
Research Supporting Resolution of PWR ECCS Sump Performance Concerns (GSI-191)

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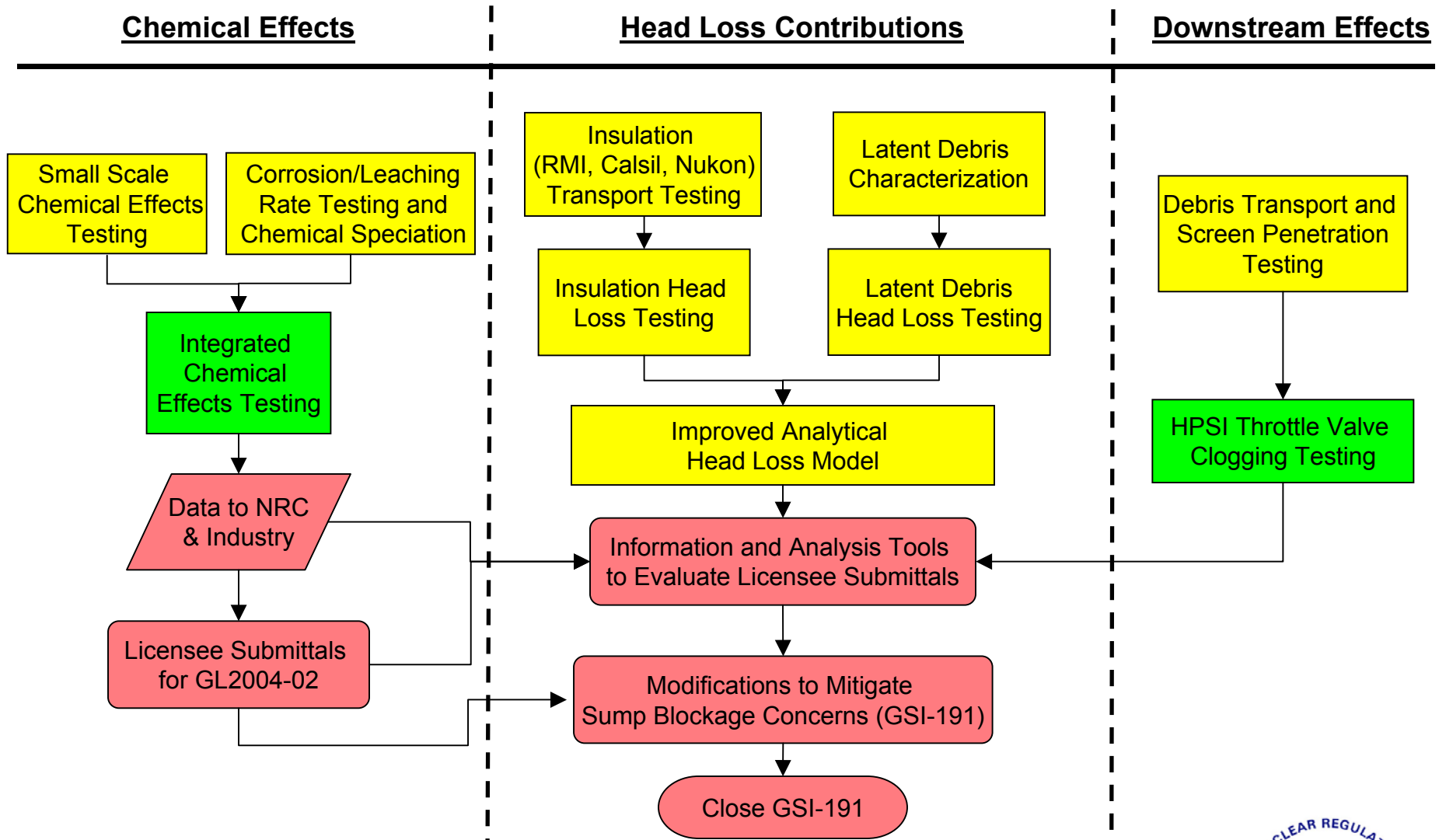
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Research Supporting GSI-191 Resolution

- NRC has past and ongoing research efforts supporting resolution of technical issues associated with GSI-191 resolution.
- Research efforts focused in three technical areas.
 - Chemical effects: Determine if sump pool environment generates by-products which contribute to sump clogging.
 - Head loss contributions: Understand head losses associated with PWR containment materials.
 - Downstream effects: Determine effect of debris on HPSI throttle valve performance.
- Research efforts in each area are integrated within a comprehensive assessment plan.



Research Supporting GSI-191 Resolution



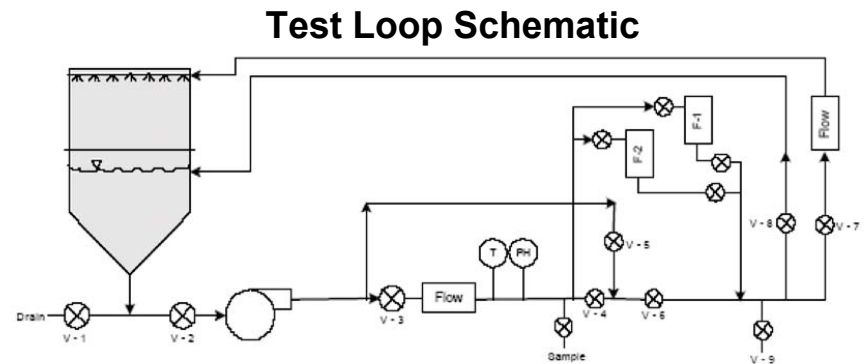
Legend

- Completed Testing/Analysis
- Ongoing Testing
- Data/Results Product
- Product/Deliverable



Chemical Effects Testing

Test Chamber & Loop Components

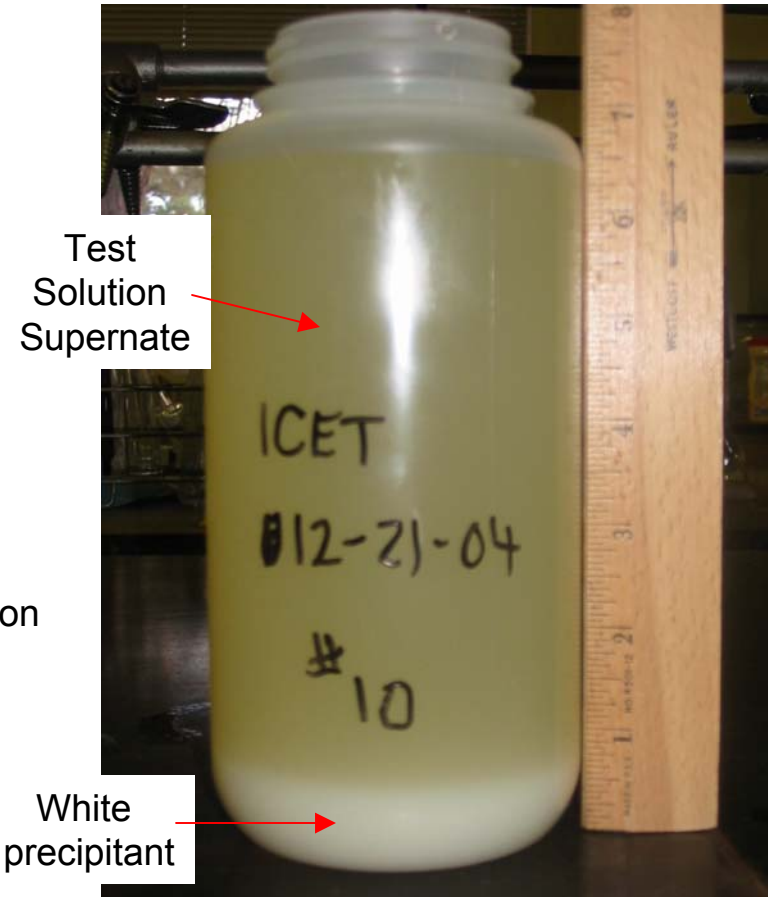


- Testing consists of multiple 30 day tests to evaluate corrosion by-products and the ability to form gel-type compounds.
- Testing and characterization procedures and requirements jointly developed by NRC and industry.
- Readiness review performed to verify the quality provisions.
- Testing results are being jointly shared between NRC and the nuclear industry.
- Test #1 has been completed; test #2 is ongoing.

Chemical Effects Testing: Preliminary Test #1 Results

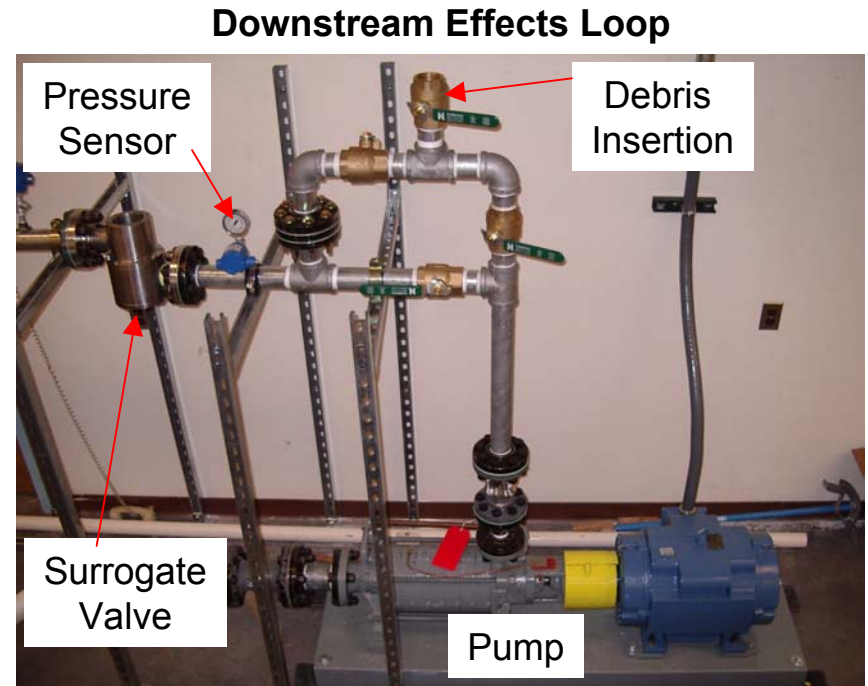
- Test #1: Conditions.
 - NaOH buffer: pH ~ 9.5
 - Test Temperature: 140°F
 - Fiberglass insulation.
 - Metallic coupons, latent debris.
- Test #1: Preliminary Findings.
 - Test temperature.
 - No precipitant visible.
 - Properties exhibit little change with test time.
 - Room temperature.
 - White amorphous precipitant formed upon cooling.
 - Greater amount of precipitant forms as test progresses.
 - Deposits
 - Insulation fibers near outer surface
 - Tank sediment.
 - Test chamber drain screen.

Day 30 Test Sample @ Room Temperature



Downstream Effects Testing

- Sump screen penetration tests are completed to evaluate physical characteristics of ingested debris.
- Quality assurance provisions, and pre-test system evaluation has been completed.
- HPSI throttle valve testing is underway.
- Three testing phases.
 - Baseline and single debris-type.
 - Multiple debris-type.
 - Long duration/progress clogging.



Head Loss Contributions



- Debris transport and characterization.
 - Completed for insulation materials and latent debris.
- Initial insulation and latent debris head loss testing completed.
 - Some technical issues raised by initial tests that require subsequent evaluation.
 - Initial planning for possible follow-on testing is underway.

Intended Research Products and Use

- Chemical effects testing results used to determine if licensees need to consider these effects in GL2004-02 submittals.
- Remaining research is confirmatory in nature and will be used by NRC to evaluate proposed licensee mitigative measures as required by GL2004-02.
 - Verify that overall safety evaluation (SE) methodology is conservative.
 - Provide analysis tools and information to be used in NRC review.
 - Chemical speciation prediction.
 - Improved head loss prediction.
 - HPSI throttle valve blockage concerns.

