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B&W mPower™ NSSS Testing Programs

February 25, 2014

(Redacted Version)

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Agenda

- Objectives
- Program Overview
- Reactor Coolant Pump (RCP) Testing
- Fuel Mechanical Testing
- CHF Testing
- Fuel Assembly and Control Rod (CR) Drive Line Cold Flow Testing
- Component Testing
- Integrated System Testing (IST)
- Control Rod Drive Mechanism (CRDM) Testing
- Hot Flow Testing
- Conclusions and Discussion

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Objectives

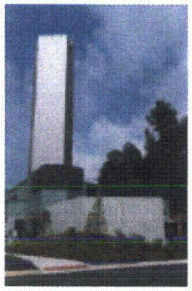
- Provide an update to NRC staff on status of NSSS testing completed, ongoing, and planned
- Communicate specific objectives, data classifications, uses, sample data, and relevance to the DCA for each planned test
- Entertain discussions of NRC staff areas of interest for visits or audits during pre and post application periods

B&W mPower Test Program Overview

Reactor Coolant Pump Test Program

CRDM Sub-component Testing Euclid, OH

Integrated Systems Test (IST) Facility



Integrated Component and System Test Programs

Fuel Mechanical Test Program

Vessel Model Flow Test Program

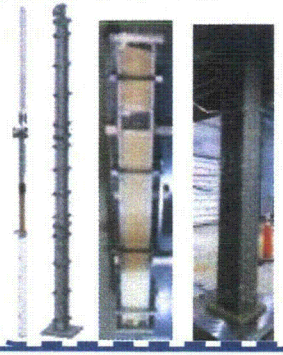
ADV / EPRV Valve Qualification

Electrical Feedthrough / Internal Connector Test Program

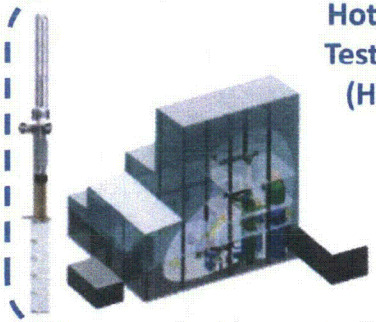
Critical Heat Flux (CHF) Testing

Integrated Control Rod Driveline Test Program

Static Test Facility (STF)



Cold Flow Test Loop (CFTL)



Hot Flow Test Loop (HFTL)

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Reactor Coolant Pump (RCP) Testing

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Description of RCP

- The RCPs are axial, single stage canned motor pumps with an internal flywheel
- One common vertical shaft assembly with the motor, [ ] and hydraulics
- The motor, [ ], and all rotating components are within the RCPB
- Motor: vertical, induction type with a canned rotor and stator, [ ]
- Variable frequency drives control motor speed
- Significant operating experience with proven technology

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Completed RCP Engineering Design Tests

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Fuel Mechanical Testing

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Fuel Assembly Component Mechanical Test

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Fuel Assembly Component Mechanical Test

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Fuel Assembly Component Mechanical Test

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Spider Assembly Component Mechanical Test

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Fuel Assembly Mechanical Tests

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Fuel Assembly Mechanical Tests

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Critical Heat Flux (CHF) Testing

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CHF Testing

- Testing was conducted at Stern [Laboratories in Hamilton, Ontario, Canada
- [ ] test series [ ] test configurations) have been completed ([ ] total CHF data points)
- QA surveillance showed Stern's quality program to be 10CFR50 Appendix B compliant
- Correlation development in progress

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Test Series Descriptions

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CHF Test Parameters

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CHF Test Local Conditions

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Correlation Development

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Fuel Assembly and Control Rod Drive Line Cold Flow Testing

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Fuel System Hydraulic Testing

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Fuel System Hydraulic Testing

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Fuel System Hydraulic Testing

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Cold-flow Test Loop (CFTL)

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Preliminary CFTL ΔP Scoping Tests Results

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Preliminary CFTL Lift-Off Scoping Tests Results

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Preliminary CFTL Pluck Scoping Tests Results

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Preliminary CFTL FIV Scoping Tests Results

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Component Tests

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Vessel Model Flow Test Program (VMFT)

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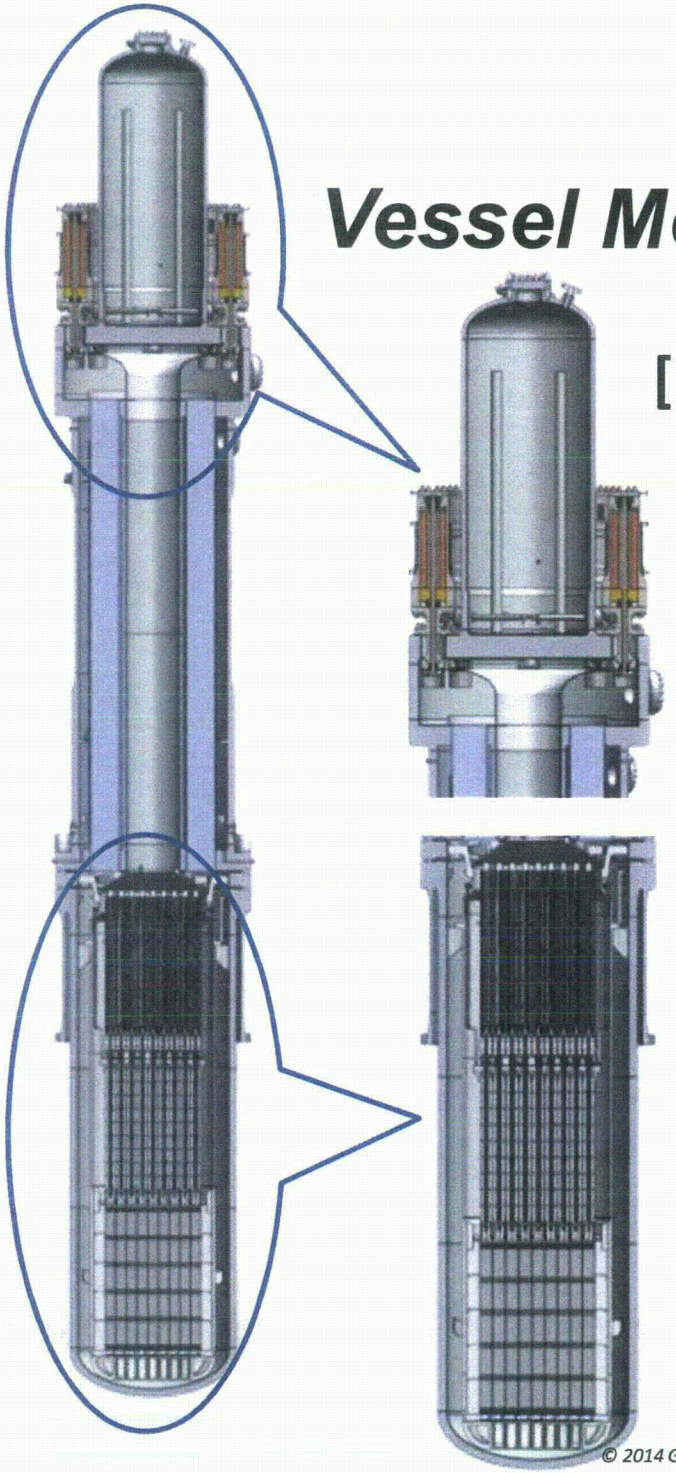

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VMFT Design Requirements

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VMFT Test Facility Layout

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[Proprietary per Affidavit (5a)-(f)]

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Test Program

- Phased Approach
  - Phase 1 [ ]

[

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- Phase 2 [ ]

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Test Program

- Phased Approach
  - Phase 3 [ ]
    [
    ]
  - Phase 4 [ ]
    [
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VMFT Test Schedule

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CRDM [ ] Testing

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CRDM [ ]

Testing to Date

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CRDM [ ]

Near Term Planned Testing

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Integrated System Testing

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B&W mPower IST Design

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[Proprietary per Affidavit (5a)-(f)]

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IST Features

Scaling

- Full height
- Full operating pressure and temperature
- Power, area and volume scaled
- Real time operation
- Trace heating

Systems Simulated

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Integral reactor and important systems are carefully scaled

[Proprietary per Affidavit (5a)-(f)]

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Planned IST testing

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[Proprietary per Affidavit (5a)-(f)]

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Current Status

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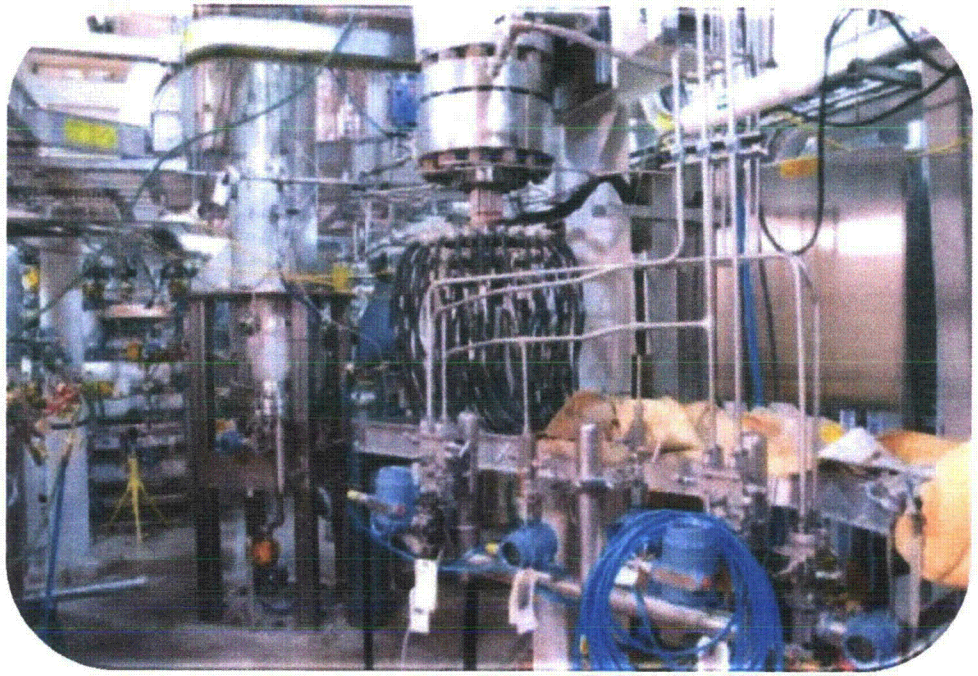

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Instrument Verification

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IEOTSG Scoping Performance Tests

(Nominal Testing)

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CRDM Testing Programs

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Major Components

[Proprietary per Affidavit (5a)-(f)]

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CRDM Testing

- Phase 1 [

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- Phase 2 [

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- Phase 3 [

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CRDM Testing

- [
  [
  ] (Phase 1 & 2):

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- [
  [
  ] (Phase 3, [ ]

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Key Design & Test Schedule Milestones

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[Proprietary per Affidavit (5a)-(f)]

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Hot Flow Testing

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Hot-Flow Test Loop (HFTL)

Hot-flow Test Facility (HFTL) Confirmatory Test Program

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Hot-Flow Test Loop (HFTL) (Confirmatory)

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HFTL Site Plan

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[Proprietary per Affidavit (5a)-(f)]

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Conclusions

- The scope and content of the NSSS Testing Program is focused on key design features, performance and plant safety
- Additional component test planning is underway for both pre and post application periods and information will continued to be shared with NRC
- We welcome NRC visits to both developmental tests and those which are generating Q data related to our application