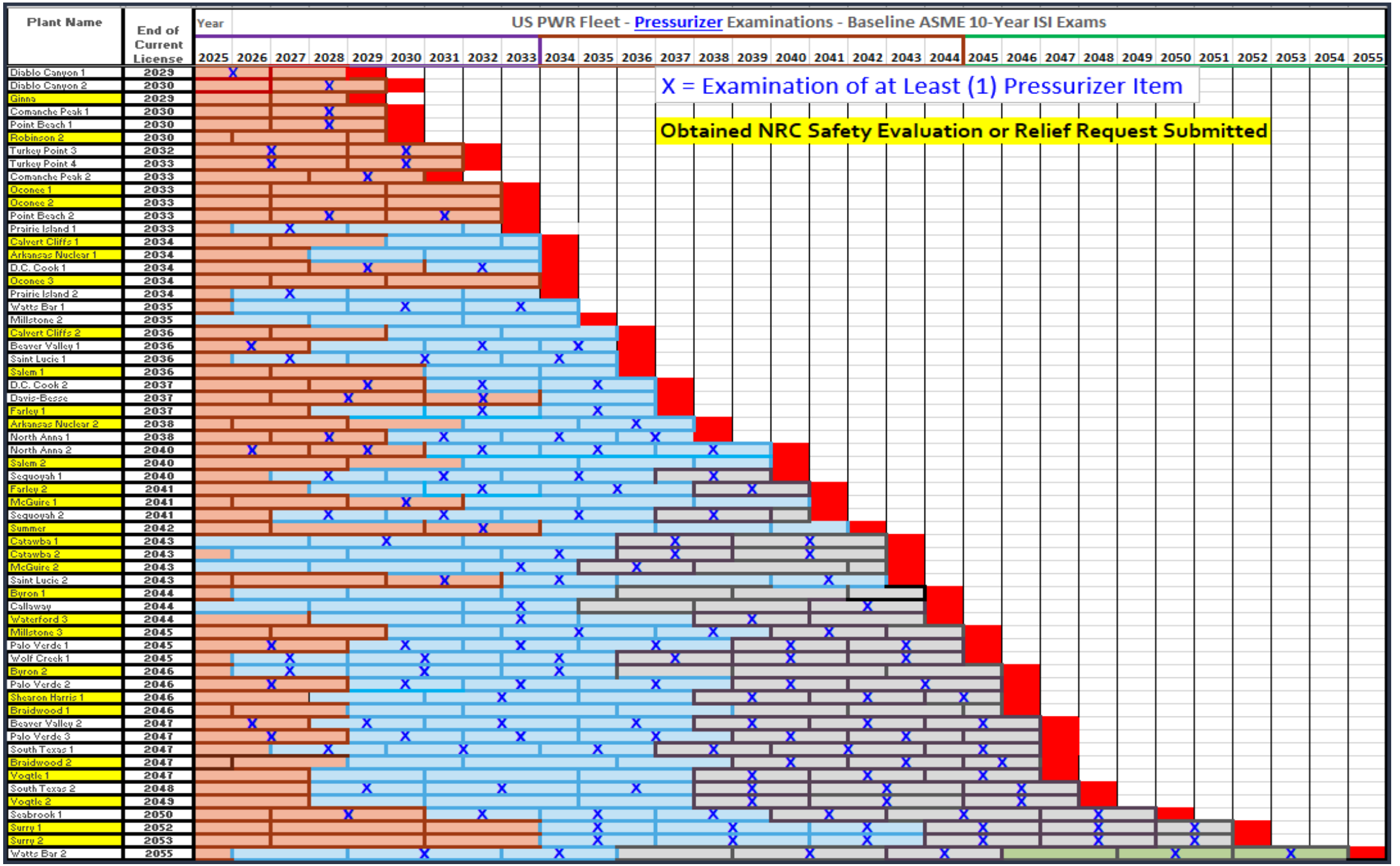


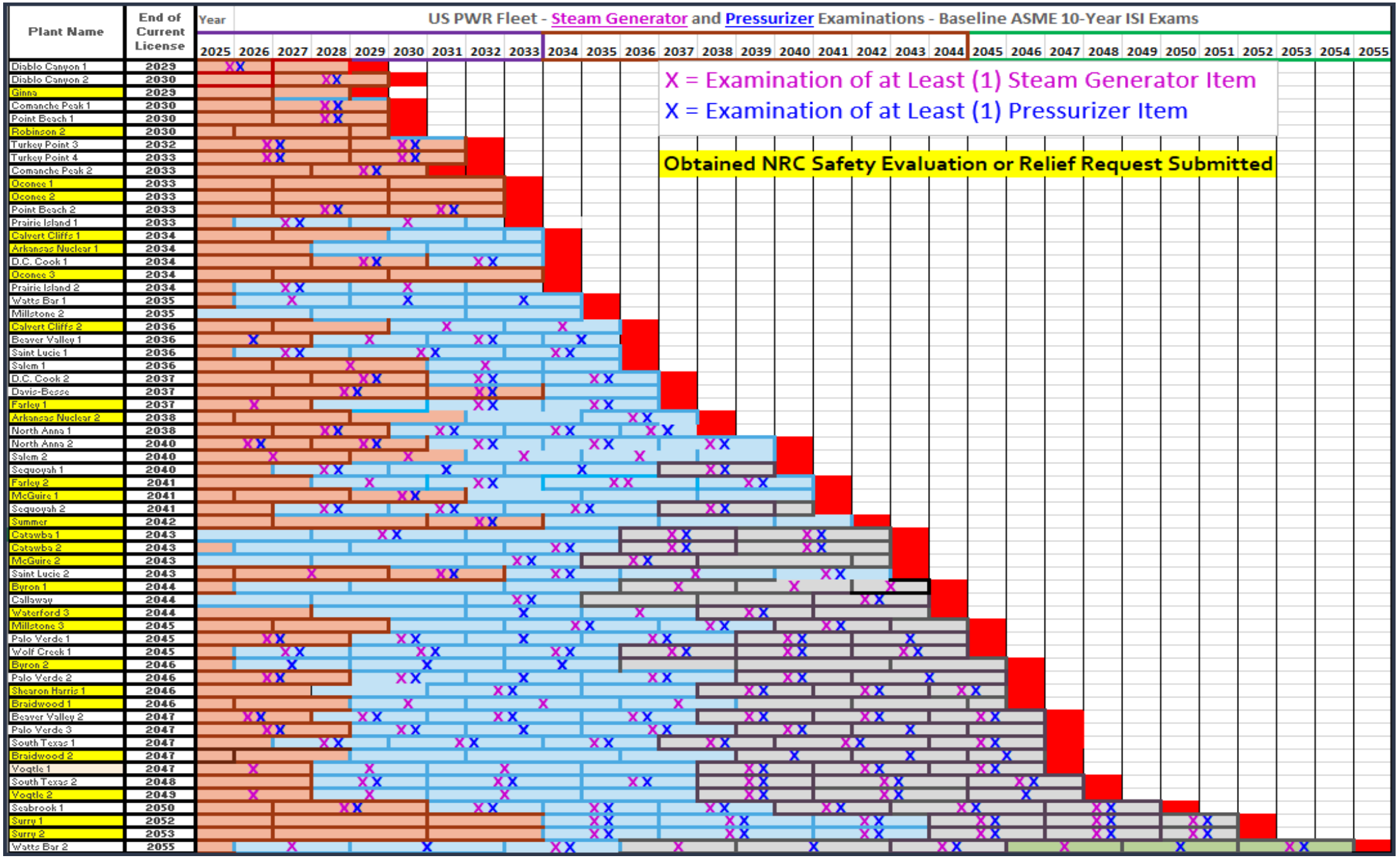
CURRENT STATUS OF INSPECTIONS FOR STEAM GENERATORS AND PRESSURIZERS IN THE US FLEET

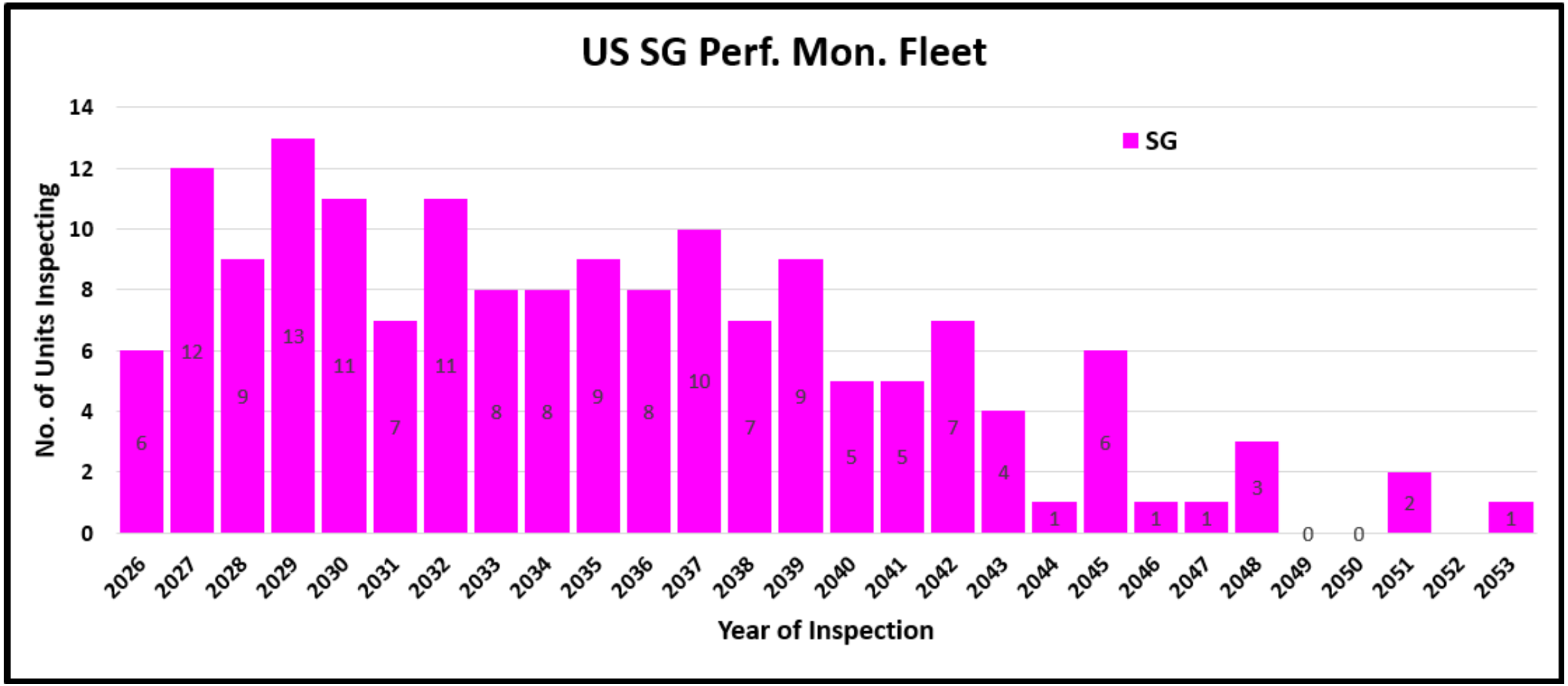
Current Status of Inspection Schedules for Steam Generators and Pressurizers of the U.S. PWR Fleet

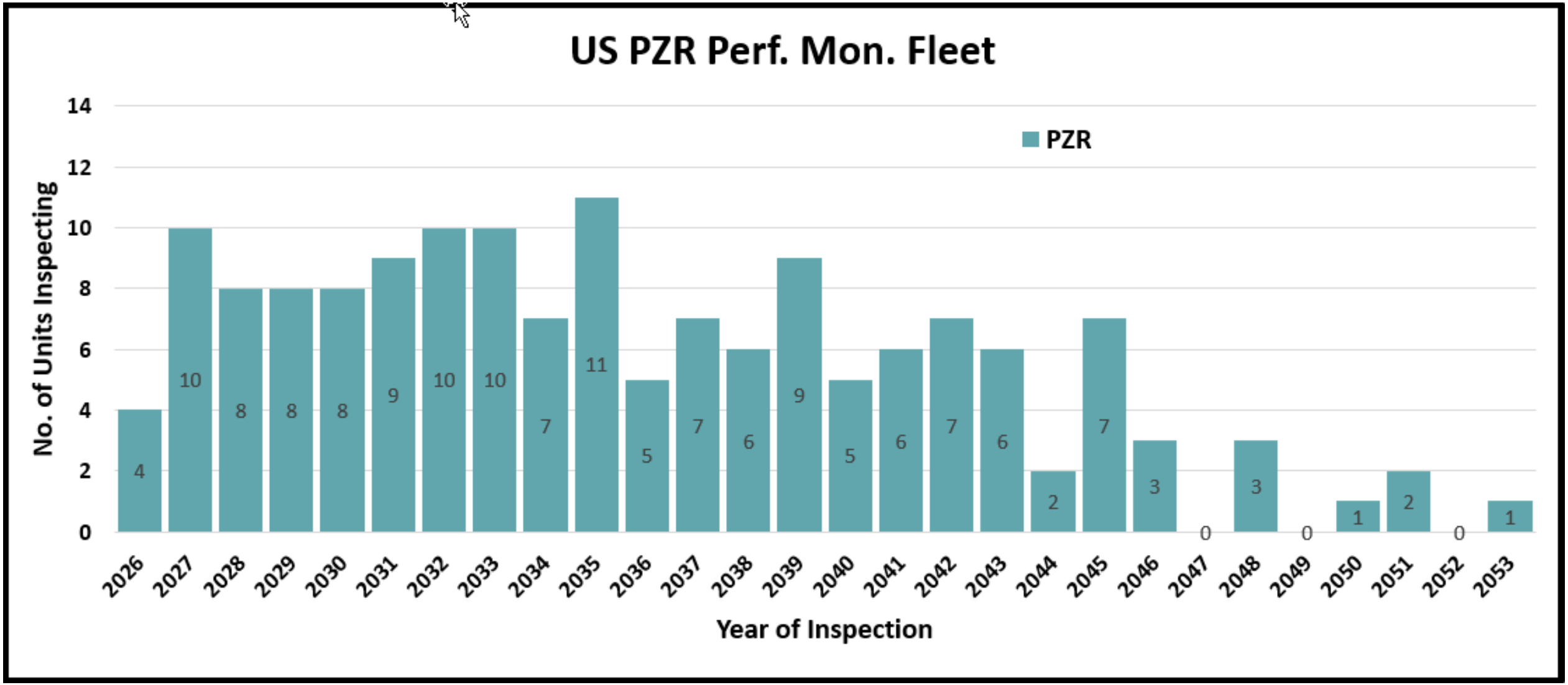
- EPRI conducted a survey of the U.S. industry, currently 61 operating units, to establish a baseline understanding of the inspection schedules from 2025 through the end of each unit's operating licenses
- 60 of the 61 operating unit replied to the survey
- The single outlier unit is a sister design to one of the other operating units, so conservative assumptions were for its inspection schedule and examination items
- The following (6) slides provide graphic and numeric representation of the status and baseline inspection plans for the industry, prior to applying any performance monitoring logic or justification

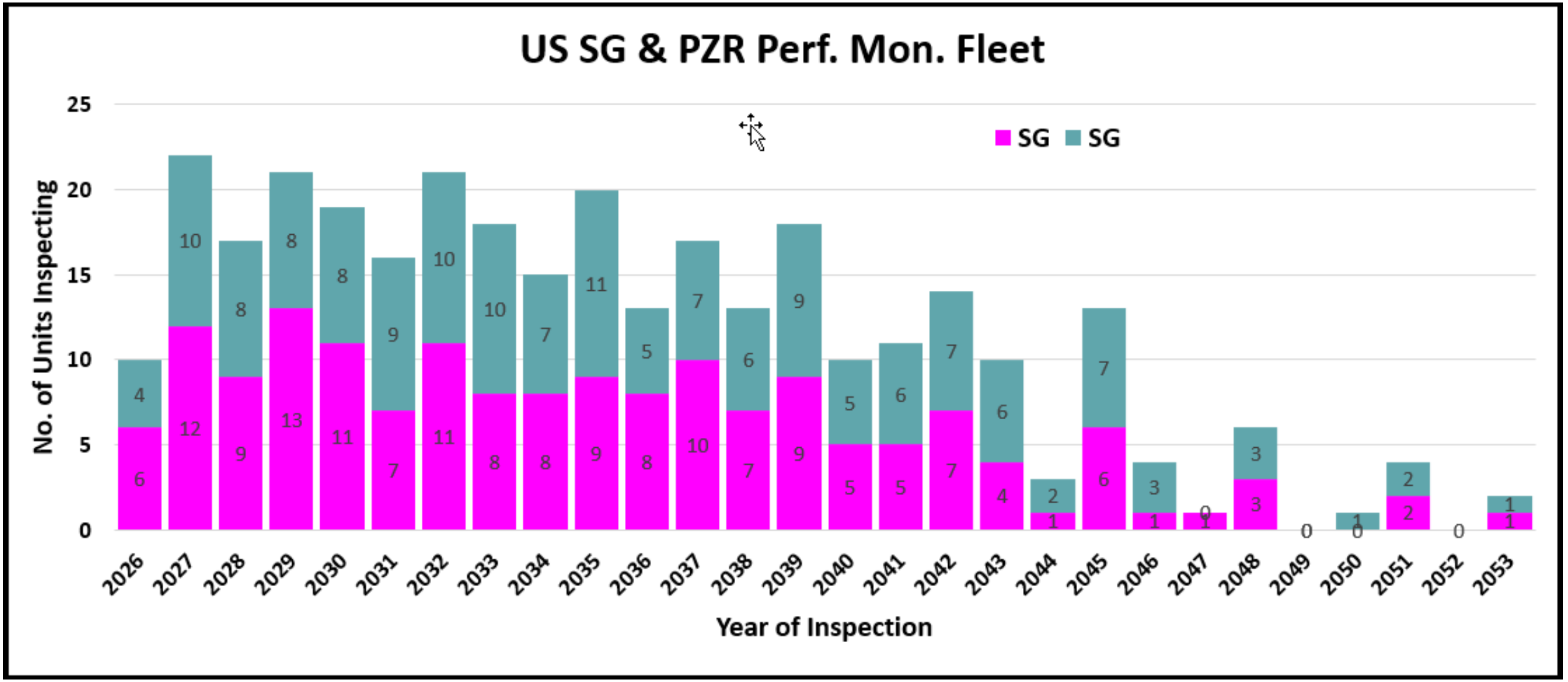












PERFORMANCE MONITORING

Performance Monitoring (1/6)

- Per the NRC, the purpose of a performance monitoring (PM) plan is to ensure:
  1. The NRC's binomial distribution model defining a minimum number of examinations that need to occur across the fleet during the current operating licenses for all plants is adhered to,
  2. Sufficient, continuous collection of examination data points, over the range of time aligned with current operating licenses for all plants, to identify known and unknown degradation mechanisms in a timely manner is achievable, and
  3. Confirm the adequacy of this technical basis
- The binomial distribution model produces ~25% sampling criterion of the current prescribed ASME 10-year ISI inspection items
- The NRC validated this approach when evaluating the effectiveness of the Duke Energy submitted PM plan for their PWR fleet's SG and PZR optimized examination schedule

Performance Monitoring (2/6)

- The previously mentioned survey, of the currently operating 61 PWR units, provided the necessary information to aggregate, compile, and tabulate the specific industry-wide data points to formulate a PM plan for SG and PZR components (see information provided in the next 3 slides)
- The number of inspections that must be performed by the U.S. industry through the end of currently licensed operating lives for all U.S. PWR units are divided into two groups:
  - Group 1 - Units that have NRC-approved optimized inspection plans that includes a PM plan for future inspections. Any units that have NRC-approved optimized inspection plans, but where part of that commitment is to revert to a typical 10-year ISI interval in the future, will be accounted for in Group 2
  - Group 2 – Units that either (1) do not currently have an NRC-approved optimized inspection plan (including a plant-specific PM plan for future inspections) or (2) have an NRC-approved inspection plan (including a plant-specific PM plan for future inspections) that reverts to typical 10-year ISI intervals in the future. To meet the 25% sampling criterion on a U.S. PWR fleet-wide basis, this second group must account for all inspections not addressed by Group 1. To achieve this criterion, a conservative value of 38% sampling was applied

Performance Monitoring (3/6)

This is an excerpt of the larger compilation for the sake of providing an example:

First Page of Steam Generator Spreadsheet Tabulation of Survey Data on 10-year ISI Inspection Items

Plant Name	End of Current License	Design	No. of SG Components Inspected per Interval	Remaining Intervals (=> 6 years)	Total # of Inspection Opportunities	Remaining Intervals (=> 6 years) w/ ASME Inspections	SER PM Exam Commitments (# of Inspections)	Binomial Distribution # of Inspections (Approx. 38%)
Diablo Canyon 1	2024	W4L	7	1	7	1		3
Diablo Canyon 2	2025	W4L	7	1	7	1		3
Ginna	2029	W2L	7	1	7	0	0	0
Comanche Peak 1	2030	W4L	11	1	11	1		4
Point Beach 1	2030	W2L	10	1	10	1		4
Robinson 2	2030	W3L	10	1	10	0	0	0
Turkey Point 3	2032	W3L	10	1	10	1		4
Turkey Point 4	2033	W3L	10	1	10	1		4
Comanche Peak 2	2033	W4L	10	1	10	1		4
Oconee 1	2033	B&W	6	1	6	0	0	0
Oconee 2	2033	B&W	6	1	6	0	0	0
Point Beach 2	2033	W4L	7	1	7	1		3
Prairie Island 1	2033	W2L	8	1	8	1		3
Calvert Cliffs 1	2034	CE	14	1	14	0	0	0
Arkansas Nuclear 1	2034	B&W	10	1	10	0		0
D.C. Cook 1	2034	W4L	9	1	9	1		3
Oconee 3	2034	B&W	6	1	6	0	0	0

Performance Monitoring (4/6)

This is an excerpt of the larger compilation for the sake of providing an example:

First Page of the Pressurizer Spreadsheet Tabulation of Survey Data on 10-year ISI Inspection Items

Plant Name	End of Current License	Design	No. of PZR Components Inspected per Interval	Remaining Intervals (=> 6 years)	Total # of Inspection Opportunities	Remaining Intervals (=> 6 years) w/ ASME Inspections	SER PM Exam Commitments (# of Inspections)	Binomial Distribution # of Inspections (Approx. 38%)
Diablo Canyon 1	2024	W4L	4	1	4	1		2
Diablo Canyon 2	2025	W4L	10	1	10	1		4
Ginna	2029	W2L	4	1	4	0	0	0
Comanche Peak 1	2030	W4L	10	1	10	1		4
Point Beach 1	2030	W2L	4	1	4	1		2
Robinson 2	2030	W3L	4	1	4	0	0	0
Turkey Point 3	2032	W3L	4	1	4	1		2
Turkey Point 4	2033	W3L	4	1	4	1		2
Comanche Peak 2	2033	W4L	10	1	10	1		4
Oconee 1	2033	B&W	10	1	10	0	0	0
Oconee 2	2033	B&W	10	1	10	0	0	0
Point Beach 2	2033	W4L	4	1	4	1		2
Prairie Island 1	2033	W2L	4	1	4	1		2
Calvert Cliffs 1	2034	CE	10	1	10	0	0	0
Arkansas Nuclear 1	2034	B&W	10	1	10	0	0	0
D.C. Cook 1	2034	W4L	4	1	4	1		2
Oconee 3	2034	B&W	10	1	10	0	0	0
Prairie Island 2	2034	W2L	4	1	4	1		2

Performance Monitoring (5/6)

Parameter	SGs	PZRs
Total Inspection Opportunities (under current ASME Code, Section XI requirements)	893	882
Number of U.S. PWR fleet-wide PM Inspections to Meet the NRC's Binomial Distribution Model @ 25% Criterion	223	220
Inspections in Accordance with NRC approved SERs with PM plans	18	18
Remaining 10-year ISI Interval Inspections @ 38% (% based on conservative calculations to meet the NRC's Binomial Distribution Model @ 25% Criterion)	251	227
Total number of U.S. PWR fleet-wide PM Inspections Planned	269	245
Percentage of Total Inspection Opportunities	30%	28%

Performance Monitoring (6/6)

- The following items add inherent and qualitative conservatisms to the PM plan for SG and PZR components for the U.S. PWR fleet
  - The international fleet of operating commercial nuclear reactors (~246), over four times the number of PWRs in the U. S., continue to follow the inspection guidelines of ASME Code, Section XI or similar international codes.
  - Restarts of U.S. commercial nuclear reactors, up to three units, are not currently part of the overall PM plan. Assumptions are they will conduct a full set of ASME examinations as part of their restart protocol
  - Recent “new starts” of U.S. commercial nuclear reactors, two AP1000 units, are not part of the overall PM plan and continue to perform examinations per ASME Code
  - License renewals of U.S. commercial nuclear reactors will eventually fold into the overall PM plan, increasing the number of data points and distributions of examinations

Additional Inherent and Qualitative Conservatisms

INSPECTION PLAN FOR STEAM GENERATORS AND PRESSURIZERS

Inspection Plan for Steam Generators and Pressurizers (1/19)

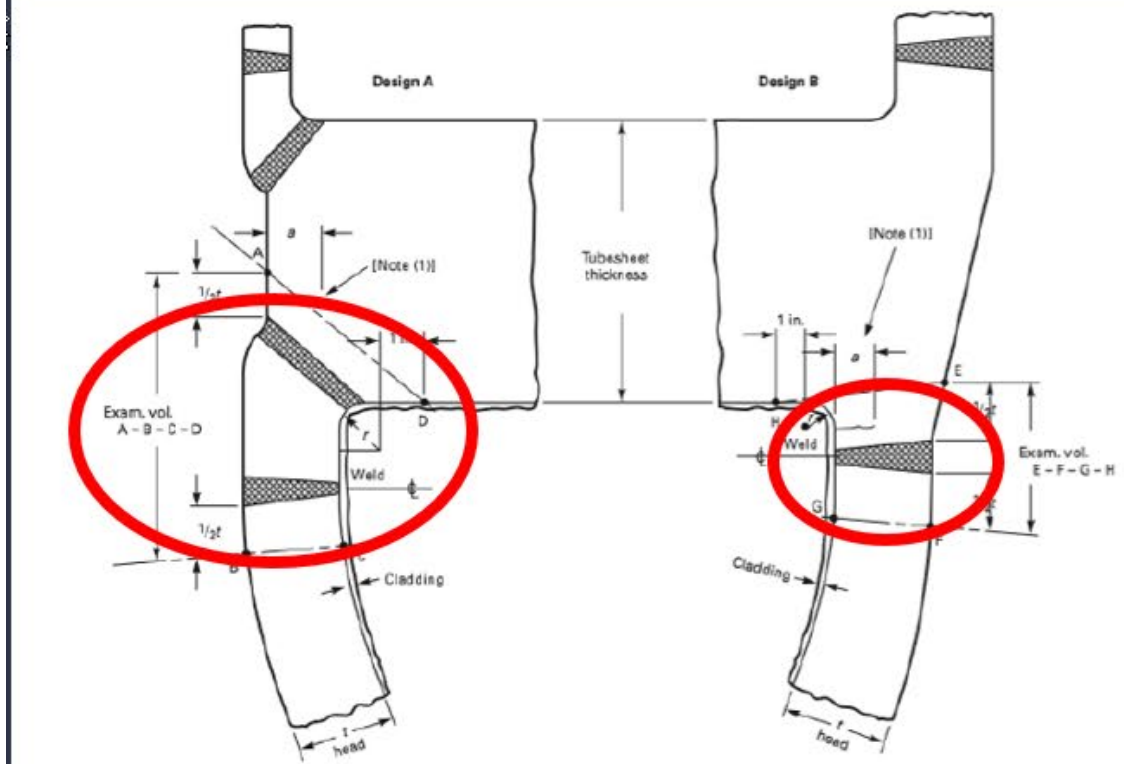
- The U.S. PWR fleet-wide PM inspection plan for SGs and PZRs is designed to achieve the following objectives:
  - Perform sufficient U.S. PWR fleet-wide inspections during the currently licensed operating lives of all operating U.S. PWRs to meet the 25% sampling criterion from the NRC's binomial distribution model
  - Provide sufficient, ongoing inspections over the currently licensed operating lives of all U.S. PWRs to identify possible novel/unknown degradation mechanisms in a timely manner
- There are 9 Item Nos. associated with the SG Component:
  - 4 on the primary side; B2.31, B2.32, B2.40 and B3.130
  - 5 on the secondary side; C1.10, C1.20, C1.30, C2.21 and C2.22
- There are 5 Item Nos. associated with the PZR Component; B2.11, B2.12, B2.21, B2.22, and B3.110

Inspection Plan for Steam Generators and Pressurizers (2/19)

Steam Generator Inspection Item(s) – Logic for Item No. Selection per Plant

- In cases where two components are required to be inspected, it is recommended that one Item No. B2.40 component and one Item No. C2.22 component (for the feedwater nozzle) be inspected, since these are both critical stress locations (see next 2 slides)
- In cases where three or more components are required to be inspected:
  - The two Item Nos. above should be inspected
  - Item No. C2.21 component for the feedwater nozzle should also be inspected since this is an additional critical stress location
  - Any additional components can be selected from the remaining Item Nos. and should be prorated roughly equally between primary- and secondary-side welds

Inspection Plan for Steam Generators and Pressurizers (3/19)

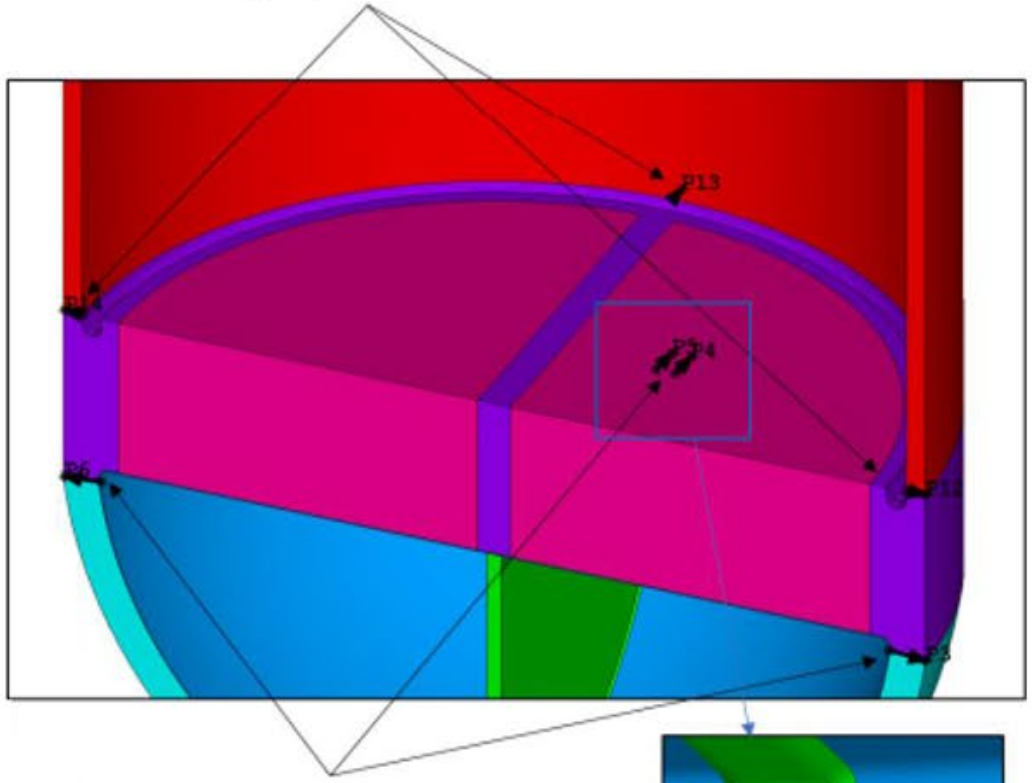


ERAL NOTE: All flaws are exaggerated in size and scale.

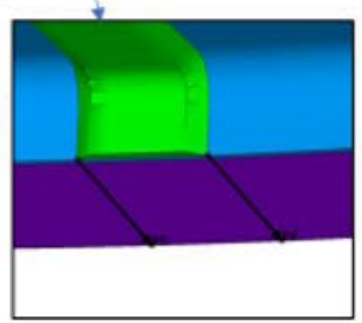
E:
laminar flaws within examined volume of tubesheet are considered planar flaws.

ASME Code, Section XI, Figure IWB-2500-6, Typical Tubesheet-to-Head Weld Joints (Item No. B2.40)

Paths P12, P13, and P14 for Vessel-to-Tubesheet Weld

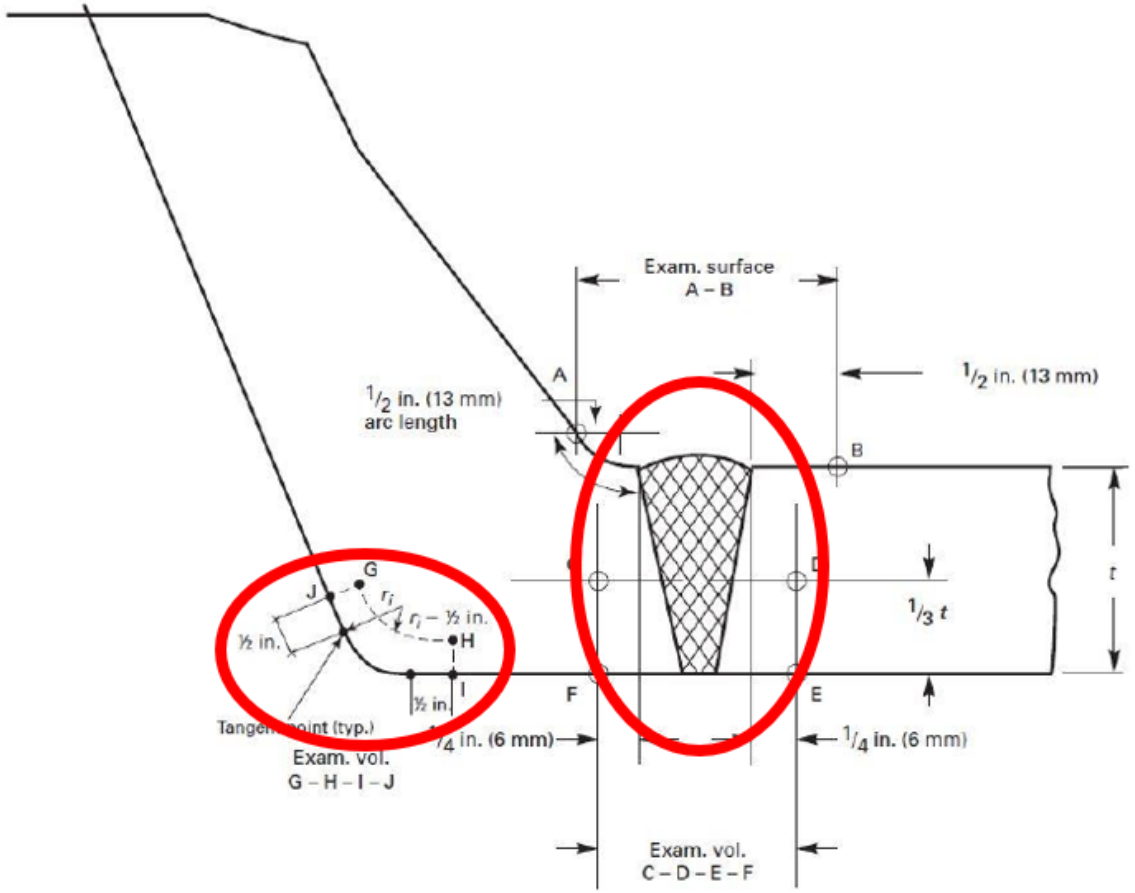


Paths P3 through P6 for Lower Head-to-Tubesheet Weld



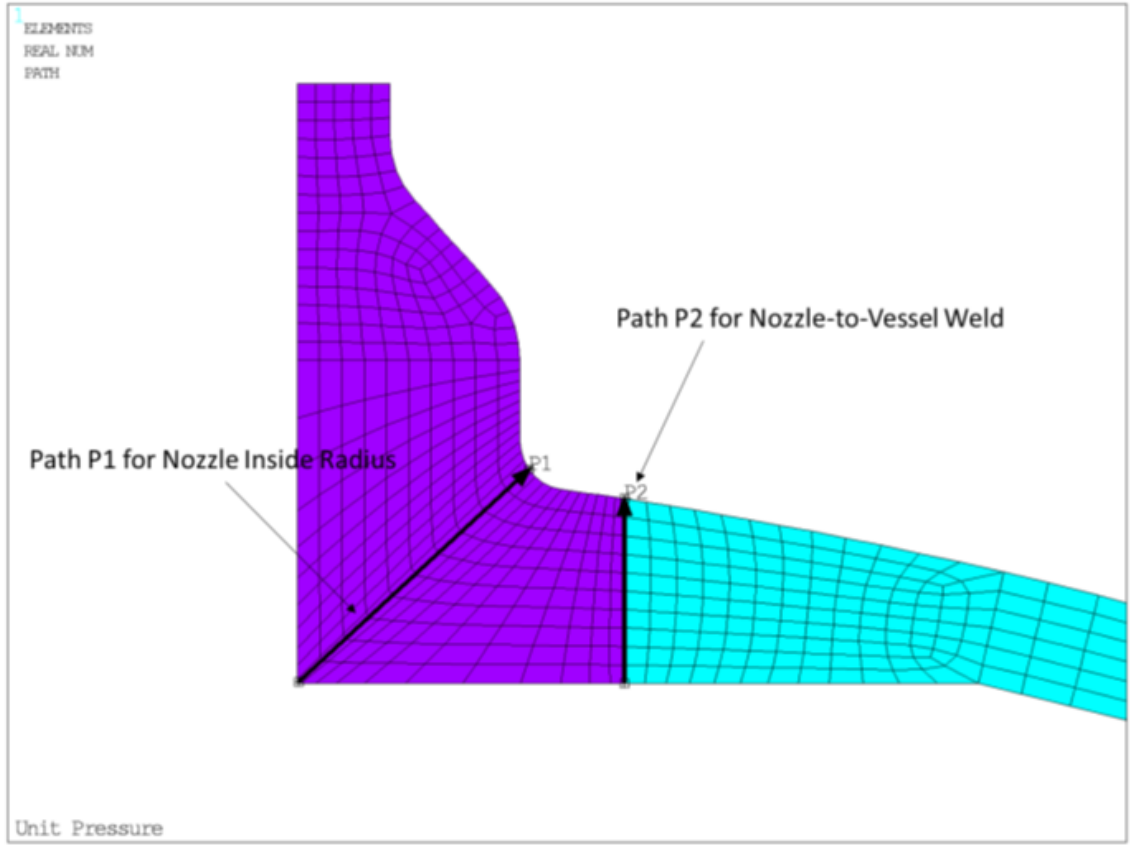
Item No. B2.40 – Head to Tubesheet Weld

Inspection Plan for Steam Generators and Pressurizers (4/19)



(a) See Notes (1), (2), and (3)

ASME Code, Section XI, Figure IWC-2500-4(a)



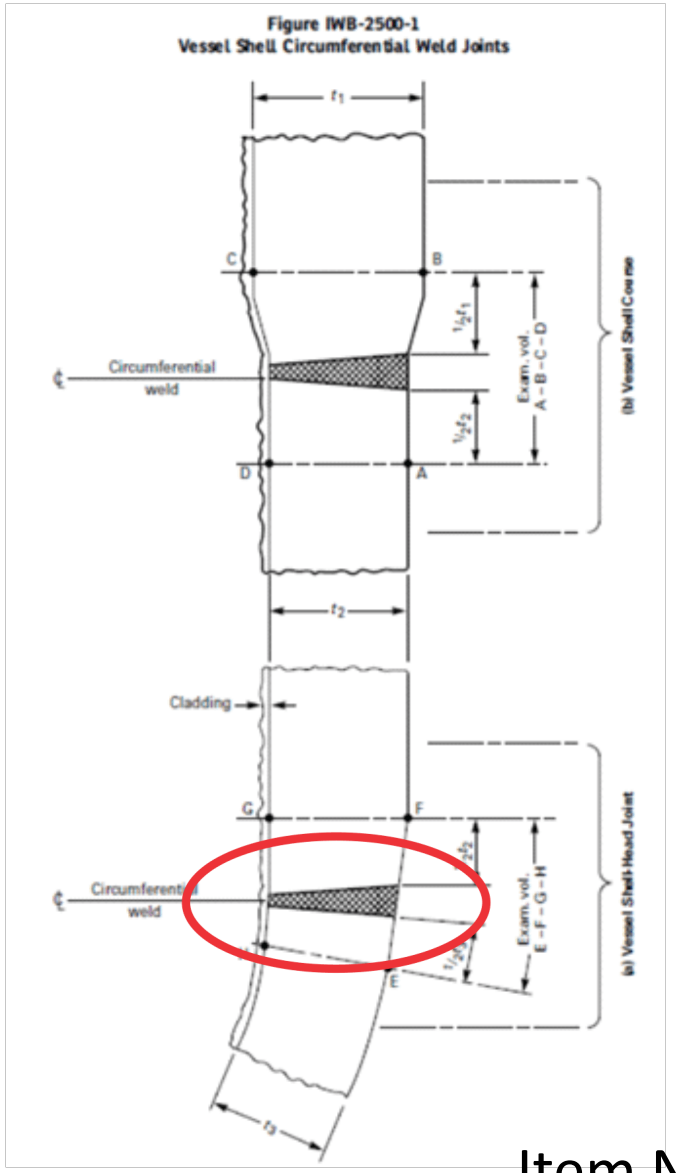
Item No. C2.22 – Feedwater Nozzle to Shell & Item No. C2.21 - Nozzle Inner Radius

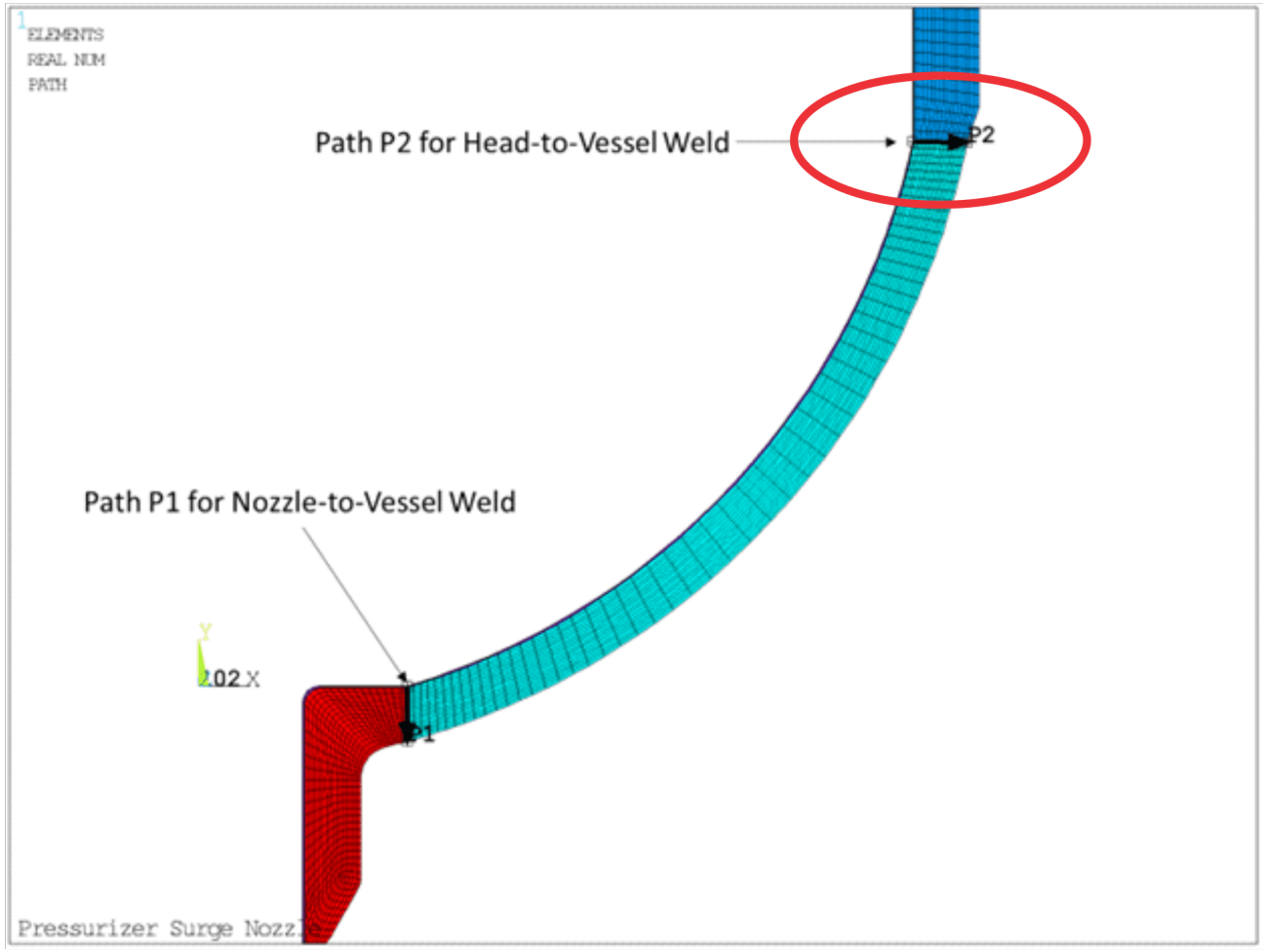
Inspection Plan for Steam Generators and Pressurizers (5/19)

Pressurizer Inspection Item(s) – Logic for Item No. Selection per Plant

- In cases where only one component is required to be inspected, it is recommended that Item No. B2.11 component on the bottom head be inspected since this is the critical stress location (see next 2 slides)
- In cases where two or more components are required to be inspected:
  - The Item No. above should be inspected.
  - Item No. B3.110 component for the surge line should also be inspected since this is an additional critical stress location
  - Any additional components can be selected from the remaining Item Nos. and should include at least one Item No. B2.12 component.

Inspection Plan for Steam Generators and Pressurizers (6/19)

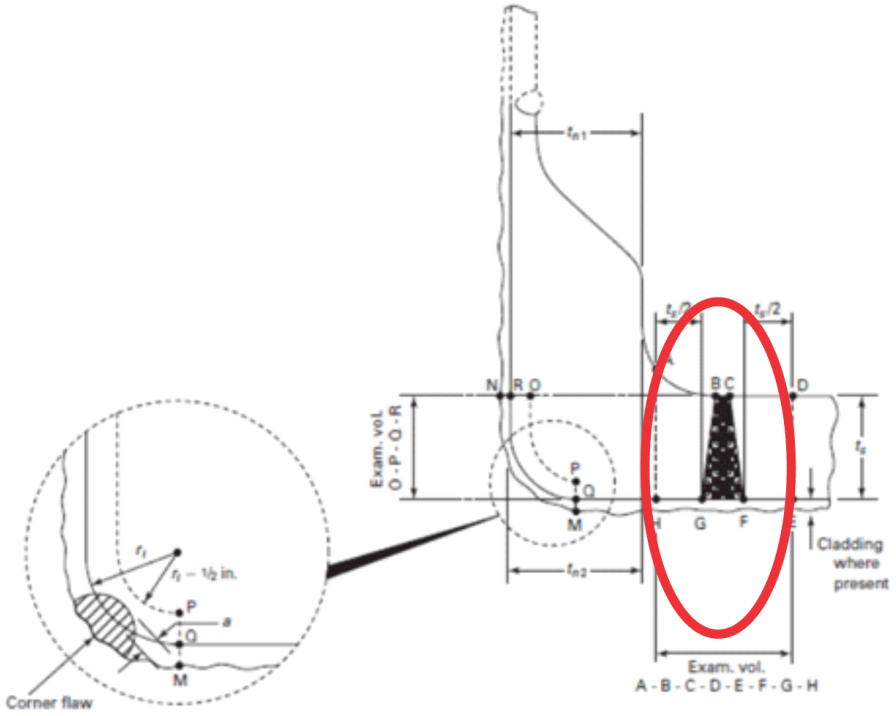




Item No. B2.11 – Bottom Head Weld

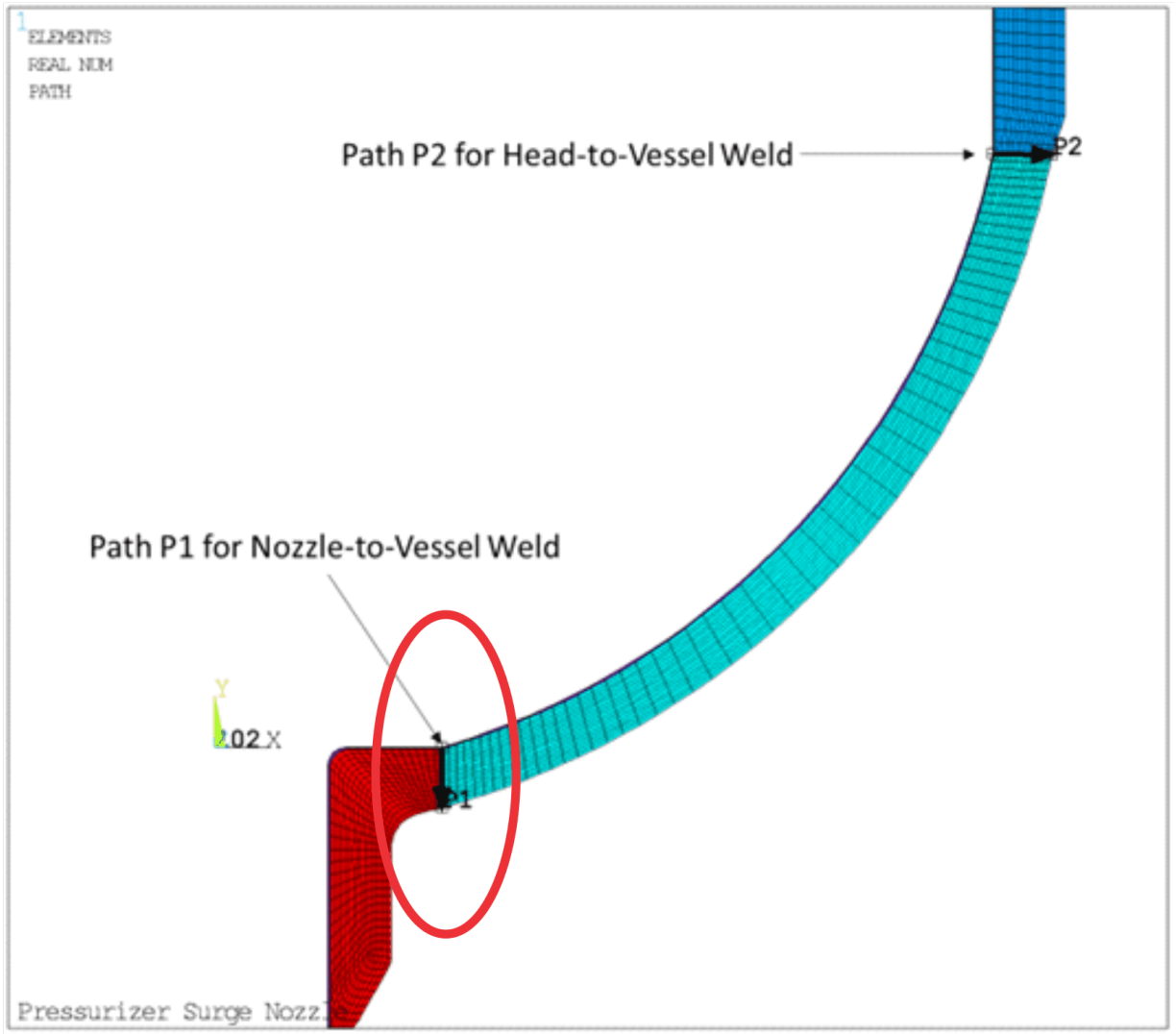
Inspection Plan for Steam Generators and Pressurizers (7/19)

Figure IWB-2500-7(b)
Nozzle in Shell or Head
(Examination Zones in Flange Type Nozzles Joined by Full Penetration Butt Welds)



EXAMINATION REGION [Note (1)]	EXAMINATION VOLUME [Note (2)]
Shell (or head) adjoining region	C-D-E-F
Attachment weld region	B-C-F-G
Nozzle cylinder region	A-B-G-H
Nozzle inside corner region	O-P-Q-R

Legend:
r_i = nozzle inside corner radius
t_s = shell (or head) thickness
t_{n1}, t_{n2} = nozzle wall thickness
NOTES:
(1) Examination regions are identified for the purpose of differentiating the acceptance standards in IWB-3512.
(2) Examination volumes may be determined either by direct measurements on the component or by measurements based on design drawings.

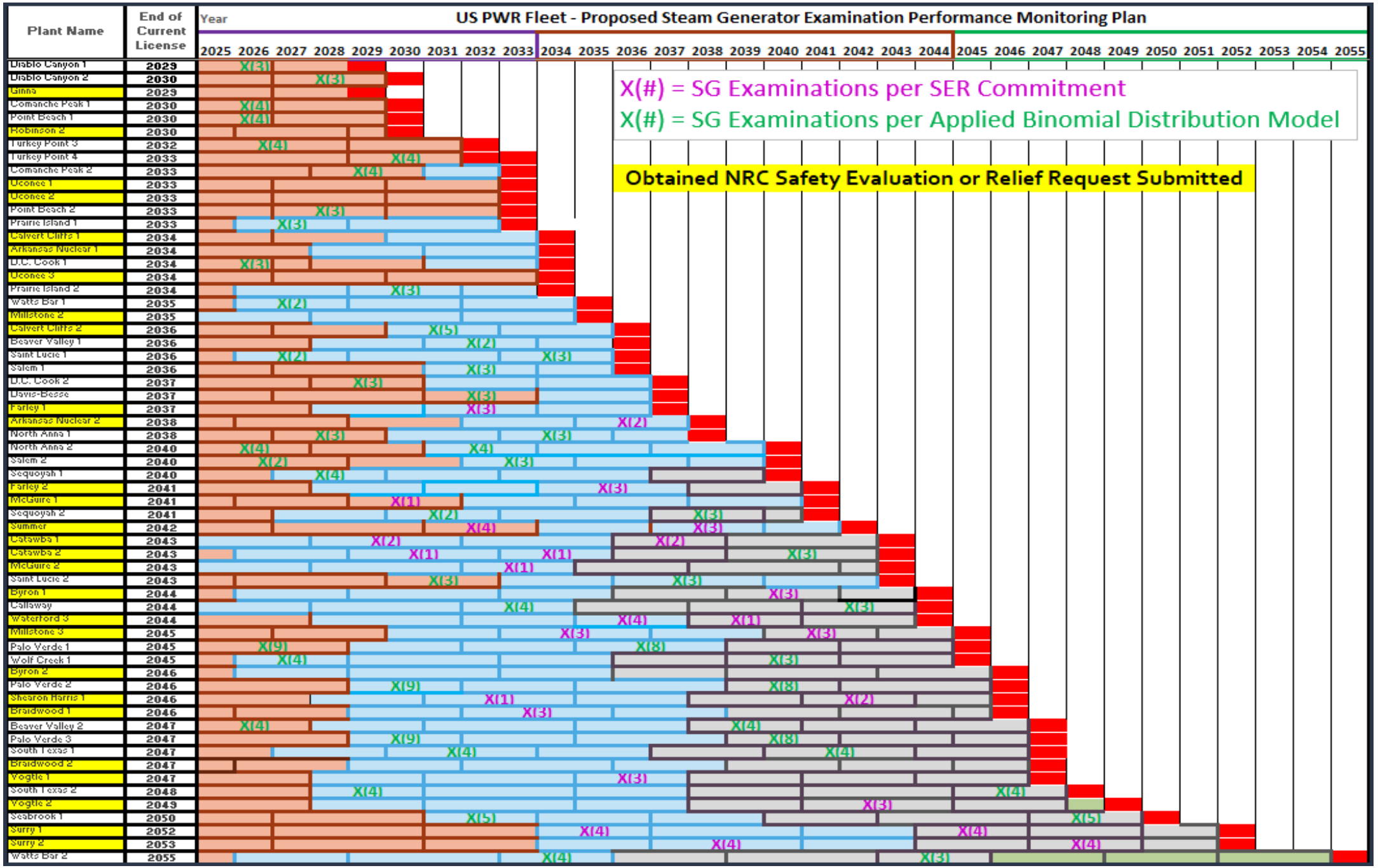


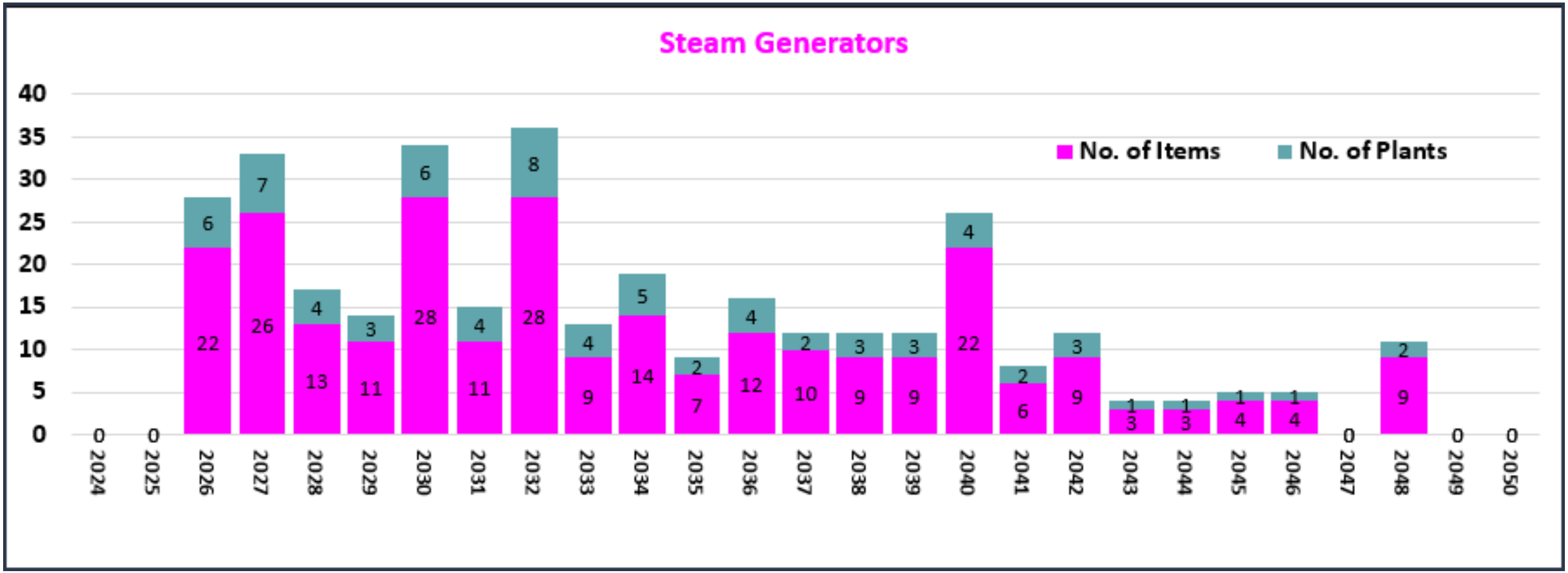
Item No. B3.110 – Nozzle to Vessel Weld

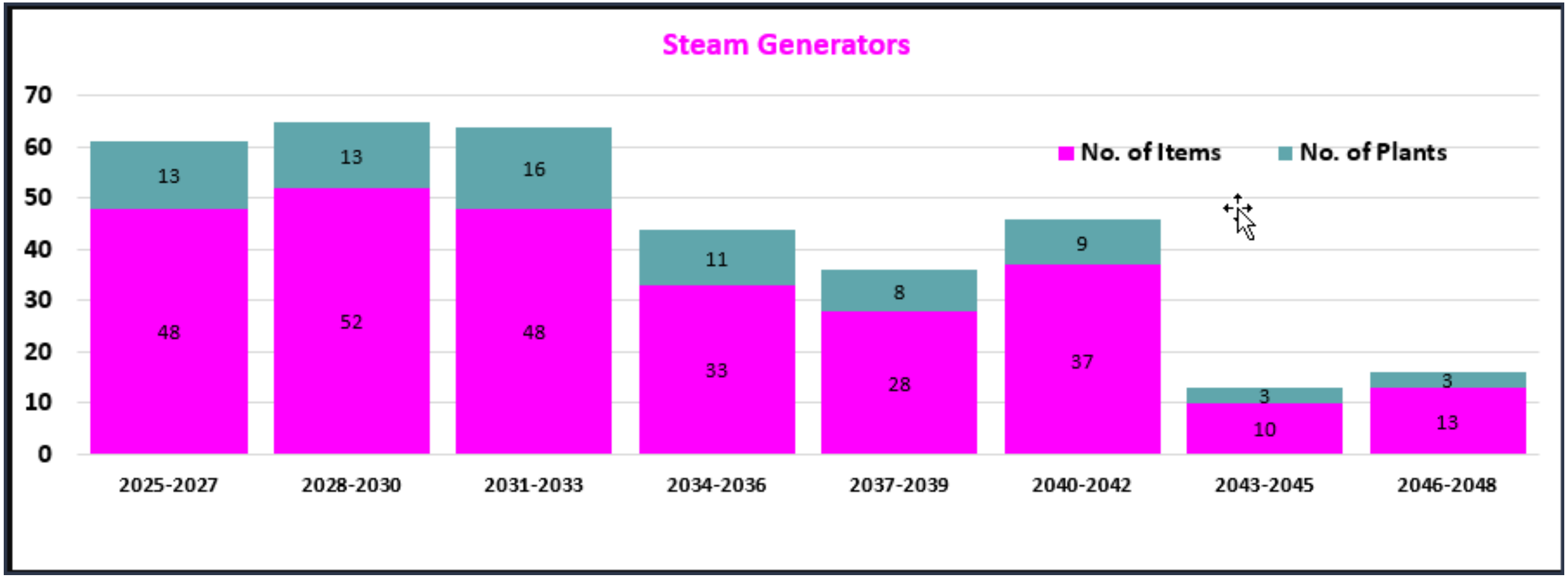
Inspection Plan for Steam Generators and Pressurizers (8/19)

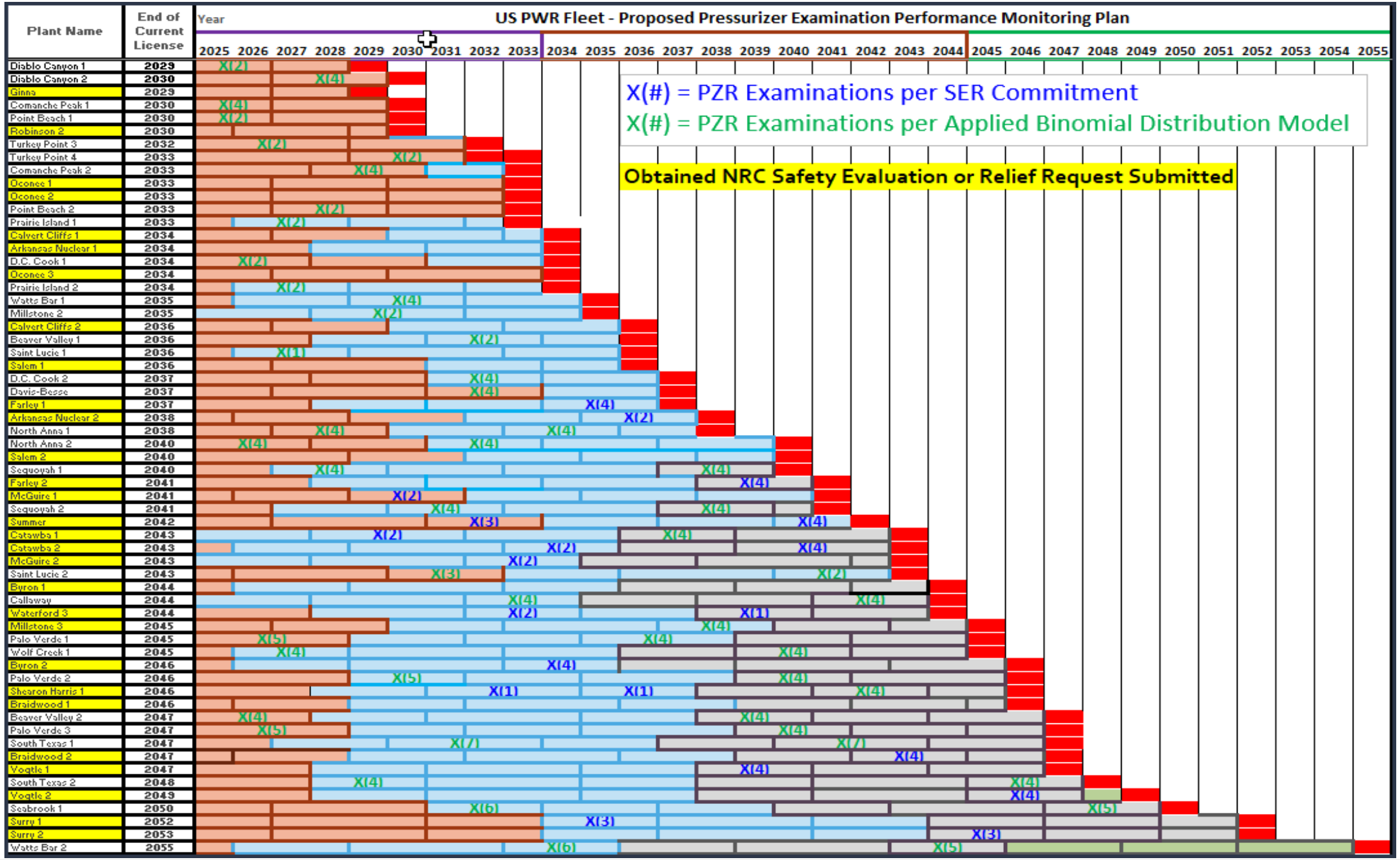
SG & PZR Inspection Item(s) – Logic for Distribution

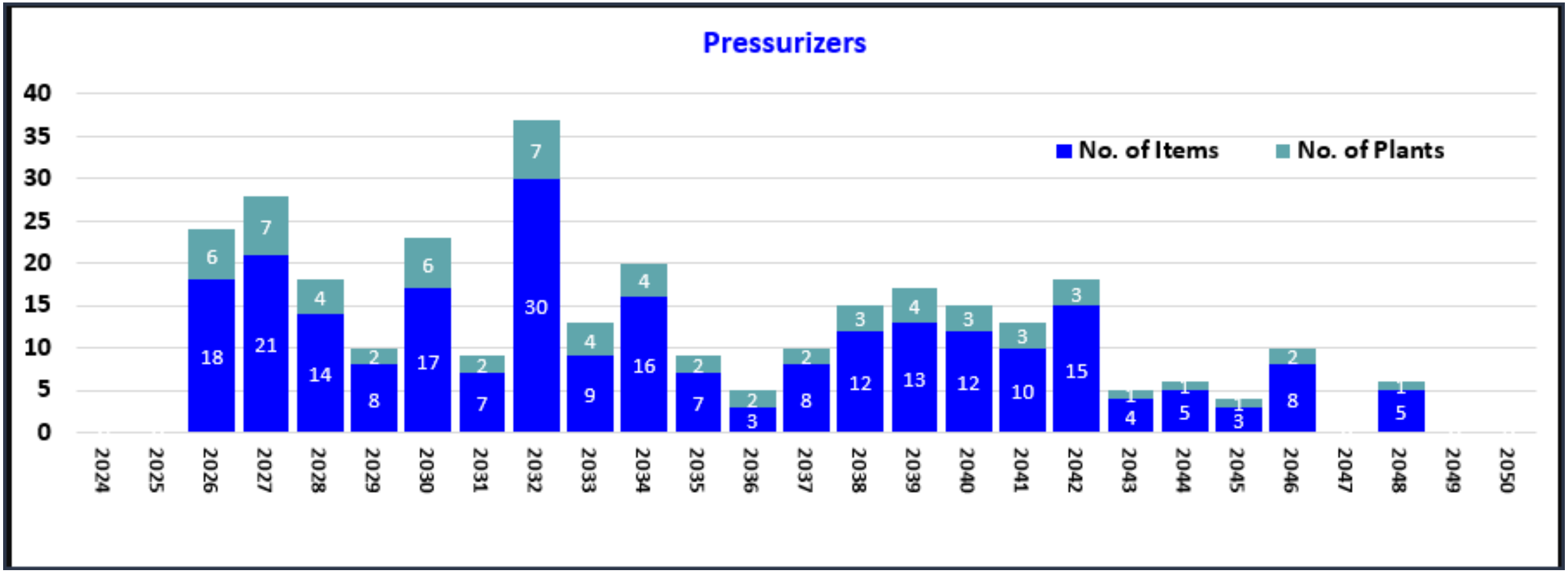
- The following (6) slides present the graphical illustration of the proposed SG & PZR inspection schedule and number of examinations for the U.S. PWR fleet
- It assumes that all inspections are performed at the time indicated to maintain continuous annual inspections
- The following logic was used:
  - The PWR units with the earliest license expiration dates have priority to inspect at the first available opportunity
  - At least (2) PWR units inspect every year, until 2043 **(ELABORATE!!)**
  - Approximately (10) components are inspected every year, until 2043 **(ELABORATE!!)**
  - No PWR unit inspects more than two times during their currently licensed operating period

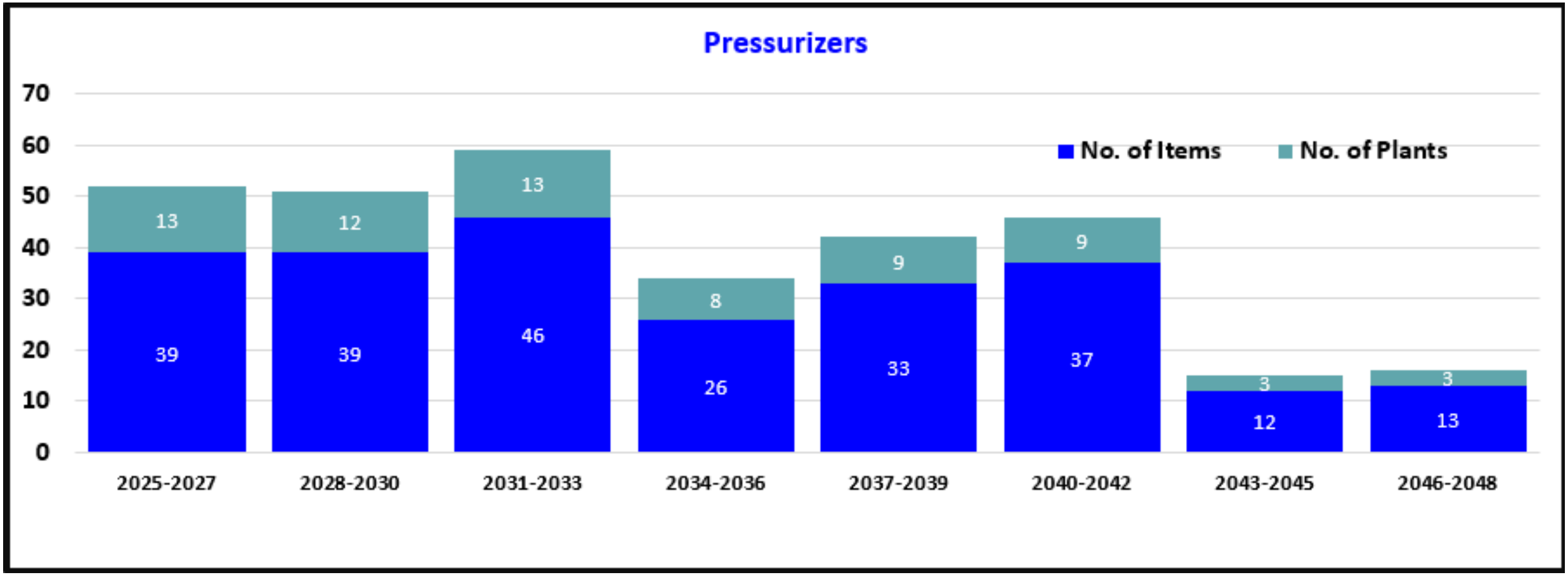












Inspection Plan for Steam Generators and Pressurizers (15/19)

SG & PZR Inspection Item(s) – Logic for Adjustments/Flexibility in Examination Schedule

- If a PWR unit has more than one component identified for inspection, the components can be split into two different inspection periods. In addition:
  - Any PWR unit with three exams or less can:
    - Perform the exams within one period (before or after) the prescribed period but cannot change the interval in which it is assigned
    - Divide the exams within the interval in which they are assigned
  - Any PWR unit with four or more exams can:
    - Perform at least two exams within one period (before or after) the prescribed period(s) but cannot change the interval in which they are assigned
    - Divide the exams within the interval in which they are assigned
- The following are prohibited while implementing the inspection plan:
  - Changing the number of examinations assigned
  - Changing the designated Item Nos. assigned
  - Combining examinations from different inspection intervals

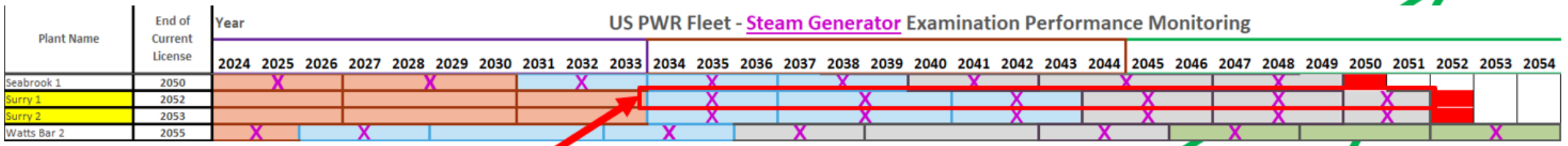
Inspection Plan for Steam Generators and Pressurizers (16/19)

SG & PZR Inspection Item(s) – Logic for Adjustments/Flexibility in Examination Schedule

- To demonstrate this logic, we will be using Surry 1 as an example as it will serve the purpose of illustrating (next 2 slides):
  - A plant site with inspection relief via NRC SER
  - A reversion to ASME 10-year ISI interval as a condition of the SER
- This would constitute a total of 20 components to be inspected for the remainder of the plants operating license, 10 per each of the 2 remaining intervals
- Under the comprehensive industry-wide PM plan, that number would be reduced to a total of 8 components, 4 per each of the remaining 2 intervals
- Distribution of component examinations is prescribed in one period of each of the remaining intervals with some flexibility as described:
  - Inspections can be moved from prescribed period in the plan to an adjacent period if it is maintained in the same interval
  - Inspection items can be redistribution across periods within the same interval

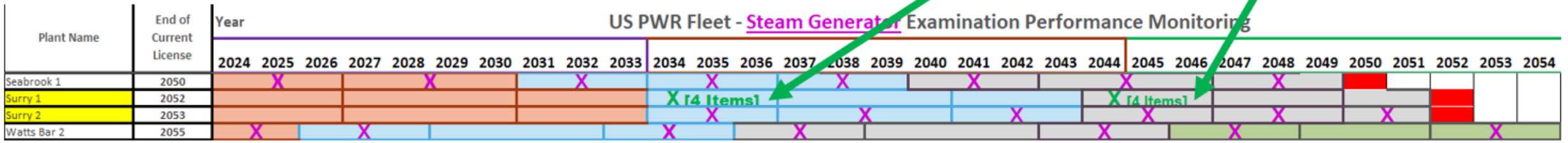
Inspection Plan for Steam Generators and Pressurizers (17/19)

	A	B	C	D	E	F	G	H	I
	Plant Name	End of Current License	Design	SG Inspection Items per Interval	Remaining Intervals (= > 6 years)	Total # of Inspection Opporunities	Remaining Intervals (= > 6 years) w/ASME Inspection	SER PM Exam Commitments (# of Inspections)	Binomial Distrbution # of Inspections (Approx 38%)
1	Surry 1	2052	W4L	10	3	30	2	0	8

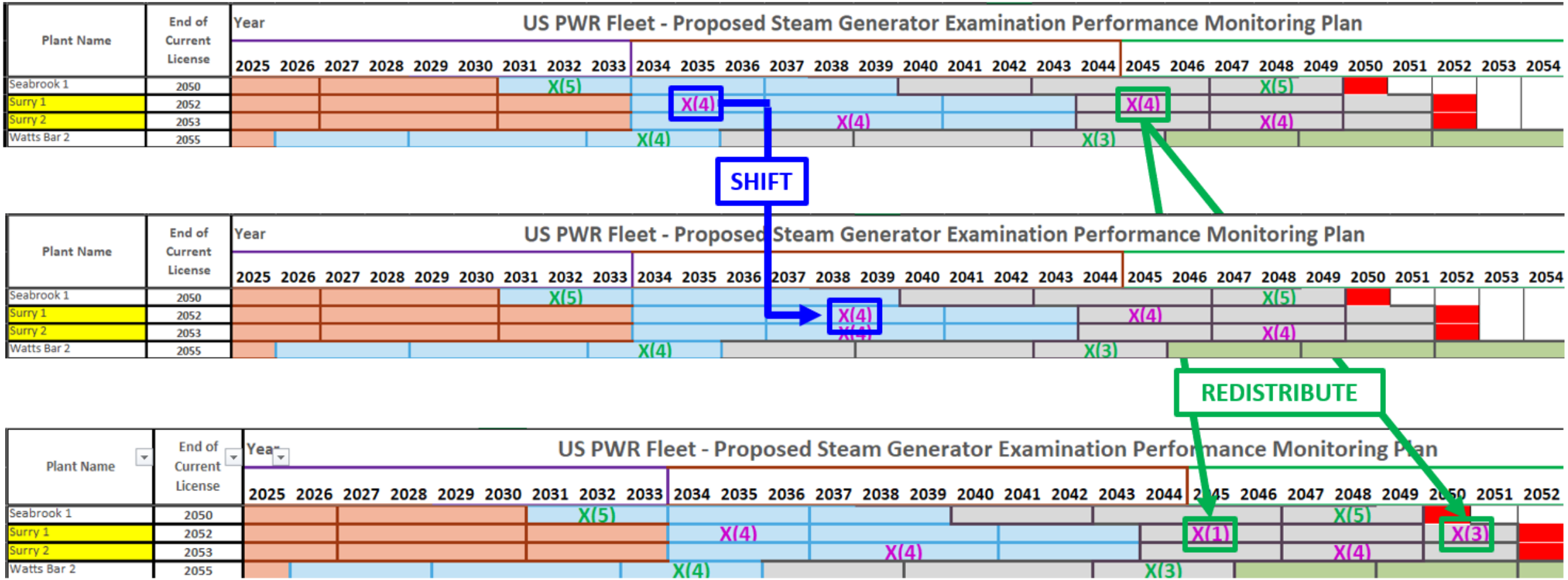


- ASME 10-year ISI Plan
  - (10) Inspection items per interval
  - (20) Total inspections

- (8) Total Inspections per Binomial Distribution Model
  - (3) based on Topical Report guidance B2.40, C2.22, & C2.21
  - (5) remaining items at the discretion of the utility



Inspection Plan for Steam Generators and Pressurizers (18/19)



Inspection Plan for Steam Generators and Pressurizers (19/19)

- Considerations for future replacement of components
  - Inspections are mandatory in the first interval after replacement
  - At least 38% of the ASME Code, Section XI-required inspections shall be performed during at least two periods of the first interval, following replacement
- Considerations for future PM inspection plan updates
  - The first PM inspection plan will be set via communication of a Letter Addendum referencing this Topical Report
  - The Letter Addendum will serve as the mechanism to continually monitor and communicate adjustments to the overall PM inspection plan
  - Review and updates to the Letter Addendum will occur based on events such as:
    - When 3 or more operating licenses are set to expire in any single calendar year, a review of the plan will be conducted in the calendar year prior to the expiration year (e.g., If 3 plants were set to expire in 2035, the plan would be reviewed in 2034)
    - When PWR units request and receive approval for alternative inspection schedules for the subject SG and PZR components from the NRC
    - When PWR units deviate from the original inspection schedule
    - Other unanticipated events

OTHER REQUIRED ACTIONS

Other Required Actions (1/3)

- Discovery of Indications During PM Examinations
  - The indications shall be evaluated as required by ASME Code, Section XI, and the Corrective Action Program at the plant
  - The additional examination and successive inspection requirements of ASME Code, Section XI, shall also apply
  - The number of additional examinations, to be performed during the current refueling outage, shall be based on the requirement in ASME Code Section XI, IWB/IWC-2430 [1]
  - All PWR units at the same plant site shall revert to ASME Code, Section XI examination requirements for the remainder of the interval during which the unacceptable indications are identified
  - ASME Code, Section XI examinations shall resume no later than the first or second refueling outage following discovery of the initial unacceptable indication
  - The same component with the initial unacceptable indication shall be included for examination at the remaining plant site units within the first or second refueling outage following discovery
  - If the unacceptable indication is identified during the current inspection interval, and no further unacceptable indications are identified during the resumption of ASME Code, Section XI examinations, then the PM plan may continue to be applied for the subsequent inspection interval for all units at the plant site

Other Required Actions (2/3)

- License Renewal of Operating Units
  - If a PWR unit pursues any future license renewals, the ASME Code, Section XI examination requirements shall again become applicable for the approved extended period of operation
  - If a PWR unit desires to use a proposed alternative for the approved period of extended operation, application of this PM plan shall be addressed in the plant-specific license renewal application, or in a separate proposed alternative submitted to the NRC in accordance with 10 CFR 50.55a(z), either of which will require separate NRC review and approval
  - Any such proposed alternative to an ASME Code, Section XI ISI plan will require evaluation as part of the overall U.S. PWR fleet-wide PM plan to ensure that the target inspection criterion for the PWR fleet is still satisfied

Other Required Actions (3/3)

- New Plants and Plants Restarting After a Long Shutdown
  - For new PWR plants and PWR plants that have been shut down for an extended period (greater than 3 years), one complete ASME Code, Section XI interval inspection shall be completed before the plant can be considered for incorporation into the U.S. PWR fleet-wide PM inspection plan
  - At that point, the proposed alternative to the ASME Code, Section XI ISI plan will require evaluation as part of the overall U.S. PWR fleet-wide PM plan to ensure that the target inspection criterion for the PWR fleet is still satisfied

SUMMARY

Summary

- An inspection plan has been developed for SGs and PZRs in the U.S. PWR fleet to provide adequate PM to satisfy a 25% sampling criterion derived from the NRC's binomial distribution model
- Conservatively, the plan applies a 38% sampling for the remainder of all 10-year ISI intervals across the U.S. PWR fleet
- The plan also includes recognition of PWR units with existing PM inspection commitments obtained through "Request for Alternative" submittals and subsequent SERs obtained from the NRC
- Additional inherent conservatism of the PM plan is realized through the benefits of the following additional inspection sources
  - Those performed by international PWR plants
  - Those performed due to the restart of existing PWR plants that have been idle for an extended period of time
  - Those performed by new PWR plants entering into commercial operation
  - Those performed due to future license renewals of current operating PWR plants

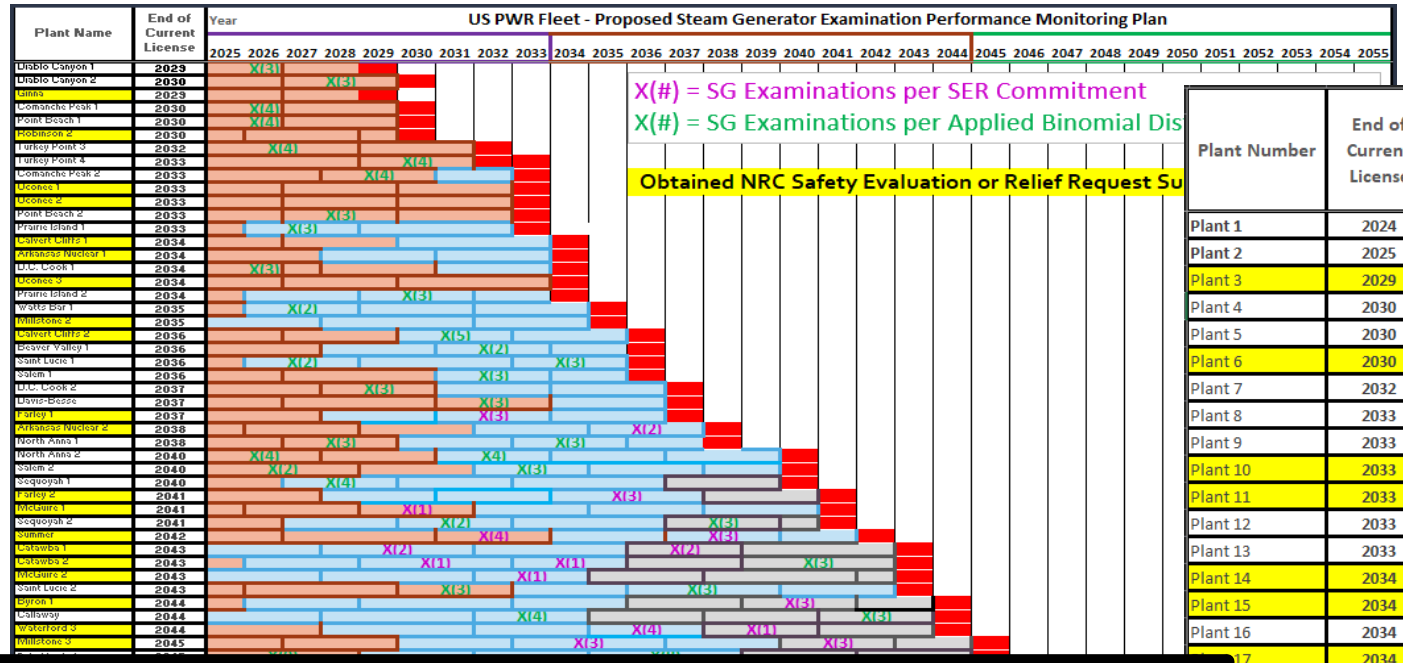
LETTER ADDENDUM

Letter Addendum (1/2)

- Restates the Objectives of the Fleet-wide PM Plan:
  1. Perform sufficient fleet-wide inspections during the currently licensed operating life for all plants to meet the minimum 25% sampling expectation implicit in the NRC's binomial distribution model. To achieve this, the minimum number of inspections for each unit must be those shown in Tables 4-1 and 4-2 of the Reference [1] report.
  2. Provide sufficient, ongoing inspections over the currently licensed operating lives of the US PWR fleet to identify possible novel/unknown degradation mechanisms in a timely manner. To achieve this, inspections must be performed according to the schedule shown in Tables 4-1 and 4-2 of the Reference [1] report.
- Summarizes events that predicate a review of the Fleet-wide PM Plan:
  - Plant licensing adjustments or changes that need to be considered
    - Renewals
    - Expired plants
    - New / replacement components
  - Request for Alternative inspection relief
  - Agreed upon periodic review of plan
- Updates to tables and charts (next slide)

Letter Addendum reviews and assessment will ensure regulatory concerns are still being addressed (i.e., the checks & balance on statistical relevance of data points and their distribution)

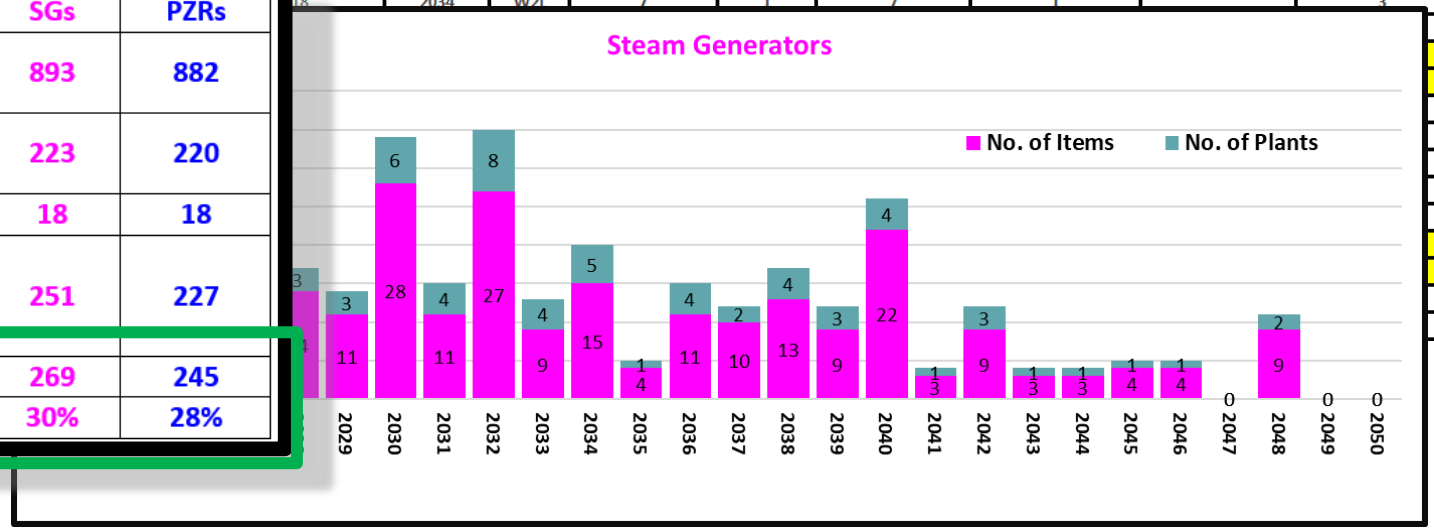
Letter Addendum (2/2)



Plant Name	End of Current License
Diablo Canyon 1	2023
Diablo Canyon 2	2030
Ginna	2029
Comanche Peak 1	2030
Point Beach 1	2030
Robinson 2	2030
Turkey Point 3	2032
Turkey Point 4	2033
Comanche Peak 2	2033
Oconee 1	2033
Oconee 2	2033
Point Beach 2	2033
Prairie Island 1	2033
Calvert Cliffs 1	2034
Arkansas Nuclear 1	2034
D.C. Cook 1	2034
Oconee 3	2034
Prairie Island 2	2034
Watts Bar 1	2035
Millstone 2	2035
Calvert Cliffs 2	2036
Beaver Valley 1	2036
Saint Lucie 1	2036
Salem 1	2036
D.C. Cook 2	2037
Davis-Besse	2037
Farley 1	2037
Arkansas Nuclear 2	2038
North Anna 1	2038
North Anna 2	2040
Salem 2	2040
Sequoyah 1	2040
Farley 2	2041
McGuire 1	2041
Sequoyah 2	2041
Summer	2042
Catawba 1	2043
Catawba 2	2043
McGuire 2	2043
Saint Lucie 2	2043
Byron 1	2044
Callaway	2044
Waterford 3	2044
Millstone 3	2045

Plant Number	End of Current License	Design	SG Inspection Items per Interval	Remaining Intervals (= > 6 yrs)	Total # of Inspection Opporunities	Remaining Intervals (= > 6 yrs) w/ASME Inspections	SER PM Exam Commitments (# of Inspections)	Binomial Distrbution # of Inspections (Approx 38%)
Plant 1	2024	W4L	7	1	7	1		3
Plant 2	2025	W4L	7	1	7	1		3
Plant 3	2029	W2L	7	1	7	0	0	0
Plant 4	2030	W4L	11	1	11	1		4
Plant 5	2030	W2L	10	1	10	1		4
Plant 6	2030	W3L	10	1	10	0	0	0
Plant 7	2032	W3L	10	1	10	1		4
Plant 8	2033	W3L	10	1	10	1		4
Plant 9	2033	W4L	10	1	10	1		4
Plant 10	2033	B&W	6	1	6	0	0	0
Plant 11	2033	B&W	6	1	6	0	0	0
Plant 12	2033	W4L	7	1	7	1		3
Plant 13	2033	W2L	8	1	8	1		3
Plant 14	2034	CE	14	1	14	0	0	0
Plant 15	2034	B&W	10	1	10	0		0
Plant 16	2034	W4L	9	1	9	1		3
[illegible]17	2034	B&W	6	1	6	0	0	0
[illegible]18	2034	W2L	7	1	7	1		3

Parameter	SGs	PZRs
Total Inspection Opportunities (under current ASME Code, Section XI requirements)	893	882
Number of U.S. PWR fleet-wide PM Inspections to Meet the NRC's Binomial Distribution Model @ 25% Criterion	223	220
Inspections in Accordance with NRC approved SERs with PM plans	18	18
Remaining 10-year ISI Interval Inspections @ 38% (% based on conservative calculations to meet the NRC's Binomial Distribution Model @ 25% Criterion)	251	227
Total number of U.S. PWR fleet-wide PM Inspections Planned	269	245
Percentage of Total Inspection Opportunities	30%	28%



INDUSTRY MILESTONE INTERACTIONS AND SCHEDULE

Next Steps and Tentative Schedule for the US Industry

- March 2025; NEI socialized plan with VP and Executive Level utility staff
  - Utilities that opt in will:
    - Submit a standardized Request for Alternative template
    - Be obligated to perform the examinations as prescribed in the EPRI Topical Report and Letter Addendum
  - Utilities that stay the course will continue with ASME 10-year ISI inspection frequency and locations as prescribed by ASME Code
  - Utilities, through EPRI, will monitor and update the Letter Addendum as necessary
- April 2025; Schedule a Topical Report pre-submittal meeting with the NRC
- May 2025; Finalize Topical Report and Letter Addendum
- June 2025; Submit Topical Report and Letter Addendum to NRC

DISCUSSION / QUESTIONS

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