



RIC 2007

Generic Safety Issue 191

Chemical Effects Update

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Outline

- Chemical Effects Issue Description
- Key Test Observations
- Path Forward

Chemical Effects

- Interaction between plant materials and the post-loss-of-coolant-accident (LOCA) containment environment that may produce chemical products that could contribute to head loss across the sump screen or affect downstream components

Key Results – ICET

- Integrated Chemical Effects Tests (ICET)
- Chemical products can form in representative post-LOCA environments
- Variations in insulation materials or chemical buffering agents produced significantly different chemical reaction products



Test Observations – Trisodium Phosphate

- May be a good option for plants with a low dissolved calcium concentration in a post-LOCA containment pool
- For Argonne National Lab test loop conditions— significant head loss was observed with TSP and a dissolved calcium concentration >25 ppm

Test Observations – Sodium Hydroxide

- Complex interactions with large test-to-test variation in head loss, probably related to the kinetics of precipitate formation
- Large head loss at both 100 ppm and 375 ppm dissolved aluminum, sometimes with no visible indication of precipitates

Test Observations – Sodium Tetraborate

- Initial tests showed no head loss at 50 ppm dissolved aluminum but significant head loss at 100 ppm dissolved aluminum
- Follow-up long-term test with increasing aluminum concentration confirmed no head loss increase with 50 ppm dissolved aluminum in Argonne Lab vertical loop
- At pH =8.3, a measurable head loss response started at a dissolved aluminum concentration equivalent to about 70 ppm

Chemical Effects Status

- Resolution of chemical effects issues have been complex and challenging
- NRC and industry testing has shown chemical products can interact with a debris bed and produce significant head loss
- Licensees are evaluating options to address chemical effects on a plant-specific basis

Path Forward – NRC Interactions

- WCAP-16530-NP review
- Public meetings
- GSI-191 plant audits
- Staff visits to observe industry chemical effects testing
- Alternate buffer evaluations
- License amendments
- Generic Letter 2004-02 supplements

Path Forward – Chemical Effects

- Licensees to demonstrate sufficient pump net positive suction head margin exists for all postulated debris sources, including plant specific chemical effects, and verify downstream component performance is not compromised by chemical products
- NRC to rely on information from confirmatory Office of Nuclear Regulatory Research work to perform independent evaluation of licensee chemical effect evaluations