

GSI-191

In-Vessel Debris Limit Determination

Challenge

On September 13, 2004, the NRC issued GL 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors" as the primary vehicle for addressing and resolving concerns associated with GSI-191. Resolution of GSI-191 requires that every plant evaluate plant-specific debris generation and transport to its recirculation sump strainer(s) for a variety of breaks and break locations. Resolution of the generic issue also requires that the effects of debris that pass through (penetrate or bypass) the sump strainer are addressed. In particular, the Pressurized Water Reactor Owners Group (PWROG) completed an evaluation of the impact of debris accumulation at the core inlet and the consequential effect on core cooling.

Involved and Engaged

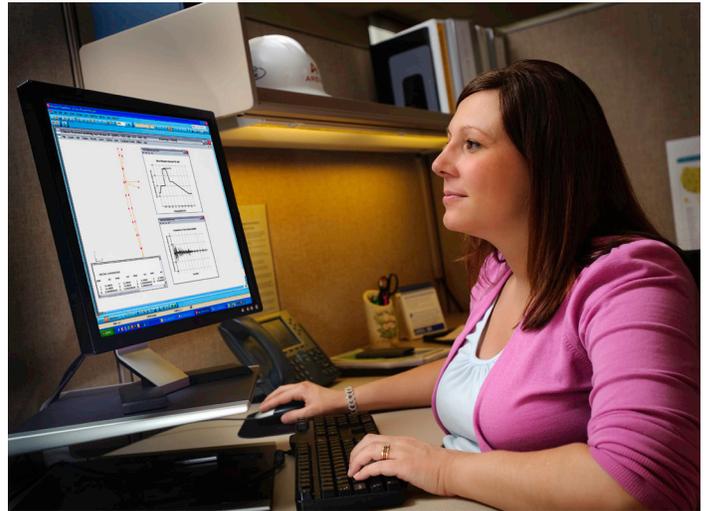
AREVA NP has been involved in helping utilities address GSI-191 since the identification of the issue. AREVA NP teamed with global experts Alden Research Labs for analytical modeling and testing and PCI for hardware supply to provide complete solutions to U.S. and international customers. Services provided include debris generation and transport modeling, field walkdowns and debris inventory, replacement strainer mod engineering and supply, strainer testing, and evaluation of downstream components for effects of debris bypass. AREVA NP helped to design and then performed fuel assembly (FA) testing for the initial PWROG effort to establish an in-vessel debris limit defined in WCAP-16793-NP.

Solution

Over the last five years, AREVA NP participated in a comprehensive test and analysis program as part of the resolution to GSI-191 to increase the fibrous debris limits per FA. The results of this effort are documented in WCAP-17788, which presents the methodology that member utilities can use to assess the time-dependent collection of fibrous debris in the reactor vessel, which can then be used for final closure of NRC GL 2004-02 and GSI-191. This work provides an alternative approach to the method detailed in WCAP-16793-NP-A, Rev. 2 for defining an in-vessel fibrous debris limit and provides a means for increasing the currently established in-vessel fibrous debris limit of 15 g/FA.

Fibertrack

AREVA NP has implemented the methodology described in WCAP-17788 for both cold leg breaks (CLB) and hot leg breaks (HLB) into a single computer program called Fibertrack. The results from Fibertrack produce plant-specific in-vessel debris limits for any operating PWR.



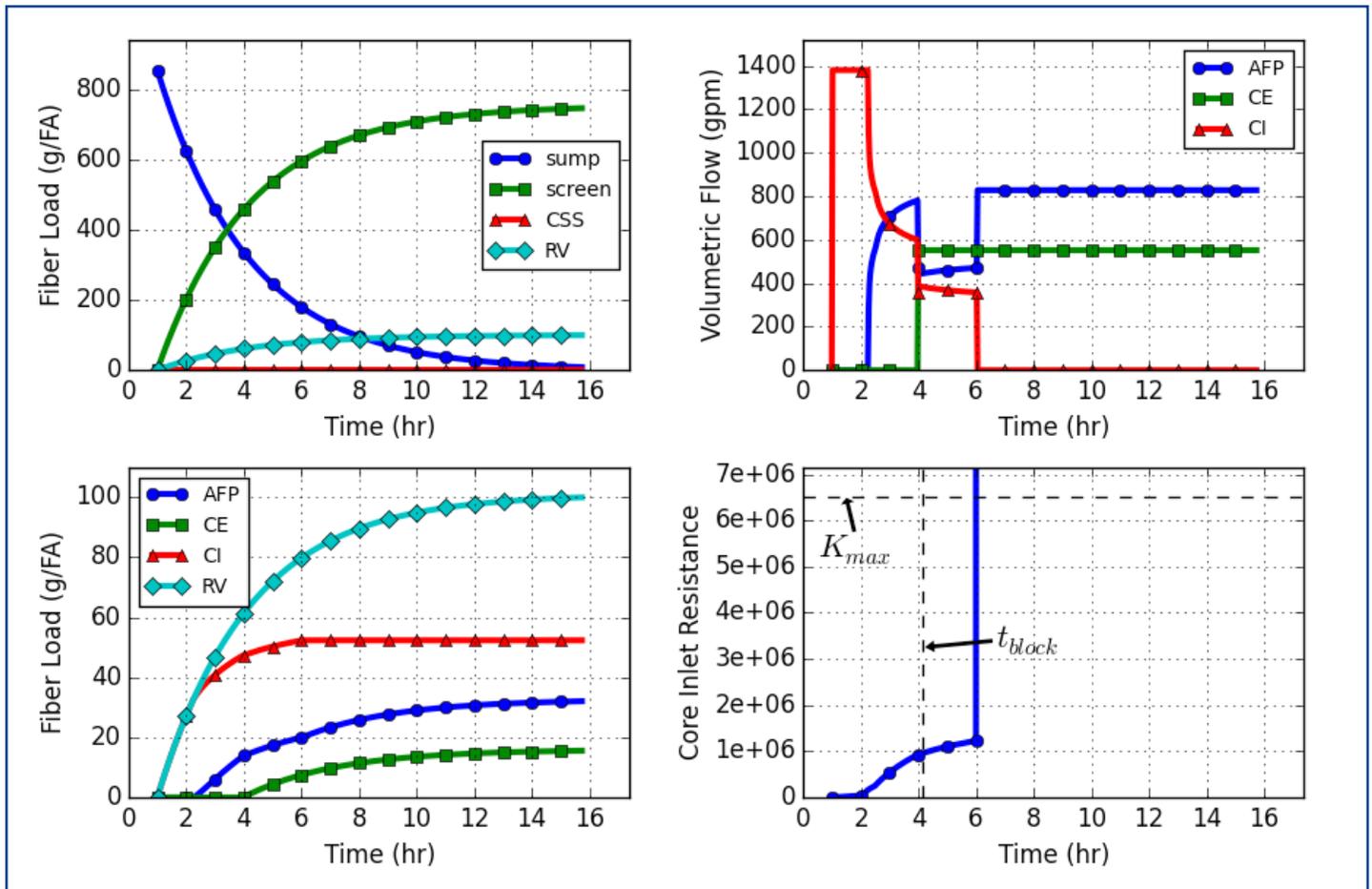
Customer Benefits:

- AREVA NP is the primary author of the methodology described in WCAP-17788. No one in the industry understands the ins and outs of the method and process better than AREVA NP.
- AREVA NP will work with utilities to define a short list of inputs needed for the analysis. Fibertrack will then be used by experienced AREVA NP engineers to generate fiber limits for both CLB and HLB in a single analysis.
- Since the analysis becomes part of the design basis of the plant, the results of this analysis will be maintained by AREVA NP in a quality-assured document for the life of the plant. AREVA NP can update the analyses as needed.
- AREVA NP will provide the necessary results and engineering support to help you close out GL 2004-02.

Technical Information

Not all plants will be able to establish acceptable debris limits using the WCAP-17788 methodology. However, as primary author of the methodology, AREVA NP has unique insights and capabilities for regaining margin and increasing debris limits above those calculated using the standard method. AREVA NP will work with utilities from start to finish on this project to try and obtain the best possible debris limits for a given plant.

AREVA NP offers the complete range of engineering services needed to help you successfully define and defend a plant-specific in-vessel debris limit to close out GL 2004-02. Working in concert with your engineers, we will define the appropriate plant-specific inputs, discuss the results of the Fibertrack in as much detail as needed with you, and provide the necessary engineering support to help you close out GL 2004-02.



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