ENCLOSURE 2

BWROG 09-09068

Redacted Presentation

Non-Proprietary Information

IMPORTANT NOTICE

Enclosure 2 is a non-proprietary version of the Draft Technology Update Presentation from Enclosure 1, which has the proprietary information removed. Portions that have been removed are indicated by open and closed double brackets as shown here [[ ]].

NRC / BWROG Meeting

BWR LOCA Long Term Cooling Fuel Effects to Debris Blockages

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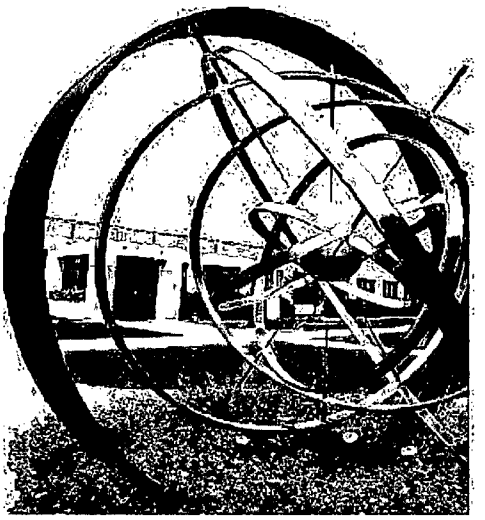
October 21, 2009



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Agenda

- Overview of LOCA Scenario (~ 10 min)
  - Emphasis on flow patterns after low pressure ECCS injection
- TRACG LOCA Simulation Results (~ 20 min)
  - Simulation Model Description
  - Limiting Case and Non-limiting Sensitivity Results
- Basis for Application to all BWR/2-6 Plants (~ 10 min)
- Method for Establishing Thermal Hydraulic Boundary Conditions for Fuel Testing (~ 5 min)
  - Bottom Reflood
  - Natural Circulation
  - Bypass Region Refill
  - Top Channel Downflow
- Method of Validation for Other Fuel Characteristics (~ 5 min)

Overview of LOCA Scenario

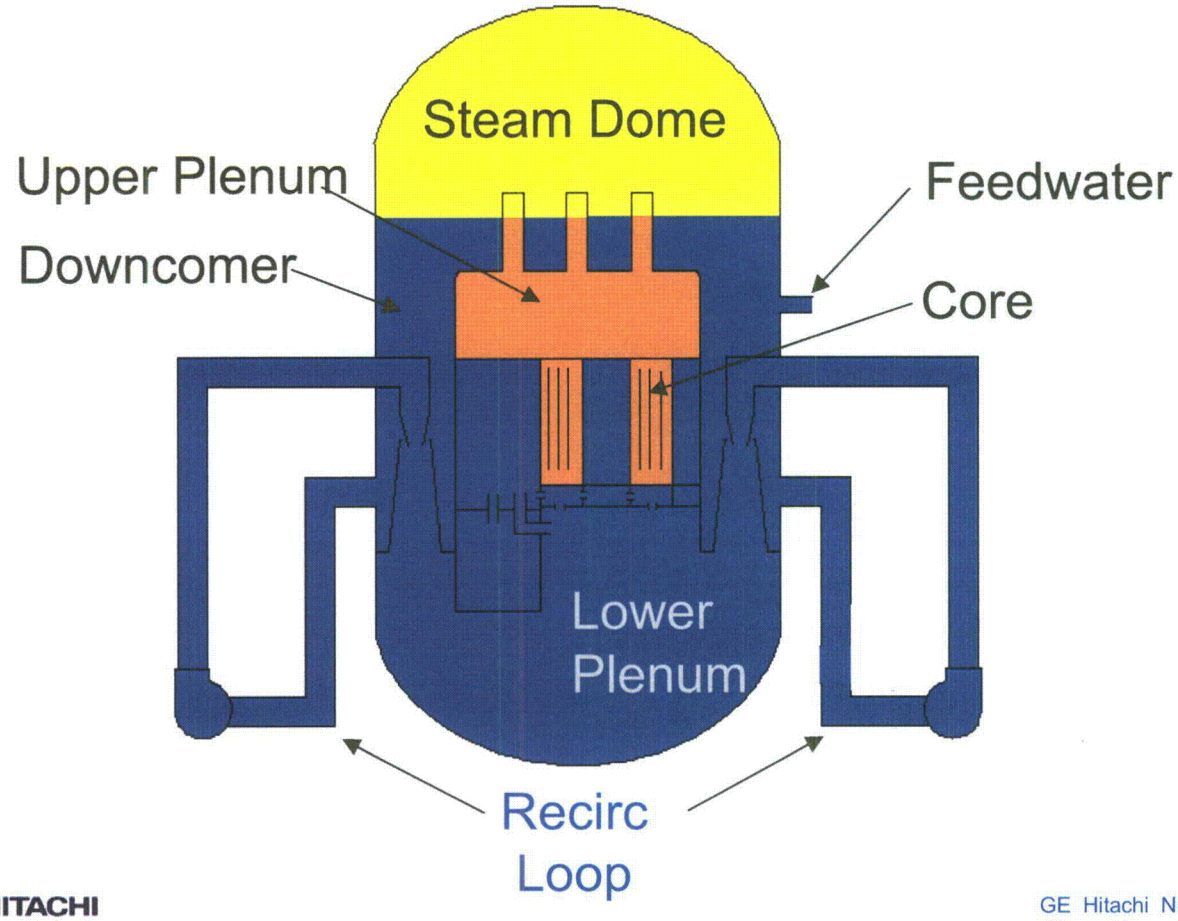
TRACG LOCA Simulation Results

Basis for Application to all BWR/2-6 Plants

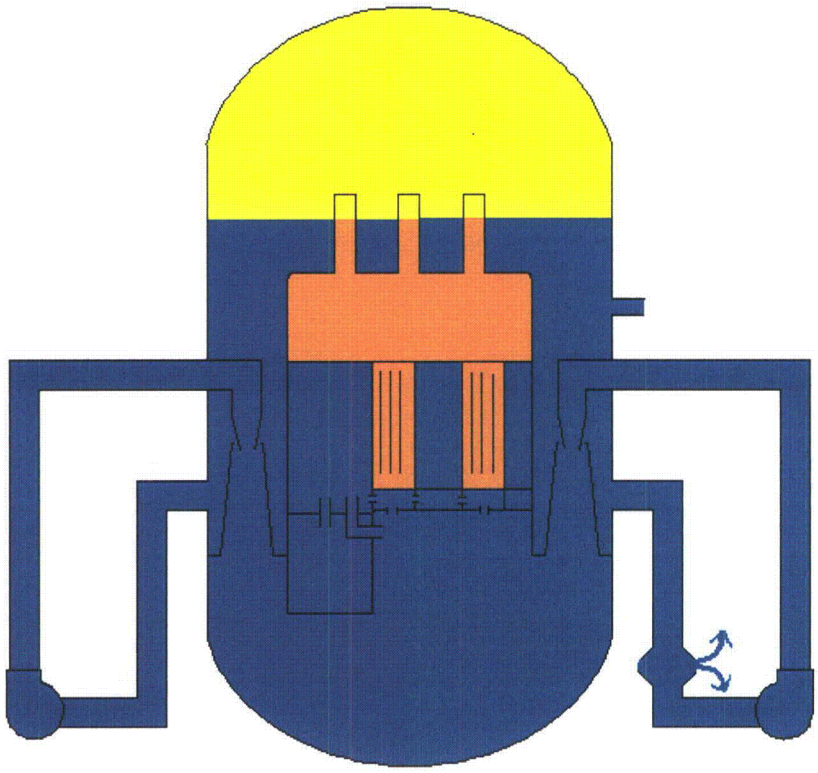
Method for Establishing Thermal Hydraulic Boundary Conditions for Fuel Testing

Method of Validation for Other Fuel Characteristics

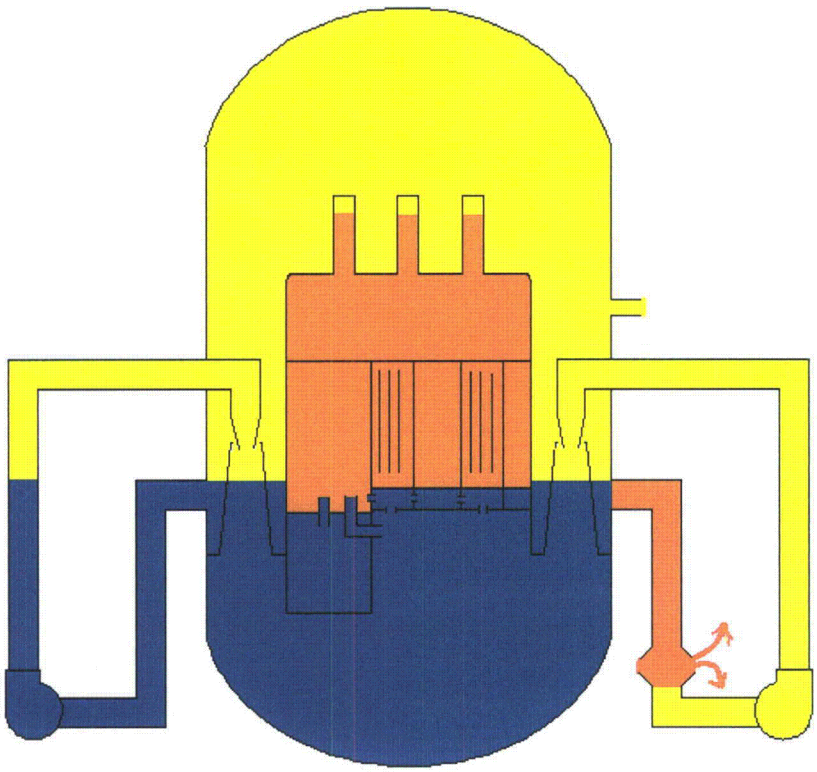
Typical BWR Normal Operation



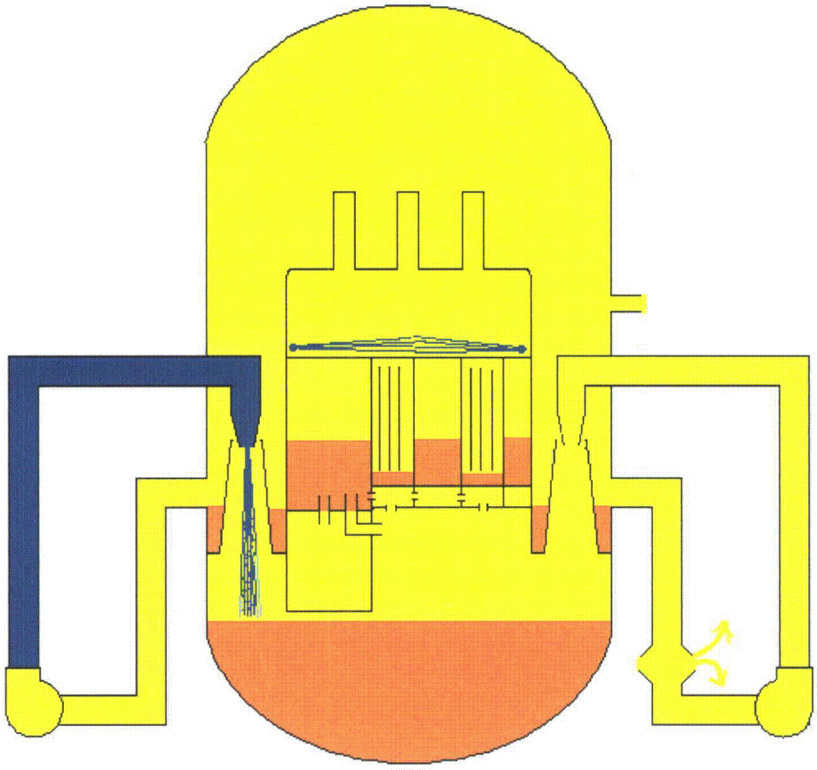
BWR LOCA Event – Initial Pipe Rupture



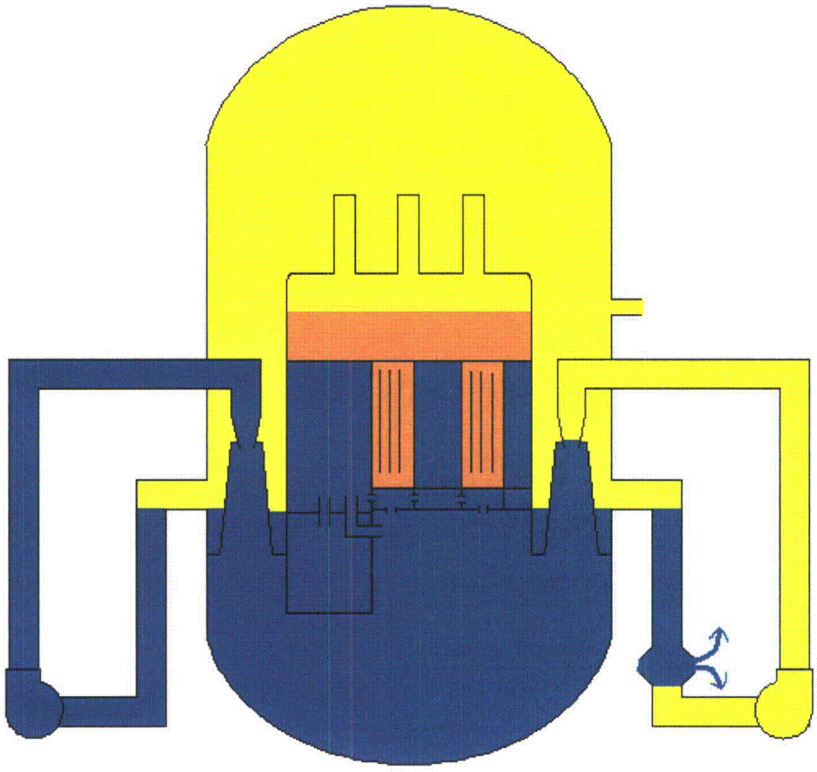
BWR LOCA Event – Prior to ECCS Injection



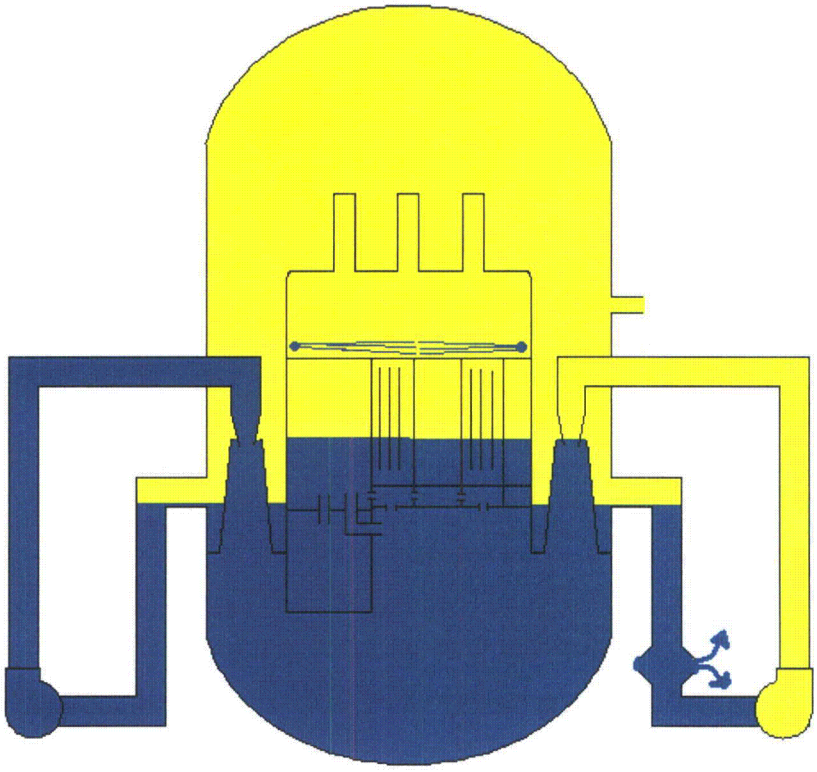
BWR LOCA Event – Initial ECCS Injection



BWR LOCA Event – Core Reflood



BWR LOCA Event – Long Term Cooling



BWR LOCA Long Term Cooling Phenomena

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Overview of LOCA Scenario

TRACG LOCA Simulation Results

Basis for Application to all BWR/2-6 Plants

Method for Establishing Thermal Hydraulic Boundary Conditions for Fuel Testing

Method of Validation for Other Fuel Characteristics

Simulation Model Description

- Objective - Demonstrate the effect that blockage has on long term fuel cooling.
  - Full inlet blockage
  - Blockage at Spacer #1 and Upper Tie Plate
- Method - GEH TRACG model
  - Parametric Study Approach
  - Variation in Blockage Degree and Timing

Summary of Conclusions

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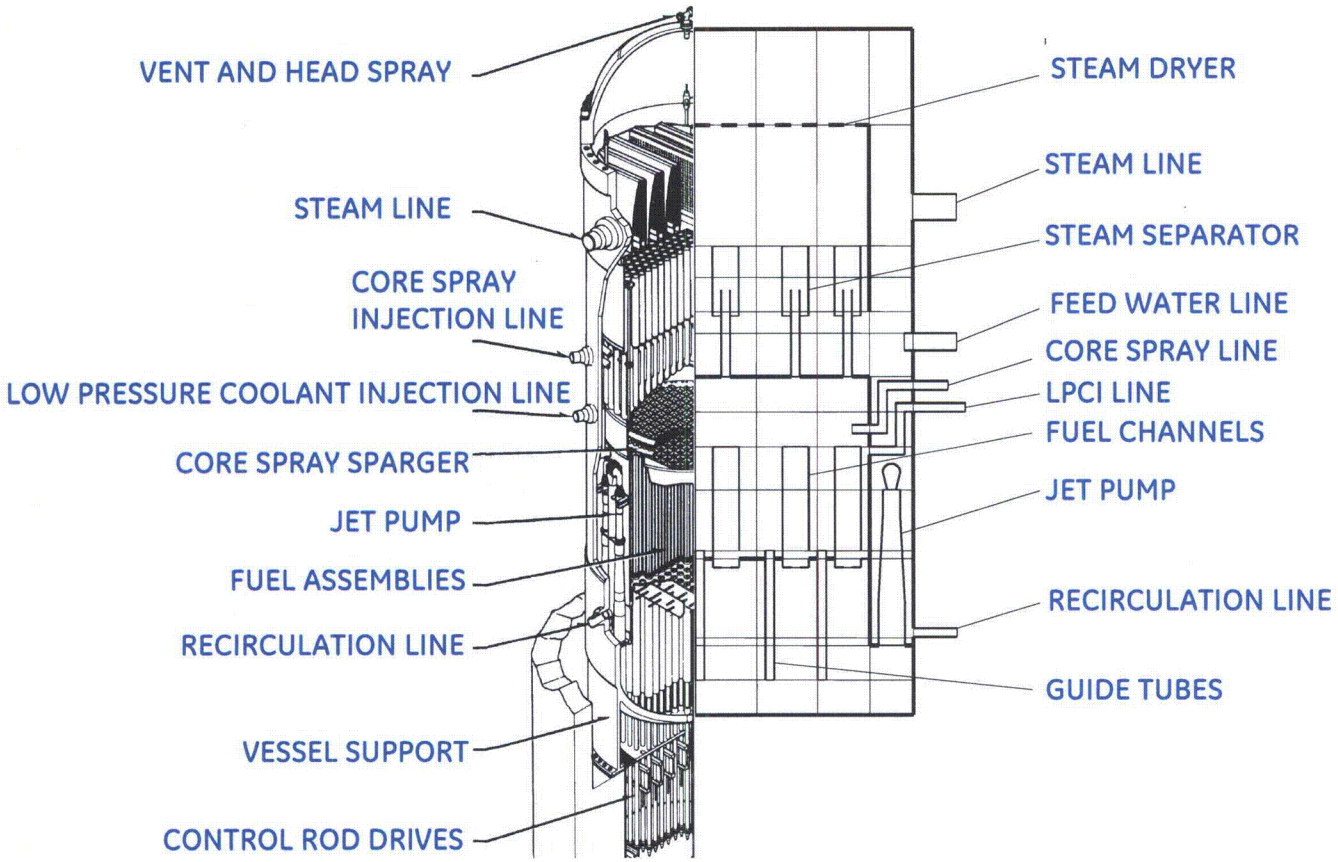
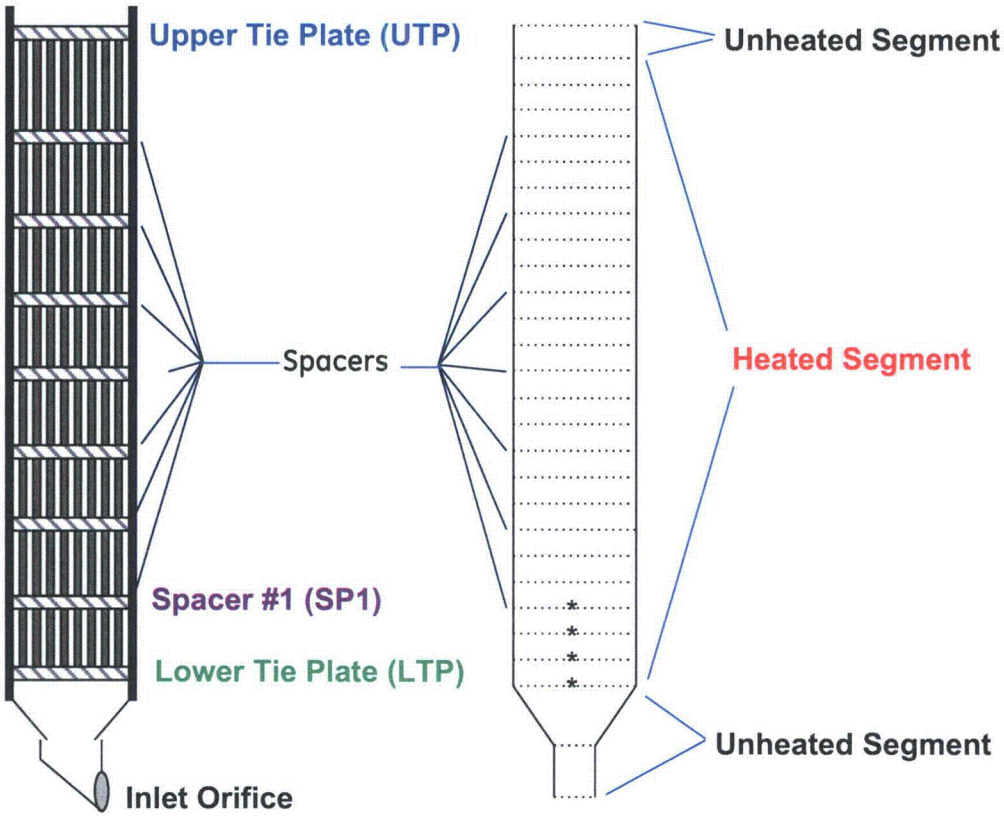
TRACG Vessel Nodalization



TRACG Fuel Bundle Nodalization



Scenario

- Double Ended Guillotine Recirculation Suction Line Break (BWR 3/4)
- Battery Failure - HPCI, two LPCI, and one LPCS are disabled
  - One LPCI and LPCS available for makeup
  - Other LPCI injects into the broken loop
- Feedwater system and pump trip at time = 0
- Scram signal generated based on DW Pressure Signal
- Blockage incorporated via area reduction for the hot fuel bundles at discrete times after Low Pressure ECCS Injection

PCT & RPV Level Response - No Blockage

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PCT & RPV Level Response – 75% Blockage at LTP

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Hot Rod Clad Temperature Profile – No Blockage

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Hot Rod Clad Temperature Profile – 75% Blockage at LTP

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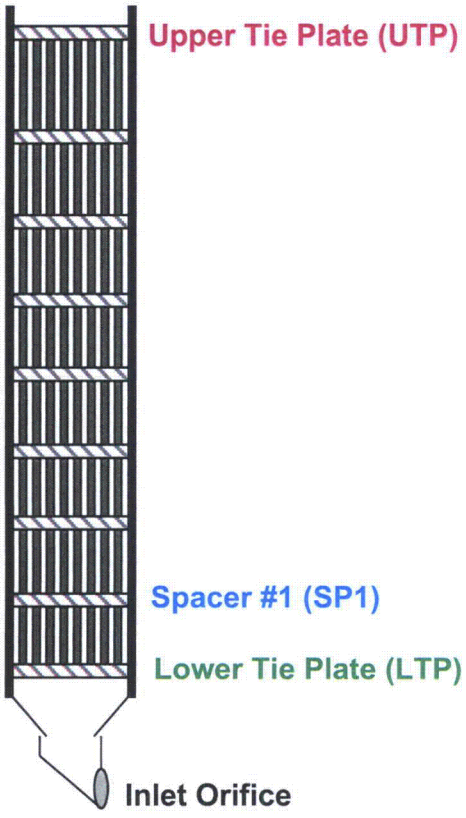
Case Matrix



Percentage Blocked	Delay after ECCS Injection
25%	5 sec
50%	30 sec
75%	60 sec
100%	120 sec
	180 sec

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PCT Sensitivity to Blockage at LTP

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PCT Sensitivity to Blockage at UTP

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* PCT Sensitivity to blockage at Spacer #1 yields similar results

Conclusions

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Overview of LOCA Scenario

TRACG LOCA Simulation Results

Basis for Application to all BWR/2-6 Plants

Method for Establishing Thermal Hydraulic Boundary Conditions for Fuel Testing

Method of Validation for Other Fuel Characteristics

LOCA Long Term Cooling Conditions Similar for BWR/2-6

- Low vessel pressure with ECCS injection from suppression pool
- Fuel submerged by a two-phase mixture and cooled by natural circulation
- Fuel uncovered and cooled by core spray

BLOCKAGE ANALYSIS RESULTS DIRECTLY APPLIED

Overview of LOCA Scenario

TRACG LOCA Simulation Results

Basis for Application to all BWR/2-6 Plants

Method for Establishing Thermal Hydraulic Boundary Conditions for Fuel Testing

Method of Validation for Other Fuel Characteristics

Thermal Hydraulic Boundary Conditions

- Heatup Phase
  - Initial Two Phase Level Recovery – Inlet Blockage
  - Lower Plenum Refill – Bypass Flow Holes Blockage
- Quench Phase
  - Natural Circulation Flow – Inlet Blockage
  - Core Spray Cooling – Spacer and Channel Top Blockage

BLOCKAGE ANALYSIS PROVIDES BOUNDARY AND CRITERIA FOR TEST

Overview of LOCA Scenario

TRACG LOCA Simulation Results

Basis for Application to all BWR/2-6 Plants

Method for Establishing Thermal Hydraulic Boundary Conditions for Fuel Testing

Method of Validation for Other Fuel Characteristics

Method of Validation for Other Fuel Characteristics

- Blockage Test Basis and Results
  - LOCA Analysis Parameters, Fuel Temperature and Inlet Flow History
  - Various Paths Minimum Area Clearing
  - Scale Test Results, Debris Type and Blockage History

OTHER FUEL DESIGNS VALIDATED BASED ON LOCA PERFORMANCE AND BLOCKAGE CHARACTERISTICS

THANK YOU !

PCT Sensitivity to Blockage at LTP

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PCT Sensitivity to Blockage at LTP

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PCT Sensitivity to Blockage at LTP

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GEH Proprietary Information

AFFIDAVIT

I, James F. Harrison, state as follows:

(1) I am Vice President, Fuel Licensing, Regulatory Affairs, GE Hitachi Nuclear Energy-Americas LLC ("GEH"), have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld will be contained in Enclosure 1 of the letter BWROG-09068, D.W. Coleman, BWR Owners' Group Chairman to the Document Control Desk (USNRC), "Request for Closure of a Meeting Between NRC and the BWR Owners' Group Scheduled for October 21, 2009," dated October 7, 2009, containing draft presentation materials to be used in a proposed meeting between NRC and the BWR Owners' Group on October 21, 2009, related to the BWROG plans for addressing downstream effects of debris on GNF fuel used in BWRs. The proprietary information in Enclosure 1, is identified by [[double square brackets$^{\{3\}}$]]. Figures and other large objects are identified with double square brackets before and after the object. In each case, the superscript notation $^{\{3\}}$ refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975 F.2d 871 (D.C. Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F.2d 1280 (D.C. Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;
b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;
d. Information that discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) above is classified as proprietary because it contains detailed results and conclusions regarding supporting evaluations of the effects on nuclear fuel performance of containment debris that bypasses the ECCS Suction Strainers for a GEH Boiling Water Reactor ("BWR"). The analysis utilized analytical models and methods, including computer codes, which GEH has developed, obtained NRC approval of, and applied to perform evaluations of containment debris effects on the nuclear fuel for a GEH BWR. The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply

the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 7th day of October 2009.

James F. Harrison
Vice President, Fuel Licensing
Regulatory Affairs
GE Hitachi Nuclear Energy Americas LLC