NRR-DRMAPEm Resource

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Slides for today's meeting. Please forward to whomever else you think may want to see these. Thx.

ed

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Enhanced Categorization Methodology for Pressure Boundary Components

October 16, 2019
3WFN 1-C3

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Problem Statement

- Licensees implementing 10CFR50.69 were asking…
  - Is the categorization methodology for pressure boundary components
    - too conservative,
    - too resource intensive, and/or
    - appropriate for the level of insights obtained
- It was determined an alternative approach could be beneficial to the industry as well as the NRC but it must establish a process that will be:
  - Robust and Stable
  - Cost Effective

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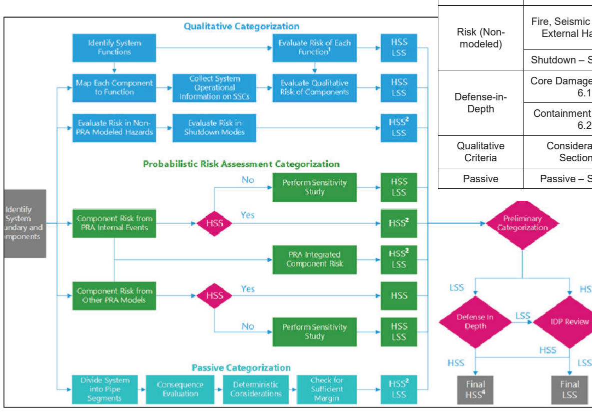
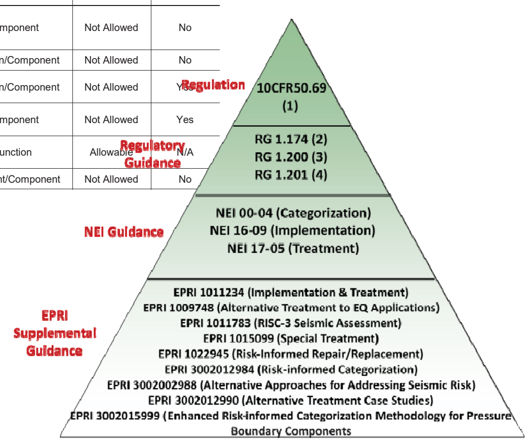
Process for Streamlining the Categorization Methodology

- Studied the existing pressure boundary 10CFR50.69 process
  - Premises
  - Assumptions
  - Conservatisms (e.g. failure probability = 1.0)
  - Process steps
  - Reviewed a number of 10CFR50.69 categorizations
- Explored possible alternatives (e.g.)
  - Training enhancements
  - Earlier Categorization methodologies
  - Evaluated alternatives using test cases
- Developed the enhanced process

Existing Process

Element	Categorization Step - NEI 00-04 Section	Evaluation Level	IDP Change HSS to LSS	Drives Associated Functions
Risk (PRA Modeled)	Internal Events Base Case – Section 5.1	Component	Not Allowed	Yes
	Fire, Seismic and Other External Events Base Case		Allowable	No
	PRA Sensitivity Studies		Allowable	No
	Integral PRA Assessment – Section 5.6		Not Allowed	Yes
Risk (Non-modeled)	Fire, Seismic and Other External Hazards –	Component	Not Allowed	No
	Shutdown – Section 5.5	Function/Component	Not Allowed	No
Defense-in-Depth	Core Damage – Section 6.1	Function/Component	Not Allowed	Yes
	Containment – Section 6.2	Component	Not Allowed	Yes
Qualitative Criteria	Considerations – Section 9.2	Function	Allowable	N/A
Passive	Passive – Section 4	Segment/Component	Not Allowed	No





Existing Process Review - Results

- Not seeing "overly" conservative results
- Skill set, experience and training drives process efficiency
- Segments are a documentation tool
  - Derived from the RI-ISI mission
  - Not a technical requirement
- Start with what you have
  - RI-ISI results
  - Internal Flooding Study
    - May be sufficient to address component failure resulting in an IE
    - May not address standby components that do not cause an IE

Existing Process Review - Results

- Given the conclusions of the previous slide, why develop a new / enhanced process for categorizing pressure boundary components?

- Reason = Enhanced process will drive;
  - Efficiencies
  - Stability
  - Safety improvements

- The next two slides provide real life examples taken from voluntary application of RI-ISI

Safety Improvements (1 of 2)

Unit	Issue	Action
1	Interfacing system LOCA exceeded metrics	More refined / realistic analyses
2	Interfacing system LOCA exceeded metrics	More refined / realistic analyses
3	Failure of a fire protection line in the Auxiliary Building which was postulated to flood the Electrical Switchgear Cable Enclosure, Battery Room and Battery Charger	Plant hardware modification (piping removed from area)
	Failures of the circulating water system in the Condenser Pit (CDF contribution of 3.75E-06).	Operating Procedure update to better define human error probabilities (HEPs)
4	Failure of a fire protection line in the Auxiliary Building which was postulated to flood the Electrical Switchgear Cable Enclosure, Battery Room and Battery Charger	Plant hardware modification (piping removed from area)
	Failures of the circulating water system in the Condenser Pit (CDF contribution of 3.75E-06).	Operating Procedure update to better define HEPs
5	Fire protection piping in auxiliary building	Supplementary visual inspection of the associated fire protection piping is required every quarter and 6 UT (thickness) exams per interval.
6	Fire protection piping in auxiliary building	Supplementary visual inspection of the associated fire protection piping is required every quarter and 6 UT (thickness) exams per interval.
7	Plant service water exceeded LERF criterion	More refined / realistic analyses
8	Service Water piping in the 480V switchgear room	Five new inspections added looking for wall loss
9	Class 3 nuclear service water in auxiliary feedwater pump room impacting mechanical / electrical equipment	New NDE selected

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Safety Improvements (2 of 2)

Unit	Issue	Action
10	Class 3 nuclear service water in auxiliary feedwater pump room impacting mechanical / electrical equipment	New NDE selected
11	Flooding caused by fire protection piping in the East DC switchgear room	3 of 10 mechanical connections selected for inspection
12	Service Water in Cable Spreading Room – loss of electrical equipment	New NDE selected
13	Service Water in Cable Spreading Room – loss of electrical equipment	New NDE selected
14	Service Water in Auxiliary building exceeded metrics	Updated analysis to allow credit for operator action in response to the postulated flood scenario
	Service Water in Control Building exceeded metrics	Updated analysis to allow credit for operator action in response to the postulated flood scenario
15	Failure of fire protection in the control building (3 separate locations) can cause loss of ESWG Rooms and CSR	Hardware (i.e. flow limiting orifice) and procedure modification
16	This remaining scenario involves a flood originating in the turbine building zone designated TGB. The area is located at elevation 46 feet, essentially plant grade.	More refined / realistic analyses
17	High Pressure Firewater in Auxiliary building exceeded metrics	New NDE and/or removal of piping
	Raw Cooling Water in Auxiliary Building exceeded metrics	New NDE and/or removal of piping
18	Failure of expansion bellows can cause loss of ESWG Rooms	Hardware and NDE being investigated

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Explored Possible Alternatives

- Brainstorming sessions resulted in various alternatives
- Ideas ranged from “do nothing” to “develop new pressure boundary PRA model”
- Considered Pros/Cons of each alternative
- Revisited earlier categorization efforts
  - WCAP-16308
  - N660, rev 1
  - N660, rev 2
  - ANO-2 RI-RRA
- Tested a number of alternatives

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Brainstorming Results (1 of 7)

	Title	Description	Strengths	Limitations/Challenges	Initial Assessment
1	Streamline existing process				
1A	Treatment of standby systems	Streamline the existing process by providing additional direction/criteria for assessing the impact of failure of standby systems	• Collapses medium, low and none consequence ranks into one bin. • Addresses skill set issue by removing some confusion. • Does not require NRC interaction.	• Still needs to assess spatial effects. • Still needs a standalone assessment of standby system (i.e. not extracted from existing PRA model/documentation). • Doesn’t address primary concerns (e.g. resource requirements, conservatisms)	Minor cost savings and complexity reduction. Recommendation would be to enhance guidance.
1B	Clarify Additional Considerations	Add additional guidance and clarifications, with examples	• Minimizes confusion. Does not require NRC interactions.	• Still needs to address questions that do not typically provide much value (e.g. LSS to HSS) • Doesn’t address primary concerns (e.g. resource requirements, conservatisms)	Minor cost saving and complexity reduction.
1C	Modify Additional Considerations	Modify and possibly delete some questions.	• Minimizes confusion. Focuses remaining questions on areas that will move LSS to HSS.	• Does require NRC interactions. • Doesn’t address primary concerns (e.g. resource requirements, conservatisms)	Minor cost saving and complexity reduction.

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Brainstorming Results (2 of 7)

	Title	Description	Strengths	Limitations/Challenges	Initial Assessment
1D	Clarify guidance for addressing shutdown	Additional guidance / examples that highlight when shutdown aspects would drive LSS to HSS (not expected to be often).	• Minor resource and confusion savings. • Does not require NRC interactions.	• Doesn't address primary concerns (e.g. resource requirements, conservatisms)	
2	Develop basis for eliminating the evaluation of shutdown	Develop basis for showing that other plant activities are in place that control shutdown risk irrespective of a SSC's categorization (e.g. RISC-1 versus RISC-3)	• Minor resource and confusion savings for pressure boundary but potential large overall savings.	• Does require NRC interactions.	
3	Adapt to more fully align with other RI-processes (e.g. RI-ISI process in TR-112657-A)	Incorporate failure probability / degradation mechanism process using existing/modified risk matrix. May require risk categories RC1-RC5 to be HSS.	• More realistic than existing risk-informed repair/replacement (RI-RRA) process that is strictly consequence based.	• Still needs to assess spatial effects. • Still needs a standalone assessment of standby system. • Need to develop process and basis (e.g. DMs for non-piping components). • May need to perform delta risk calculation or sensitivity (NEI00-04). • NRC interactions required. • Doesn't address resource requirements concern (may increase resource requirements).	

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Brainstorming Results (3 of 7)

	Title	Description	Strengths	Limitations/Challenges	Initial Assessment
4	Use of internal flooding (IF) PRA				
4A	Use existing internal flooding IF PRA with no modifications	Use RG1.200 compliant IF PRA (already a 10 CFR 50.69 LAR requirement) with no modification to NEI00-04 supplied metrics/criteria.	• Cheaper and faster. • Few segments show up as high CDF/LERF contributors.	• Does not address standby system pressure boundary failures (no current technical basis for exclusion). • Existing NEI00-04 risk metrics will make pressure boundary SSCs HSS (e.g. RAW>2.0). NRC interactions required.	Requires additional work (e.g. metric to use, conducting delta risk analysis). Would need to assess how this would impact on alternate treatment. Currently, with assuming a failure probability of 1.0, prospective alternate treatments cannot increase this failure probability and therefore there is no need for sensitivity studies with the existing process. While few segments typically show up as high CDF/LERF contributors, current metrics/criteria (e.g. RAW> 2.0) would make many segments HSS (see WCAP-14572. Could be resource intensive.
4B	Upgrade IF PRA study to include standby configurations	Upgrade existing IF PRA to address failures of standby system using existing pressure boundary metrics (e.g. CCDP/CLERF).	• Complete risk-informed evaluation using upgraded PRA model. • Does not require NRC interactions.	• Treatment of standby failures (e.g. failure prob. versus frequency, exposure time, etc.) See TR-112657. • Large resources and new ground.	Could be resource intensive.

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Brainstorming Results (4 of 7)

	Title	Description	Strengths	Limitations/Challenges	Initial Assessment
4C	Upgrade IF PRA study to explicitly address standby configurations and existing NEI00-04 metrics	Upgrade existing IF PRA to address failures of standby system using NEI00-04 risk metrics and values (e.g. RAW of 2.0).	• Complete risk-informed evaluation using upgraded PRA model.	• Treatment of standby failures (e.g. failure prob. versus frequency, exposure time, etc.) See TR-112657. • Large resources and new ground and requires NRC interactions. • Requires risk sensitivity be conducted.	Could be resource intensive.
4D	Upgrade IF PRA to explicitly address standby configurations and alternate metrics	Upgrade existing IF to address failures of standby system using alternate risk metrics and values (e.g. Birnbaum).	• Complete risk-informed evaluation using upgraded PRA model.	• Treatment of standby failures (e.g. failure prob. versus frequency, exposure time, etc.) See TR-112657. • Large resources and new ground and requires NRC interactions. • Requires risk sensitivity be conducted. • Requires developing a basis for threshold value.	Resource intensive.
4E	Upgrade IF PRA to explicitly address standby configurations and absolute risk metric	Upgrade existing IF to address failures of standby system using absolute risk metric (CDF and LERF < X = LSS)	• Complete risk-informed evaluation using upgraded PRA model.	• Treatment of standby failures (e.g. failure prob. versus frequency, exposure time, etc.) See TR-112657. • Large resources and new ground and requires NRC interactions. • Requires risk sensitivity be conducted.	Resource intensive.

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Brainstorming Results (5 of 7)

	Title	Description	Strengths	Limitations/Challenges	Initial Assessment
4F	Upgrade IF PRA to explicitly address standby configurations and absolute risk metric	Upgrade existing IF to address failures of standby system using absolute risk metric (CDF and LERF < X = LSS) and DID (e.g. CCDP/CLERP)	• Complete risk-informed evaluation using upgraded PRA model. Quantitatively addresses Defense in depth.	• Treatment of standby failures (e.g. failure prob. vs freq., exposure time, etc.) See TR-112657. • Large resources and new ground and requires NRC interactions. • Requires risk sensitivity be conducted.	Resource intensive.
5	Develop basis and revise break size assumptions	Apply double ended guillotine break (DEGB) assumption to only applicable systems/segments (e.g., flow accelerated corrosion (FAC), high energy line break (HELB) locations) and use something less (e.g. ½ pipe diameter by ½ pipe wall thickness) for low energy systems	• Reduces conservatism in assessing impacts (flooding, timing)	• Doesn't address primary concerns (e.g. resource requirements, existing skill set)	Substantial industry experience with this approach not succeeding.
6	Develop basis and revise break size assumptions and CCDP metric	Apply DEGB and CCDP to only applicable systems/segments (e.g., FAC, HELB) and use ½ PD by ½ PT and separate CCDP for low energy systems	• Reduces conservatism in assessing impacts (flooding, timing)	• Still need to assess spatial effects. • Still needs a standalone assessment of standby system (i.e. not extracted from existing PRA model/documentation). • Requires NRC interactions • Doesn't address primary concerns (e.g. resource requirements, skill set)	Substantial industry experience with this approach not succeeding.

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Brainstorming Results (6 of 7)

	Title	Description	Strengths	Limitations/Challenges	Initial Assessment
7	Develop a Holistic Approach				
7A	Use streamlined RI-ISI approach (ASME Code Case N716-1)	Use existing N716-1 scope and process	• Stable and predictable. • Easily implemented, cost-effective.	• Current N716 basis doesn't address scope of 50.69. • No basis for applicability to some Class 2 systems and all Class 3 systems. • Change is risk currently only addresses impact on ISI (e.g. missing QA, RRA, seismic, etc.). • Process requires multiple owner defined programs (e.g. FAC, IGSCC-BWRs, LC). • Requires NRC interactions. • Requires additional work.	See below
7B	Modify scope of ASME Code Case N716-1 to address scope of 50.69	Use N716-1 as starting point and develop generic set of missing Class 2 and all Class 3 systems. Keep existing plant-specific screening (CDF/LERF) threshold.	• Stable and predictable. • Easily implemented, cost-effective. • More than half of US fleet using this method.	• No clear adequate experience / data to draw from. Need to consider supplementing missing data with PS screening threshold Need to address Class 2 and Class 3 standby systems. • Need to consider whether CDF of 1E-06/yr and LERF of 1E-07/yr are the right thresholds for this option. • Method needs to be developed and tested. • Need NRC interaction.	See below
7C	Modify scope of N716 to address scope of 50.69 and add CCDP/CLERP thresholds	Use N716-1 as starting point and develop generic set of missing Class 2 and all Class 3 systems. Add CCDP/CLERP (i.e. to addresses DID) to exiting plant-specific screening (CDF/LERF) threshold.	• Stable and predictable. • Easily implemented, cost-effective. • More than half of US fleet using this method.	• There may not be adequate experience / data. • Supplement data with plant-specific screening threshold • How to address Class 2 and Class 3 standby systems. • Are 1E-06/1E-07 the right thresholds for 50.69 • Method needs to be developed and tested. • Need NRC interaction.	See below

Brainstorming Results (7 of 7)

	Title	Description	Strengths	Limitations/Challenges	Initial Assessment
7D	Use streamlined RI-ISI approach (ASME Code Case N716-1) coupled with identification of what impacts the missing scope (e.g. some Class 2 and all Class 3 systems)	Use existing N716-1 scope and process, coupled with programs that drive pressure boundary reliability.	• Stable and predictable. • Easily implemented, cost-effective. • More than half of US fleet using this method.	• Requires NRC interactions. • Method needs to be developed and tested.	See below
7E	Use streamlined RI-ISI approach (ASME Code Case N716-1), modified to address 50.69 scope (see # 16 & 17) coupled with identification of what impacts missing scope (e.g. some Class 2 and all Class 3 systems)	Use existing N716-1 scope and process, add additional 50.69 scope and coupled with programs/processes that drive pressure boundary reliability.	• Stable and predictable. • Easily implemented, cost-effective. • More than half of US fleet using this method.	• Requires NRC interactions. • Method needs to be developed and tested.	Selected. See Chapters 4, 5 and 6.

Many of the brainstorming ideas were further explored but it was determined that developing a holistic approach to reflect the scope of 50.69 was the most effective path forward.

Enhanced Methodology
Overview

This enhanced methodology for categorizing pressure boundary components contains three main features:

- A Set of Prerequisites (Entrance Fee)
- A Set of Pre-determined HSS Systems/Subsystems
- A plant-specific search for outliers that need to be upgraded to HSS

Enhanced Methodology
Prerequisites

The following prerequisites are required for using the Enhanced Categorization Process

- Robust Probabilistic Risk Assessment, including internal flooding,
- Robust Program that addresses localized corrosion,
- Robust Program that addresses flow accelerated corrosion,
- Robust Program that addresses erosion,
- Protective Measures for internal flooding events

Enhanced Methodology
Pre-determined set of HSS systems/subsystems consisting of:

- Reactor Coolant Pressure Boundary
- Portion of decay heat removal function
- Steam Gen. and Feedwater to containment isolation
- Break exclusion regions
- Applicable portions of ultimate heat sink function
- Key inventory sources (e.g. RWST, suppression pool)
- Condensate storage tanks (PWRs without reliable backup)
- PWR component cooling water system without pressure boundary independence
- Heat exchangers (ISLOCA, flooding impacting multiple systems)

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Enhanced Methodology
Pre-determined set of HSS systems/subsystems consisting of:

No.	HSS Criteria	Premise	Additional Considerations
1	Reactor Coolant Pressure Boundary (Class 1)	Consistent with LARs approved to date	Some piping between the 1st and 2nd isolation could be medium/low consequence (i.e. possible RISC-3)
2	Applicable portions of the shutdown cooling pressure boundary function. Class 1 and 2 components of systems or portions of systems needed to utilize the normal shutdown cooling flow path either: (a) as part of the RCPB from the reactor pressure vessel (RPV) to the second isolation valve (i.e., farthest from the RPV) capable of remote closure, or to the containment penetration, whichever encompasses the larger number of welds, or (b) other systems or portions of systems from the RPV to the second isolation valve (i.e., farthest from the RPV) capable of remote closure or to the containment penetration, whichever encompasses the larger number of components	Consistent with some of the insights from previous pressure boundary categorization efforts (e.g. 10CFR50.69, RI-ISI, RI-RRA)	Some Class 2 components in PWRs will be HSS that might otherwise be LSS if other parts of NEI00-04 do not make HSS. But probably driven HSS by consideration of shutdown events.

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Enhanced Methodology

Pre-determined set of HSS systems/subsystems consisting of:

No.	HSS Criteria	Premise	Additional Considerations
3	Class 2 portions of steam generators and Class 2 feedwater system components greater than NPS 4 (DN 100) of pressurized water reactors (PWRs) from the steam generator to the outer containment isolation valve	Consistent with some of the insights from previous pressure boundary categorization efforts (e.g. risk-informed break exclusion region (RI-BER), risk-informed repair/replacement requirements (RI-RRA)). High energy system	Some components will be HSS per this enhanced methodology that might otherwise be LSS based on PRA and plant design.
4	Components larger than NPS 4 (DN 100) within the break exclusion region for high energy piping systems as defined by the Owner	Consistent with some of the insights from previous pressure boundary categorization efforts (e.g. 10CFR50.69, RI-BE) High energy system Typically, cannot meet single failure criteria and / or EQ issue.	Some components will be HSS that might otherwise be LSS based on PRA and plant design
5	Portions of the ultimate heat sink flowpath (e.g. service water) whose failures will fail both trains (i.e. fail the UHS function). [Note: Even if piping is isolated/independent the service water pumphouse (e.g. reservoir, bay) would be expected to be HSS].	Consistent with present passive categorization method where loss of safety function is loss of defense-in-depth	This should be redundant to 11 through 13 below.

Enhanced Methodology

Pre-determined set of HSS systems/subsystems consisting of:

No.	HSS Criteria	Premise	Additional Considerations
6	Tanks/vessel and connected piping and components up to the first isolation valve that support/provide inventory to multiple systems/functions (e.g. RWST for PWRs, suppression pool for BWR).	Consistent with present passive categorization method where loss of safety function is loss of defense-in-depth	None,
7	Condensate Storage Tank (CST) for AFW/EFW in a PWR unless there is a redundant independent reliable source (e.g., auto switchover to service water supply to each train of AFW/EFW suction).	Consistent with present passive categorization method where loss of safety function is loss of defense-in-depths	None
8	For PWR plants, low volume, intermediate safety systems that typically consists of two physically independent (e.g. component cooling water) trains that are, on a plant-specific basis, physically connected. For example, loss of pressure boundary integrity on train A will drain train B as well.	Relies on risk insights indicating plant designs with physically independent CCW train (e.g., 2 surge tanks) are LSS, while plants without separation are not.	Might be overly conservative, but PRA results presently indicate that total loss of CCW is a high consequence at most PWR plants.
9	Heat exchangers that if they fail (e.g. tube or tubesheet failures) could allow reactor coolant outside primary containment.	Addresses important containment issues that might not be typically covered by PRA importance measures Confirmation of risk insight/ safety insights	May be covered by #11 below (LE-D4 of [20]) except maybe during shutdown, which is typically not included in full power operation IF.

Enhanced Methodology

Pre-determined set of HSS systems/subsystems consisting of:

No.	HSS Criteria	Premise	Additional Considerations
10	Other Heat exchangers – If not explicitly addressed in 11 through 14 below, other heat exchangers should be evaluated to determine if component failure (e.g. tube or tubesheet) may impact multiple systems. If yes, the methodology and criteria of [5, 6] shall be used to determine HSS versus LSS assignment.	Experience to date: only applicable to SW floods	Experience to date: only applicable to SW floods. Add guidance to #11-13 below.
11	Any piping or component (including piping segments or components grouped or subsumed within existing plant initiating event groups) whose contributions to core damage frequency (CDF) is greater than 1E-06/year, or whose contribution to large early release frequency (LERF) is greater than 1E-07/year, based upon a plant-specific probabilistic risk assessment (PRA) of pressure boundary failures (e.g., pipe whip, jet impingement, spray, and inventory losses). This may include Class 1 and 2 and Class 3, or Non-Class components.	Agreement from NRC based on N716 Scope Consistent with RI decision-making philosophy Safety improvement	Need to re-look at applicable SRs and capability categories.

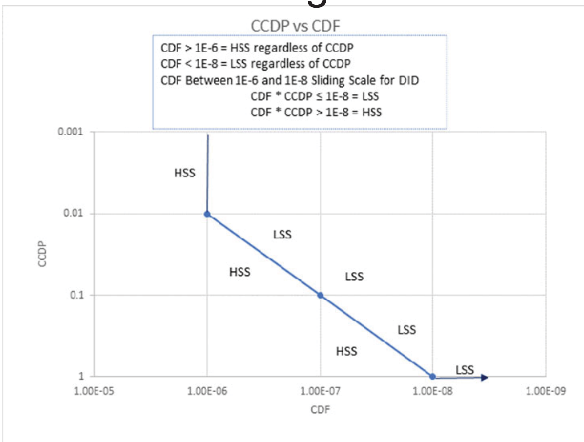
Enhanced Methodology

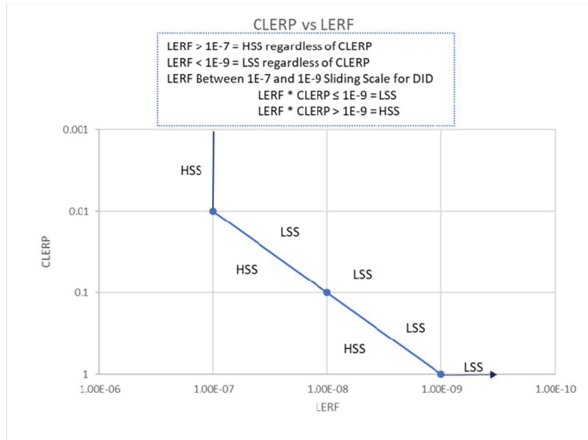
Pre-determined set of HSS systems/subsystems consisting of:

No.	HSS Criteria	Premise	Additional Considerations
12	Any piping or component (including piping segments or components grouped or subsumed within existing plant initiating event groups) whose contributions to CDF is greater than 1E-08/year and the product of its CDF contribution times its associated CCDP (conditional core damage probability) is greater than 1E-08/year, based upon a plant-specific PRA of pressure boundary failures (e.g., pipe whip, jet impingement, spray, and inventory losses)	Consistent with RI decision-making philosophy Safety improvement Incorporates defense-in-depth	Requires additional minor spreadsheet calculations for CDF times CCDP.
13	Any piping or component (including piping segments or components grouped or subsumed within existing plant initiating event groups) whose contributions to LERF is greater than 1E-09 and the product of its LERF contribution times its associated CLERP (conditional large early release probability) is greater than 1E-09, based upon a plant-specific probabilistic risk assessment (PRA) of pressure boundary failures (e.g., pipe whip, jet impingement, spray, and inventory losses).	Consistent with RI decision-making philosophy Safety improvement Incorporates defense-in-depth	Requires additional minor spreadsheet calculations for CDF times CCDP.

Enhanced Methodology
Plant-Specific Outlier Evaluation

This will ensure plant specific HSS outliers are captured in the Enhanced Categorization Process





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Enhanced Methodology
Additional Confirmatory Evaluations

- Reviewed a number of plants systems to provide an additional assessment on comprehensiveness of the proposed approach
  - BWRS
  - PWRs
  - Newer and earlier vintage designs
- Insights and results documented in Chapter 5 of EPRI Report 3002015999

Table 5-1
BWR Systems

System	Passive	PRA Insights	50.69 Conclusions
Main Steam		Initiating event and modeled In IF scope	LSS with exception of Class 1 unless determined otherwise by PRA/IF (note 1)
Standby Diesel Generators, including HPCS		Modeled In IF scope (support systems)	LSS – note 2, note 3 Support systems usually screen in IF except possibly the cooler interface with service water (note 3)
Meteorological Monitoring	No		
Circulating Water		Initiating event and modeled In IF scope	LSS unless IF determines otherwise
Acid Treatment/Hypochlorite		Not modeled In IF scope – usually screens	LSS unless IF determines otherwise
Service Water		Initiating event and modeled In IF and typically important	LSS unless IF determines otherwise
Hydrogen Water Chemistry		Not modeled In IF scope – usually screens	LSS unless IF determines otherwise
Alternate Decay Heat Removal		Not Modeled (shutdown) In IF scope	LSS unless IF determines otherwise
Service Water Chemical Treatment		Not modeled In IF scope – usually screens	LSS unless IF determines otherwise
Traveling Water Screens and Wash Disposal		Initiating event and modeled In IF scope – usually screens	LSS unless IF determines otherwise

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Enhanced Methodology
Summary

- Prerequisites and pre-determine HSS systems/subsystems will make the process **Robust and Stable**
- Applying the methodology once (no matter how many systems are selected) on a plant-specific basis will make the process **Cost Effective**
- Evaluating the pressure boundary function of all safety related and non-safety related systems will result in a **Fullscope Approach**
- Identifying all RISC-2 components will result in a **Safety Benefit** immediately upon implementation.
- Documented in **EPRI Report 3002015999**
  - To be published (11/15/2019)

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