PWR Owners Group Boric Acid Precipitation Analysis Methodology Program

NRC Update
August 23, 2006

Why Are We Here Today

Purpose

- Discuss long term PWROG program for boric acid precipitation analysis methodology
- As time permits
  - Discuss interim approach for boric acid precipitation analyses/evaluations (LARs, 50.59s)
  - Discuss any NRC comments/questions on Owners Group response to November 23rd 2005 letter

Where We Are Today

Background

- NRC August 01, 2005 Letter – Suspension of CENPD-254-P-A
- NRC November 23th, 2005 Letter - Clarifications
  - Four Basic Methodology Features
  - Cited areas of margin
- Areas of Focus
  - Mixing Mechanisms
  - SBLOCA
  - Sump Debris

Where We Are Today

Background (cont'd)

- PWROG Response to NRC November 23th,2005 Letter
  - Evaluated US fleet of PWR AORs with respect to the basic methodology features
  - Used margin cited by the NRC
  - Showed that for all plants, boric acid precipitation is not predicted

Where We Are Today

Interim Approach

- LAR re-analyses will incorporate the four basic methodology features
  - CE Plants to use Waterford approach
  - Westinghouse to use Beaver Valley / Ginna EPU approach
  - B&W Plants to use Crystal River 3 / Davis Besse 1 approach
- 50.59 evaluations will review the Analysis-of-Record

Where We Are Today

PWR Owners Group

- Funded a significant program (PA-ASC-0264) last year to proactively address NRC concerns regarding the methodology used to address post-LOCA boric acid precipitation
- Funded and completed a program (PA-ASC-0290) to respond to NRC request to confirm that sufficient margin exists and that licensees remain in compliance with regulations and their design basis
- After November 23rd, 2005 letter and Beaver Valley and Ginna EPUs LAR reviews, it became clear that new methodologies are needed.

Path Forward

PWROG Boric Acid Precipitation Analysis Methodology Program

- Phase 1 – Identify Methodology Requirements (Current Program)
  - Phenomena Identification and Ranking Table (PIRT)
  - Testing and Analytical Studies
  - Methodology Requirements
- Phase 2 – Methodology Development and Implementation (Future Program)

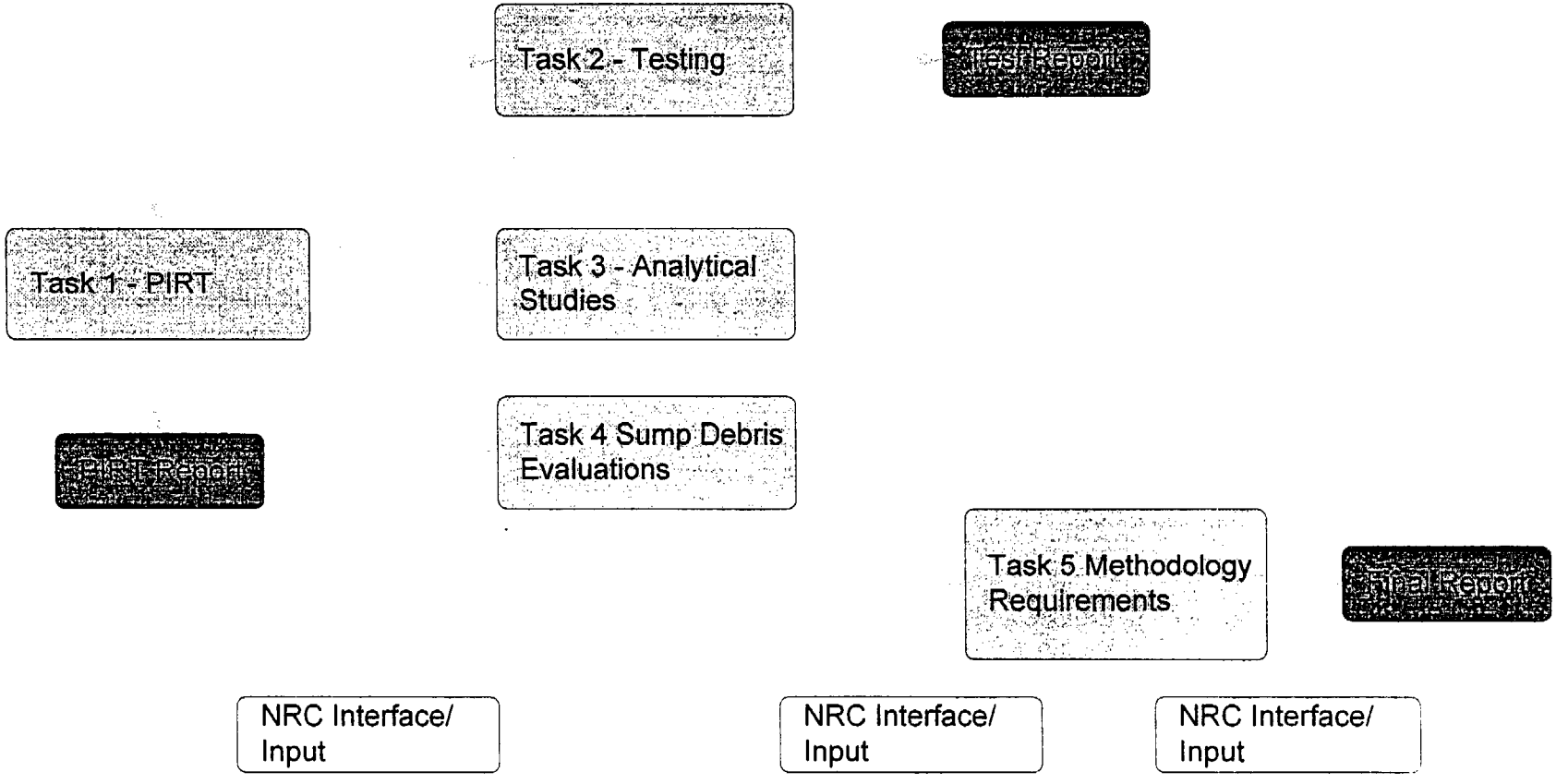
Path Forward

Phase 1 Major Tasks

- PIRT Development
- Testing
- Analytical Studies
- Define New Methodology Requirements
- Sump Debris Issues (Approval Pending)

Path Forward

Phase 1 Major Task Interfaces



Task Description

PIRT

- Determine phenomena to be addressed by testing
- Determine phenomena to be addressed by generic analytical work
- Provide input for the test facility scaling study
- Determine key phenomena to be incorporated into the methodology
- Provide the basis for the disposition of low-ranked phenomena

Task Description

Testing

- Objectives of the testing program
  - Supplement the original MHI boric acid vessel mixing tests
  - Understand the mixing mechanisms in the core region, lower plenum, and entire vessel
  - Understand the mechanisms and rate of core dilution once a dilution flow path is established
- The key phenomena identified by the PIRT will be used as guidance for the test plan
- A test facility scaling study will be included

Task Description

Analytical Studies

- Analytical studies will be necessary to support the new methodology. For example, analytical studies will likely be needed to address mixing phenomena that cannot be addressed with testing
- The need for specific analytical studies will be identified as part of the PIRT process

Task Description

Define New Methodology Requirements

- Define rules (e.g. decay heat, solubility limit, boric acid properties)
- Define new methodology requirements (i.e. what needs to be included in the analysis)
- Summarize in methodology requirements report (WCAP)

Task Description

Sump Debris Issues (Pending Approval)

- Effect of sump debris particulates/chemistry on boric acid solubility
- Effect of sump debris particulates/chemistry/blockage on mixing mechanisms
- Effect of sump particulate debris volume on mixing volume
- Effects of sump debris on reactor coolant flow paths

Program Summary

- Define assumptions and acceptance criteria that will be used by all vendors for all PWR plant designs
- Define methodology requirements that will be satisfied in design-specific methodology
- Focus methodology on key phenomena and credible scenarios

Request of NRC

- Provide comments on PIRT when available
- Work with PWROG to develop regulatory compliance and licensing options for alternate decay heat standards
- Keep PWROG advised of other NRC activities in the boric acid precipitation area