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# NRC Perspectives on Potential Chemical Effects in Boiling Water Reactors

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**Meeting with:**
**Boiling Water Reactor Owners Group**
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# Outline

- Japanese Testing in BWR Environment
- German Testing in Un-buffered Environment
- Applicability of These Tests to US BWRs
- NRC Perspective for US BWRs

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# Testing for Japanese BWRs

- Japanese chemical effects testing was conducted by the Central Research Institute of Electrical Power Industry (CRIEPI)
- Funded by the Japanese Nuclear Electric Safety Organization (JNES)
- Integrated Chemical Effect Assessment on NPH (ICAN)
  - Test tank is similar to the Integrated Chemical Effects Test (ICET) tank at University of New Mexico, but includes the ability to measure head loss

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# Japanese Results - ICAN

- Most tests related to a PWR environment
- One test was dedicated to a representative Japanese BWR environment (ICAN #6)
- Significant weight loss occurred in iron coupons
- Iron oxide particulate was evident in the test tank and on the filtering bed of coarse fibrous debris
- When the test fluid was passed through a bed of finely prepared fiber, significant head loss increase occurred

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# Post Test Debris Bed for ICAN #6

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# ICAN6: Potential Implications

- Not the type of colloidal chemical precipitates found in some PWR environments
- Particulate corrosion products such as iron oxide may be an additional source of debris that could significantly affect head loss
- Corrosion products formed post-LOCA may or may not be bounded by the head loss testing that was previously performed for US BWRs, which considered iron oxide formed during normal operating cycle

# German Testing

- During information exchanges with German regulators (GRS) the NRC staff learned of their chemical effects head loss results
- Unbuffered post-LOCA pool environment
- Accelerated corrosion of galvanized steel floor grating exposed to simulated flow from a pipe break was observed
- Significant head loss increase from zinc corrosion products

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# Applicability of Foreign Testing

- The tests described are specific to each country's plants
- Results may not be directly correlated to US plant environments
- Differences exist in chemistry, pH, insulation, and other plant materials
- However, results indicate that the BWR plant environment has the potential to form chemical products post-LOCA

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# NRC Perspective for US BWRs

- Chemical effects will likely be different between PWRs and BWRs
- By themselves, these data are not sufficient to say that the US BWRs have a significant un-analyzed source of debris
- There may be corrosion products generated in a post-LOCA BWR environment that have not been accounted for by US BWRs

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# Conclusion

- Additional testing and/or analysis by US BWRs is warranted to fully understand the potential forms and quantities of debris that may be generated through chemical processes following a LOCA in various BWR environments