

# **Generic Safety Issue 191: Risk Informed Application at South Texas Project**

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# New Tools for Risk-Informed Applications

- ❖ Plants like STP have large amounts of fibrous insulation in the reactor containment building faced great challenge.
- ❖ STP served at the pilot for Risk-informing GSI-191

# Background

- ❖ Resolution of GSI-191 involves safety concerns related to potential clogging of ECCS strainers, potential clogging of fuel assemblies and debris build up on fuel pins.
  - ❖ Debris build up on the strainers causes increased head loss and potential ECCS/CS pumps NPSHM.
  - ❖ Greatest concern with CLBs, bypassing the strainers and collecting on fuel assemblies.
  - ❖ Can result in loss of long-term cooling required by 10 CFR 50.46.

## Background (cont.)

- ❖ Response to GL 2004-02, STP replaced the original ECCS sump screens with very large ECCS sump screens and tested them to maximum assumed debris loads. Replacement screens are designed to accommodate very large amounts of debris compared to the original screens.

# Risk-Informed Approach Included

- ❖ In 2010, NRC Commissioners directed staff to investigate closure options for GSI-191 to include risk-informed methods.
  - ❖ STP proposed to pilot a risk-informed closure to GL 2004-02.

# Risk-Informed Approach Included

(cont.)

- ❖ The paths were multiple paths
  - ❖ Mitigative Measures and Alternative Methods Approach
    - ❖ Within this path two paths were defined.
    - ❖ (2a) Deterministic with potential to refine models.
    - ❖ (2b) Risk-Informed (STP) approach.

# Risk-Informed Approach

- ❖ Technical team, led by STP, developed innovative risk-informed tools & methods including:
  - ❖ CASA Grande
  - ❖ RoverD method
  - ❖ Integrating uncertainty quantification results into a PRA

# RoverD

- ❖ Risk-informed over Deterministic (RoverD)
- ❖ A break is analyzed to understand if it can meet deterministic model.
- ❖ If not, the scenario is assigned to a risk-informed category where the frequency of failure is assigned to core damage.



# RoverD Application

Risk-informed  
↑

Scenarios with more than the tested  
or more amount of fines in the sump

Deterministic  
↓

Scenarios that pass with the tested  
or less amount of fines in the sump

1. Transported Fine Debris
2. Latent Debris Fines
3. Eroded Fines

All debris species must be bounded

# Conclusion

- ❖ On July 11, 2017, the NRC formally approved license amendment adopting risk-informed resolution to GSI-191.
- ❖ Approved license amendment eliminates need to replace fibrous insulation in both STP units and avoids 176 rem of exposure.
- ❖ Cost saving is approximately \$43 million.
- ❖ A key project conclusion is that safety benefit provided by containment insulation removal as recommended GSI-191 closure path, does not justify required worker radiation exposure and significant resource expenditures.
- ❖ The project results demonstrate viability of a risk-informed closure path to GSI-191 and applicability to other risk-informed projects.

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