



## RIC 2011 GSI 191 Long Term Cooling Testing

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## GSI-191 Long-Term Core Cooling Testing

### BACKGROUND

- GL 2004-02 issued to identify and request utilities to address the affect of debris from the sump on long-term core cooling (LTCC).
- Utility response to GL must include:
  - Basis for concluding that adequate ECCS flow is available for long-term core cooling in spite of blockage at flow restrictions downstream of the screens (i.e., downstream effects)
  - Description of modifications, if needed, to provide for adequate ECCS flow
- Industry guidance for fuel effects: WCAP-16793-NP
  - Written to demonstrate there is reasonable assurance LTCC requirements of 10CFR50.46 are satisfied with debris and chemical products in the circulating coolant delivered from the containment sump to the core.
  - Applicable to operating fleet of PWRs.

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## GSI-191 Long-Term Core Cooling Testing

### WCAP-16793-NP, Revision 1

- PWROG sponsored fuel assembly (FA) testing to define maximum amount of debris that would not impede LTCC.
- It is the combination of debris limits defined by FA testing with the evaluations presented in WCAP-16793-NP that demonstrate adequate heat-removal capability for utilities.
- Westinghouse and AREVA conducted FA tests at independent facilities:
  - AREVA → Continuum Dynamics, Inc. (CDI)
  - Westinghouse → Westinghouse Research and Technology Unit (RTU)

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### GSI-191 Long-Term Core Cooling Testing

Westinghouse Test Loop



AREVA Test Loop



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### GSI-191 Long-Term Core Cooling Testing

#### Test Overview

- PWROG has sponsored over 50 FA tests. The evaluations have included:
  - The impact of flow rate on dP,
  - The repeatability of test results,
  - The effect of particulate-to-fiber ratio,
  - The effect of various types and amounts of debris, and
  - The impact of hardware differences on dP.
- There is different behavior of debris between the test facilities. However, both facilities are constructed in such a way that any minor differences in test facilities are outweighed by the conservatism inherent in the test process.
- PWROG will be sponsoring additional testing to quantify conservatism and define a single fiber load for the operating fleet.

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