10 CFR 50.69 Generic Categorization Process Development

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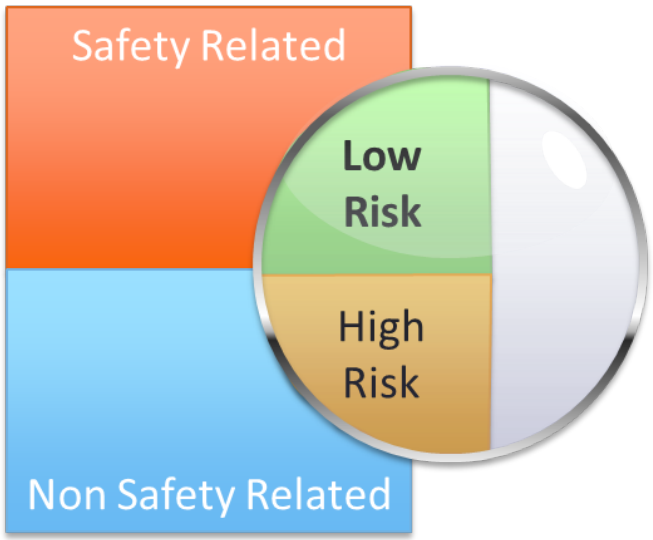
Introduction



RISC 1	RISC 2
Safety Related High Safety Significance	Non Safety Related High Safety Significance
Safety Related **Low Safety Significance**	Non Safety Related Low Safety Significance
RISC 3	RISC 4

RISC = Risk Informed Safety Class

10CFR50.69 process reduces burden on low safety significant components (RISC3) by allowing alternate treatments

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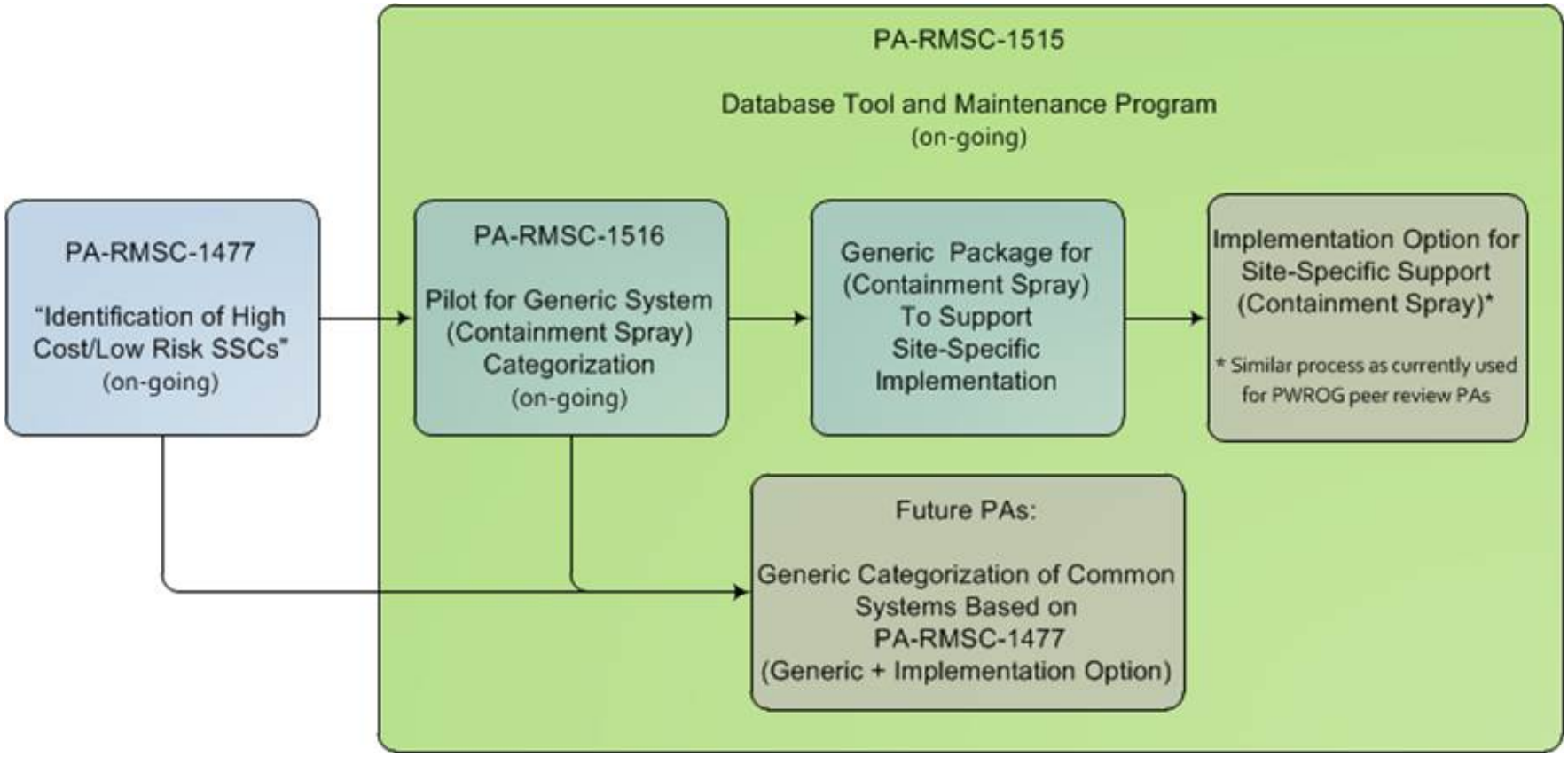
Background



Generically identify and categorize systems, then implement alternative treatments

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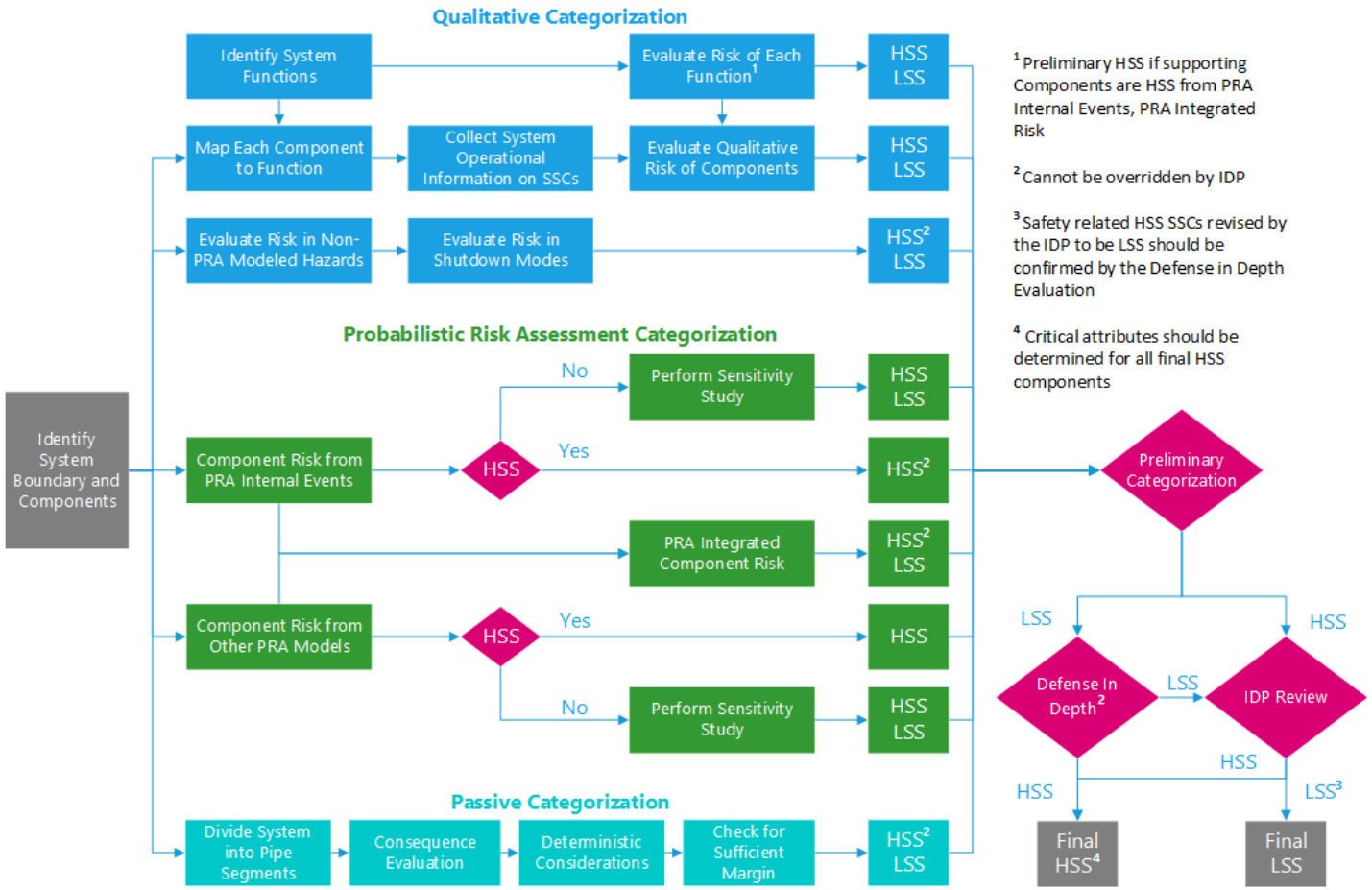
Background

10CFR50.69 Categorization Process [NEI 16-09]



Purpose

- Pilot generic categorization effort
  - Using real plant data to better understand challenges
  - Using CSS as expected to be relatively low safety significance and effort
- Goal is to understand lessons and best practices
  - What insights from CSS categorization from one plant can be applied to another?
- Reduce (not eliminate) effort of categorization for plant
  - Sites will apply generic results and supplement with plant-specific effort
  - IDP review to be done by sites

Benefit from lessons learned from common approach

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Method for Generic Categorization

1. Review system designs and define bins (Task 1)
   A. Identify system functions and design features
   B. Review P&IDs

2. Evaluate bins relative to baseline plant (Task 2)
   A. Compare representative plants
   B. Evaluate applicability of baseline plant

3. Perform generic categorization (Task 3)
   A. Apply baseline results and identify gaps
   B. Complete representative plant categorization

3-phase approach to identify bins, review design similarities, and perform categorization

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Task 1 Summary – Bin Identification

- Reviewed CSS designs and functions for all U.S. PWRs
  - Identified 9 common functions
  - Identified 12 common design features
- Based on plants whose CSS shares similar functions, identified 4 bins:
  1. Westinghouse and B&W plants with dry, atmospheric pressure containment
  2. Westinghouse plants with dry, sub-atmospheric pressure containment systems
  3. Westinghouse plants with ice condenser containment systems
  4. CE plants with optional shutdown cooling capability by the containment spray system

Bins defined based on common CSS design and functions

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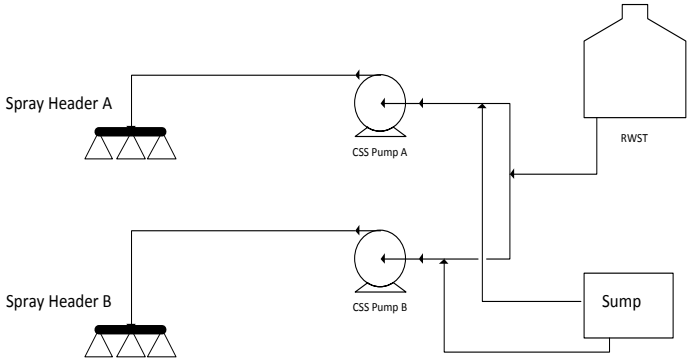
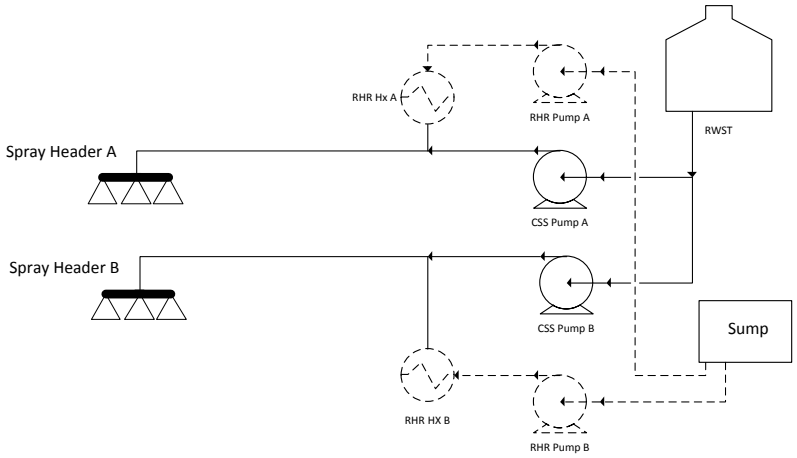
Dry, Atmospheric Pressure Containment Systems (Bin 1)

Bin 1 plant CSS systems have three different configurations

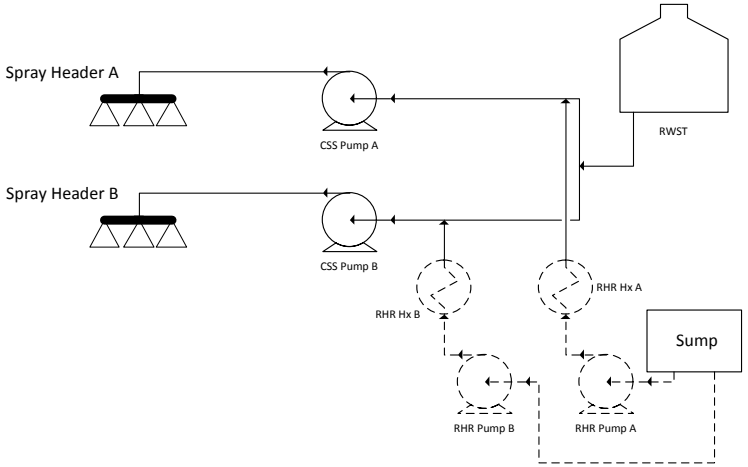
1. CS Pumps Drawing Suction for Recirculation Directly from the Containment Sump
2. RHR Pumps Drawing Suction for Recirculation from the Containment Sump
3. CS Pumps with the RHR Pumps in Piggyback Mode



Configuration 1



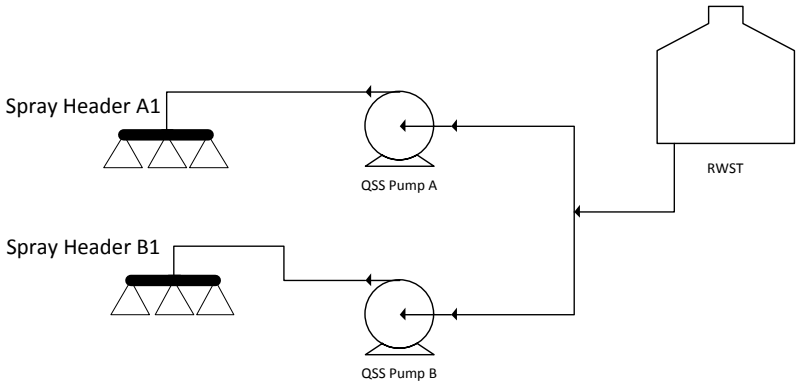
Configuration 2



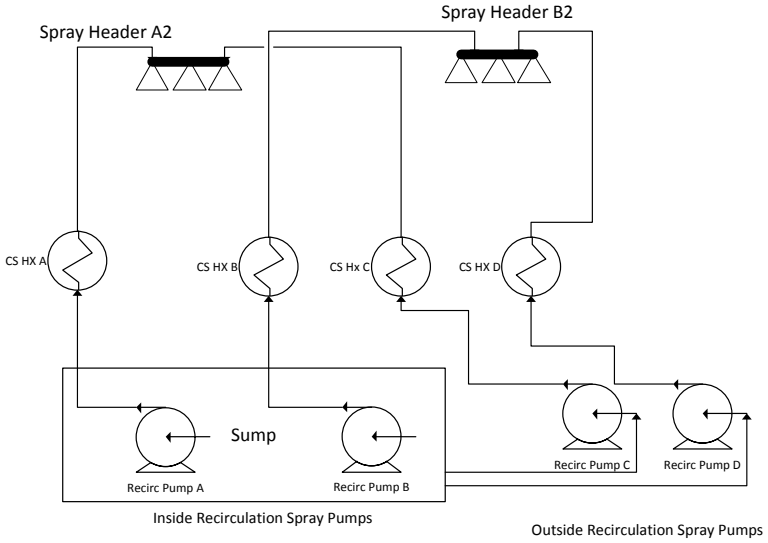
Configuration 3

Dry, Sub-atmospheric Pressure Containment Systems (Bin 2)

Quench Spray

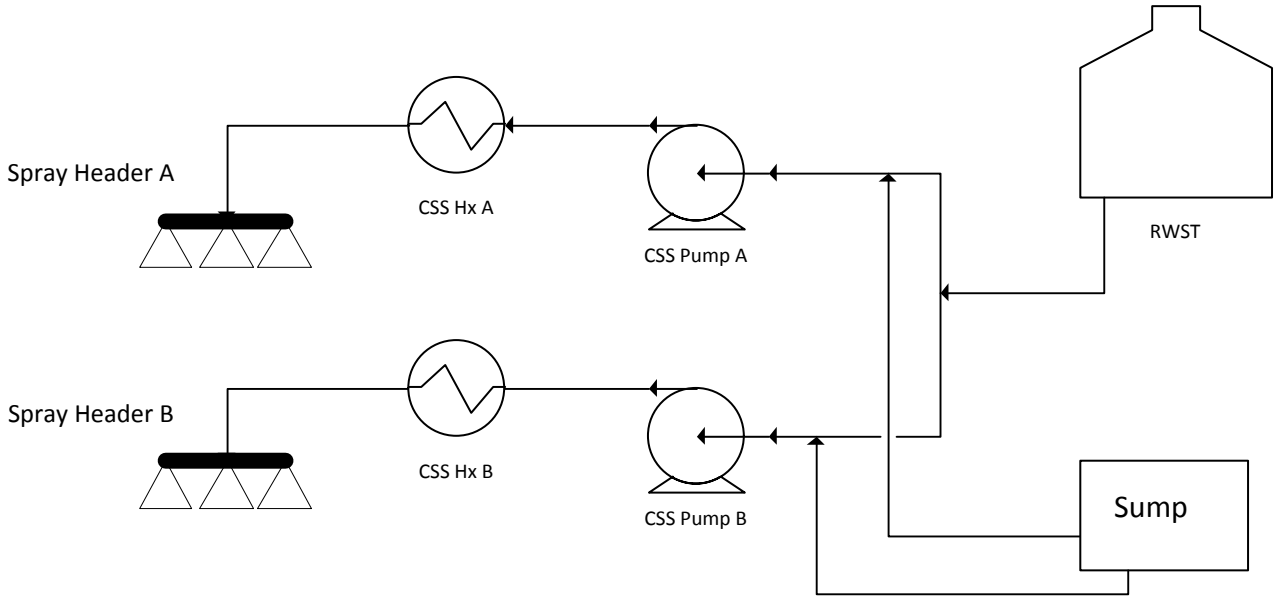


Recirculation Spray



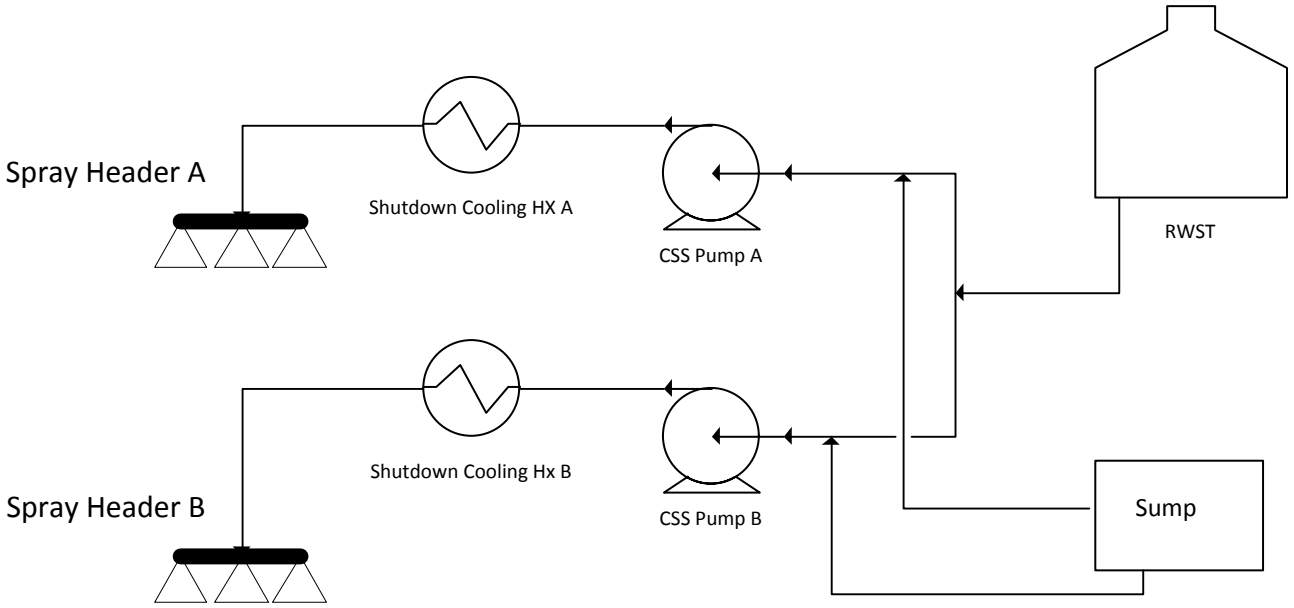
For these plants, the CSS is split into two systems: quench spray and recirculation spray. Only the quench spray system is analyzed for generic categorization.

Ice Condenser Containment Systems (Bin 3)



CSS layout and configuration similar to baseline plant

CE Plants with Shutdown Cooling Heat Exchangers (Bin 4)



CSS layout and configuration similar to baseline plant

Map components and functions

- CSS piping and instrumentation diagram (P&ID) from one plant overlaid on another
- Identified common flow paths to establish “equivalent” segments
- Noted differences for plant-specific categorization
- Identified functions supported by each flow path section
- Compares the function assignment element of the 50.69 categorization process

Identify portions of CSS where function mapping can be generically applied

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Compare data from RI-ISI

- Segments from baseline plant matched to “equivalent” segments from Bin 1 plant
- Consequence evaluations from RI-ISI program for each segment were compared
- Compares the passive element of the 50.69 categorization process

Identify portions of CSS where passive results can be generically applied

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Preliminary Results

- Task 2 (evaluate bin relative to baseline plant) has been completed for one plant (Plant 1)
- Compared consequence category of piping segments defined for RI-ISI
  - 68% of segments had same consequence category
  - 22% of Plant 1 segments had higher consequence category
  - 10% of Plant 0 segments had higher consequence category
- Generic categorization not possible for some portions of system because of significant differences in:
  - Spatial layout
  - Failure consequences

Results suggest generic categorization possible for a substantial portion of CSS

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Preliminary Lessons Learned

- Generic categorization is likely to be more efficient on systems for which RI-ISI data is available.
- More than two-thirds of similar piping segments have the same consequence category.
- Significant portions of the CSS between Plant 0 and Plant 1 have similar layout and support identical functions.

On-going results support decision to continue remaining tasks

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Next Steps

- Perform generic categorization for each representative plant
  - Determine RISC for each CSS component
  - Use results from baseline plant where appropriate (i.e., for portions of CSS identified as generic)
  - Generate new results where necessary (i.e., for portions of CSS identified as plant-specific)

Next step is to complete categorization using generic results as much as possible

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Next steps [cont.]

- Apply generic categorization package to actual plant
  - Understand deltas
  - Evaluate value of generically categorizing additional systems
- Apply process to additional systems
  - Separate effort has identified systems which are low risk at most plants
  - Also identified annual costs associated with these systems
- Continue to work with 50.69 working group of PWROG

Developed recommendation for which system to categorize next

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Discussion/questions

Backup slides

Identify System Boundaries and Functions

- Component Mapping Considerations
  - Map each component within the system to one or more functions
    - Uses same sources of information as system function development
    - Identify any components that perform beyond design basis functions
      - May require input from PRA

Passive Component Risk Assessment

- Passive components are components that perform no active function and their function is to only act as a pressure boundary. (e.g., system piping, tanks, and heat exchangers)

- Active components such as a valve can have a passive function in addition to their active function.

Passive Component Risk Assessment [cont.]
Method for passive component categorization

- NEI 00-04 identifies the use of ASME Code Case N-660
- The industry will be using the ANO2 Risk Informed Repair/Replacement Method
  - Used in the pilot 50.69 application
  - Adopts the methodology from risk-informed ISI (RI-ISI), i.e. EPRI TR-112657, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*
- Intent is to assign a consequence rank to each location within the piping system.
- Runs of piping with the same consequence of failure (plant impact) are typically grouped into “segments”.

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Passive Component Risk Assessment [cont.]
Final Passive Categorization

- Each piping segment, and every pressure-retaining component within the boundaries of that pipe segment are HSS or LSS per the consequence assessment, additional considerations and IDP review/approval process.

- Component supports, hangers, and snubbers will have the same classification as the highest-ranked piping segment within the piping stress analytical model in which the support is included.