ECCS Suction Strainers Debris Characteristics Issue No. 10

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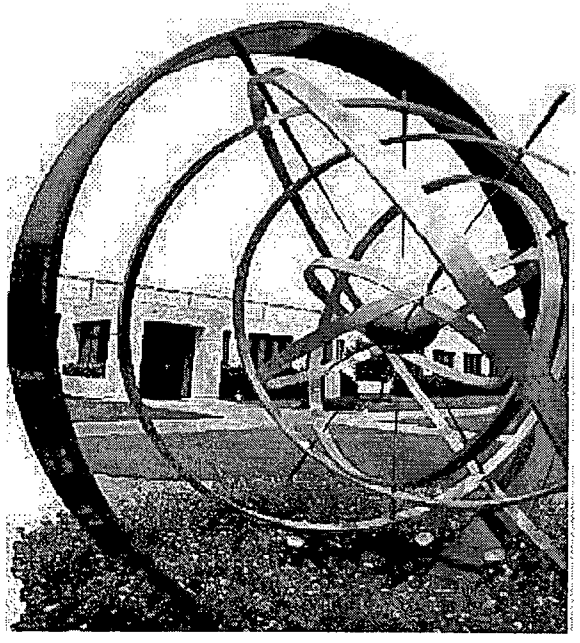

Topics

Issue Overview

Problem Statement

BWROG Objective

URG Assessment

GSI-191 Approach

Proposed Resolution

Relationships to Other Issues

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Issue Overview

The NRC stated the following regarding "Debris Characteristics" from the November 2007 presentation by Ralph Architzel (NRC) to the BWROG:

- "Blockage potential of calcium silicate insulation and other problematic materials such as microporous insulation may not have been treated conservatively"
- "Recent testing for PWRs has identified potential for significant head loss increases"

Problem Statement

The modeling of Cal-Sil and microporous insulation (Min-K and microtherm) as particulates in head loss correlations does not fully account for their head loss impact at concentrations greater than 20%

Additional Topics

OG will also address debris characteristics related to other issues

- Fiber
- Coatings
- Sources of other drywell debris, such as dirt, dust, and rust

BWROG Objective

Develop document that identifies acceptable debris characteristics for use in BWR strainer qualification analysis and testing

Plants will compare their analysis to the guidance document and address gaps

Expectations:

- Most debris characteristics used by BWRs were appropriate
- Some materials may need special treatment

URG Assessment

Microporous and Cal-Sil

- No specific debris characteristics guidance

Fiber Insulation Debris

- The URG adopted a three category size distribution for the fiberglass debris in the ZOI: fines, large pieces, and blankets
- Large pieces at upper elevations were judged to be held up in gratings in the drywell and not transported to the suppression pool
- The size distribution of fiber in the suppression pool consists of fines (23%) and large pieces (77%)

URG Assessment

Non-Insulation Debris

Dirt/Dust: This issue is under detailed resolution under Issue No. 6, *Latent Debris (Dirt/Dust)*

Rust from Unpainted Steel Surfaces: The URG recommended 50 lbm on the basis of engineering judgment. This source term considers unpainted steel surfaces in the drywell, the main vents/downcomers and that portion of the suppression chamber above the pool. Rust was considered to be in the form of "flakes"

Paints/Coatings in the ZOI: The URG recommends a maximum of 85 lbm for ablated coatings within the ZOI

Unqualified/Indeterminate Paint/Coatings: The URG does not provide any specific guidance. However, most evaluations have used either "spheres" or "flakes" as the size classification

GSI-191 Approach

Microporous / Cal-Sil

- Microporous transport utilized 10 micron particulate
- Cal-Sil transport utilized OPG data for size distribution
- Headloss testing was based on pulverized material

Fiber Insulation Debris

- Section 3.0 (Baseline Analysis) of NEI-04-07 presents a size distribution of 60% fines and small pieces and 40% large pieces
- The SER to NEI-04-07 provides updated guidance identifying four size classification of fines, small pieces, large pieces and intact pieces

GSI-191 Approach

Non-insulation Debris

- All particulates are classified as 10 micron spheres for high fiber loads headloss testing
- Coatings transport allowed for treatment of non-spherical debris

Resolution Strategy

A guidance document will be developed that describes what debris characteristics are appropriate for both transport and headloss. The following major steps will be used to develop the guidance:

- Review the current knowledge base of size distribution of debris for BWRs
- Prepare a report that provides recommended BWR debris characteristics
- Provide the report to the NRC for review and comment
- Issue revised report addressing NRC concerns

Document will be sent to utilities for utility comparison

Utilities will individually address any gaps

Resolution Strategy (cont.)

Expectations:

- Most URG-defined debris characteristics used by BWRs are appropriate
- Cal-Sil and microporous insulation debris characteristics may not have been estimated conservatively for certain debris bed compositions
- Fibrous debris characteristics used for thin-bed testing may have been non-conservative

Key Relationships to Other Issues

Issues 1 & 2: *Downstream Effects*

- The debris characteristics of the debris that reaches the strainer will impact the quantity and characteristics that bypasses the strainer and transported downstream of it.

Issue 3: *Debris Bed Head Loss Predictions*

- Different debris characteristics could impact the debris bed and debris head loss predictions.

Issue 9: *Debris Transport and Erosion*

- Different debris size distributions could impact the quantity of debris transported to the suppression pool.

Next Steps and Milestones

Review the current knowledge base of size distribution of fibrous debris for BWRs	4Q 2010
Prepare a report that provides recommended BWR debris characteristics	2Q 2011
Provide report to NRC for review and comment	2Q 2011
Issue revised report addressing NRC concerns	3Q 2011