BWROG Proposed Activities
Assessment of GSI-191 Impact

Randy Bunt
Southern Nuclear
BWROG Chair

Purpose:

Ensure adequate long-term cooling is available considering debris generated from post LOCA events.

GSI 191 Closure Process
12 Key Issues

Debris Source Term	Strainer Head Loss Correlation	Downstream Debris Effects
•Break selection	•Head loss vortexing	•Chemical Effects
•Debris generation	•NPSH	•Downstream effects
•Latent debris	•Upstream Effects	
•Debris transport		
•Coatings		
•Debris source term		
•Debris characteristics		

Assess previous actions for BWRs based on recent learnings.

BWROG Proposed Activities
Assessment of GSI-191 Impact

Tom Morales
Energy Northwest
Committee Chair
ECCS Suction Strainers

Purpose

Provide the NRC with an update on proposed BWROG ECCS Strainer activities.

November 27, 2007 Meeting

NRC Presentation –

- Eleven Δ's between BWR 1996 URG and PWR Response to GSI-191

BWROG Presentation -

- Qualitative Discussion on Five of the Eleven Issues

NRC/BWROG Agreement

- Continue to work together to proactively address these issues
- Meet again in 2Q 2008.

Subsequent Communications

March 6, 2008 GEH / BWROG /NRC phone call

GEH SC 08-02 BWR Suction Strainer

LTR Head Loss

April 10, 2008 NRC letter to BWROG:

Summary of the potential BWR issues arising from the PWR effort

BWROG Activities

- BWR ECCS Strainer Committee Reestablished and Funded
- Initial Plant Surveys
- Solicited PWR and International plant inputs
- Draft Plan issued for GSI-191 Assessment
- March, 2008 Committee meeting with Utilities and Key Industry Participants
- April 17, 2008 - Plan Update based upon committee input

Impact Areas

Three primary areas to address issue:

- Debris Source Terms
- Strainer Head Loss Correlations
- Downstream Debris Effects

Δ's Affecting Debris Source Terms

- Debris Transport and Erosion
- Latent Debris
- Coatings
- Confirmation of Cal-Sil & Micro-Porous Insulation Quantities
- Chemical Effects

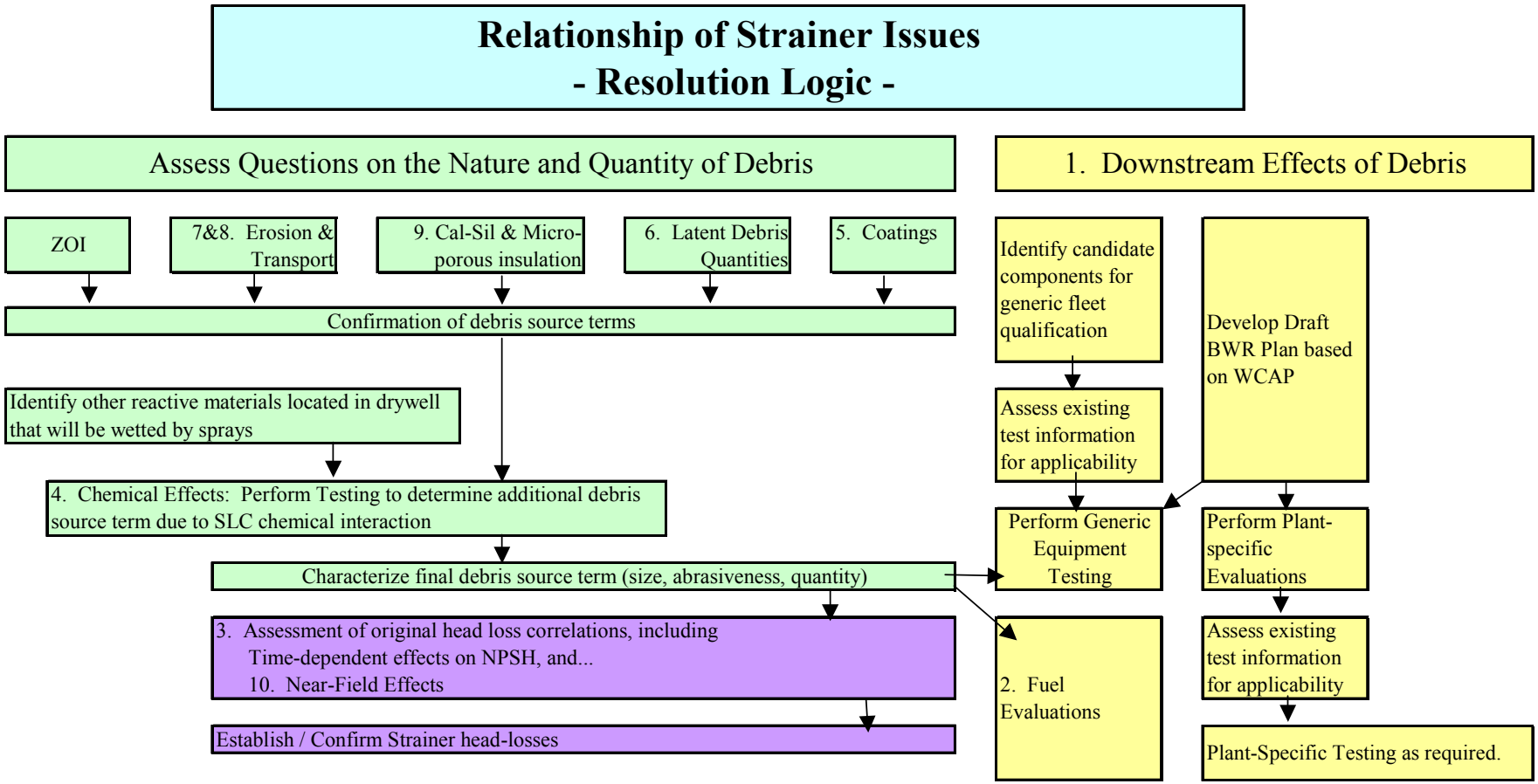
Δ's Affecting Head Loss Correlations

- Near Field Effect/Scaling
- Conservatism of NUREG/CR-6224 for Cal-Sil & Micro-porous Insulations
- Thin Bed Effects
- Non-homogeneous debris beds

Downstream Effects

- Fuel
  - Debris Filter Clogging
  - Debris Deposition on Fuel
- Components
  - Clogging
  - Long-term effect of Abrasion/Erosion

Relationship of Strainer Issues & Resolution Logic



Plan Goals

- Acquire data:
  - Understand the Δ's with PWRs
  - Better understand conservatisms and margins in BWR and PWR methodologies
  - Refine application of PWR methodologies based upon PWR results and BWR design
  - Assess other industry Δ's since NRC Bulletin 96-03
- Define BWR actions with consideration of:
  - Safety Significance
  - Cost Effectiveness

Debris Source Terms
Transport and Erosion

Concern: Conservatism of ZOIs developed from air-jet testing

BWR Plan:

- Acquire PWR test data and related erosion data
- Compare with BWR URG testing methodology and results
- Issue Technical Paper that documents:
  - BWR URG conservatism, or
  - Further actions required to address concern

Debris Source Terms
Latent Debris

Concern: Conservatism and characterization of URG 150 lb source term for BWR latent debris

BWR Plan: Plant-specific assessments of:

- Containment FME practices vs.
  - Original URG recommendations
  - EPRI TR-106756 –*FME Exclusion Guidelines*
  - INPO 07-008 – *FME Guidelines for Excellence*
  - Plant Condition Reports / Trends
  - Sludge Deposition Margins
  - PWR considerations

Debris Source Terms
Latent Debris (cont'd)

- Develop summary of :
  - BWR fleet FME practices and margins
  - Outlier Plants, if any, and corrective actions
  - Other required actions, as applicable
- Issue technical report to document results

Debris Source Terms
Cal-Sil & Micro-Porous Insulations

Concern: High-head loss insulations may have been inappropriately excluded from debris source terms

Plan: Survey plants for use of problematic insulations in their drywells (Reg Guide 1.82).

- Confirm that insulation was in debris source term, or
- Obtain technical justification for insulation's exclusion (barriers, separation, or other means)

Debris Source Terms
Coatings

Concern: Are BWR's generic debris source terms for coatings sufficiently conservative?

Plan: Assess current industry information on DBA effects on coatings, including:

- EPRI Report 1014884

Degradation Research for Nuclear Service Level I Coatings

- NEDC-32996-P

URG for Evaluation of Effect of Containment Coating Debris on ECCS Suction Strainers

- NRC Coatings Evaluation Guidance for PWRs
- PWR ZOI Test Results

Debris Source Terms
Coatings (cont'd)

Issue Technical Paper

- Document results and, if required,
- Further actions by BWROG

Debris Source Terms
Chemical Effects

Concern: Long-term effect of chemical interaction with post-LOCA debris is unknown

Plan:

- Confirmation of debris source terms
- Identification of reactive material inside containment
- Confirmation of post LOCA chemistry in suppression pool
- Chemical effects testing as required

Head Loss Correlations

Concern: Head loss correlations may not be conservative for fine particulate (e.g., micro-porous insulations) and thin-bed effects

Plan:

- Confirm debris source terms
- Enlist Strainer Manufacturers for application of current knowledge base

Downstream Effects
Fuel

Concern: BWR channeled fuel assemblies will inhibit cross-flow and cooling, if debris filters are clogged.

Plan:

- Elicit input from each fuel manufacturer
- Evaluate deposition of debris on fuel
- Develop a written evaluation

Downstream Effects
ECCS Components

Concern: Degradation of low-clearance ECCS hardware due to clogging or abrasiveness of bypass debris

Plan:

- Develop BWR adaptation of WCAP 16406 R1, including steps to:
  - Assess the lessons learned from PWRs
  - Characterize BWR Debris source terms
  - Identify and evaluate vulnerable BWR components
- Issue technical report
- Implement BWR Adaptation

Next steps:

Request funding for current plan

Evaluate any additional items to be added to plan

Develop schedule