



Summary of Recent/Continuing NRC Research Activities Related to GSI-191

T.Y. Chang

Office of Nuclear Regulatory Research

Division of Engineering Technology

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Status of NRC Research

- **Chemical Effect Tests:**
 - Completed tests under present scope
 - Peer reviewed by an independent panel
 - Completed additional zinc corrosion tests with silica measurements as recommended by Peer Review Panel
 - Tests and results are documented in LANL report LA-UR-03-6415
- **Calcium Silicate Head Loss Tests:**
 - Tests completed and draft LANL report is under NRC review
- **Debris Characterization and Additional Head Loss Tests:**
 - Latent debris from 2 of 6 potential volunteer plants received by LANL
 - Separation and characterization have begun



Status of Chemical Effect Tests

- **Experiments completed at UNM under direction of LANL**
- **LANL's draft test report peer reviewed by :
Dr. Edward Lahoda (Westinghouse),
Professors Peter Griffith (MIT) and Adrian
Hanson (New Mexico State University)**
- **Tests and results are documented in LANL
report LA-UR-03-6415**



Summary of Chemical Effect Tests

- **Concern is that post-LOCA chemical interactions between ECCS/CSS water and exposed materials may produce additional debris**
- **Issue was raised by ACRS in 2/03, cited evidence was “gelatinous” debris found in TMI after 1979 accident**
- **A limited-scope study was conducted to assess potential for chemically induced corrosion products to impede performance of ECCS recirculation after a LOCA in PWR plants**
- **No integrated tests were performed to demonstrate complete progression of chemical interactions from metal corrosion to the ultimate formation of precipitation products**



Summary of Chemical Effect Tests (Continued)

- **Separate-effects tests were conducted for each potential stage of the progression**
- **Precipitation was artificially induced in head loss flow tests by addition of metallic salts to the fluid**
- **Principal findings:**

If precipitated gelatinous debris is formed and transported to the sump screen, it can increase head loss across a fibrous debris bed
- **Findings lend credibility to the concern raised by ACRS, but are not sufficient to provide a basis for plant-specific quantitative assessment of the issue**



Summary of Peer Review Comments and Recommendations

- **Comments included in LANL report as Appendix A**
- **Realistic head loss can only be determined with good corrosion rate data**
- **Corrosion rate data needed include:**
 - **Oxidation in air (pre-LOCA surface corrosion)**
 - **Corrosion from spray**
 - **Corrosion from submersion**
- **Materials commonly used in NPPs should be used for testing, e.g.:**
 - **Hot dipped galvanized coating - lead and other compounds could be present**
 - **concrete**
 - **silica sources such as dust and fiberglass**
- **Consideration of realistic accident scenarios**
- **Pointed out difference in head loss between surface filtration and bed filtration**



Summary of Peer Review Comments and Recommendations (Continued)

- Corrosion rate for submersion should be measured in actively oxygenated/stirred tests
- Silica can reduce solubility of metal and its effects need to be investigated, e.g.:
 - Na-Al-Si gels can be formed and have very large volumes due to hydration
- Co-precipitation may have significantly different properties than the precipitants formed from single species (e.g., Na-Al-Si gels)
- Integrated tests should be performed with suitably scaled experiments that uses prototypical values of:
 - Water chemistry, water velocities, pool depths, water temperature, time, etc.
- Corrosion/leaching tests on zinc-rich primer coating need to be considered



Follow-on Chemical Effect Tests

- **NRC to consider Peer Review Panel recommendations for future tests**
- **NRC to consider integrated tests:**
 - **Staff participation from RES and NRR**
 - **Scaled tests**
 - **Realistic / Prototypical**
 - **Timeliness**
 - **Industry involvement**
 - **Communicate with stakeholders**