

mPower Reactor IST Test Facility and Test Plan Update, IST PIRT Insights and Results,
and I&C Software QA Program Description Slides (Non-Proprietary)

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*B&W mPower™ Reactor Integrated Systems Test
Plan Update and Scaling Analysis
[Redacted Version of Slides]*

May 26, 2011



Agenda

- IST Design
- Previously Scaled Tests
- Loop in CAER
- IST Phenomena/Scaling
- PIRT Results
- IST Scaling Differences
- RELAP5 Results



Objectives

- Scaled integrated systems tests
- Steam generator performance
- Computer code/model verification
- Licensing support
- Control and protection systems verification
- Reactor design enhancements
- Simulator development/verification
- Operating procedures and training
- Demonstration to potential customers



IST Design Requirements

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[CCI per Affidavit 4(a)-4(d)]



IST Approach

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] [CCI per Affidavit 4(a)-4(d)]

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Comparison

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**[CCI per
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4(a)-4(d)]**

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IST Loop Facility

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] [CCI per
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4(a)-4(d)]



Previously Scaled Tests

- OTSG Design and Verification Tests
- MIST Test Facility (BAW-2021, NUREG/CR-5395)
 - Lowered Loop OTSG
 - Test Objectives
 - SBLOCA
 - PORV-HPI
 - ATOG
 - Scaling
- OTIS Tests (BAW-1905, NUREG/CR-4567)
 - Raised Loop OTSG
 - SBLOCA
 - ATOG
- GERDA
 - IEOTSG
 - SBLOCA



Top-Down Scaling



IST Phenomena/Scaling

- Ishii & Kataoka Report, "Scaling Criteria for LWRs Under Single-Phase and Two-Phase Natural Circulation, CONF-820962-04, September 1984"

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] [CCI per Affidavit 4(a)-4(d)]



IST Phenomena/Scaling (continued)

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] [CCI per Affidavit 4(a)-
4(d)]



IST Scaling Differences

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] [CCI per Affidavit 4(a)-4(d)]



mPower Reactor Emergency Condenser

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[CCI per Affidavit 4(a)-4(d)]



IST Emergency Condenser

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[CCI per Affidavit 4(a)-4(d)]



Emergency Condenser

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[CCI per Affidavit 4(a)-4(d)]



Emergency Condenser Conclusions

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] [CCI per Affidavit 4(a)-4(d)]



Bottom-Up Scaling



ECCS Diagram with Break

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[CCI per Affidavit 4(a)-4(d)]



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PHASE

Figure of Merit

Interval

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Conclusion

- Facility Description and Objectives
- Previous Scaling Experience

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[CCI per Affidavit 4(a)-4(d)]



RELAP5 Modeling Comparison of IST and mPower LOCA Results



Introduction

- Models
- Node diagrams
- Steady state results
- LOCA transient description
- LOCA results/comparisons
- Conclusions

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Model Features

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] [CCI per Affidavit 4(a)-4(d)]



IST Core Node Schematic

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4(a)-4(d)]



IST Heater Rod Node Schematic

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IST Riser and Pressurizer Node Schematic

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IST Steam Generator Node Schematic

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IST Downcomer Node Schematic

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mPower Overall Primary-side Schematic

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[CCI per Affidavit 4(a)-4(d)]

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LOCA Transient

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**LOCA Transient
Parameter Comparisons**

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Conclusions

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