



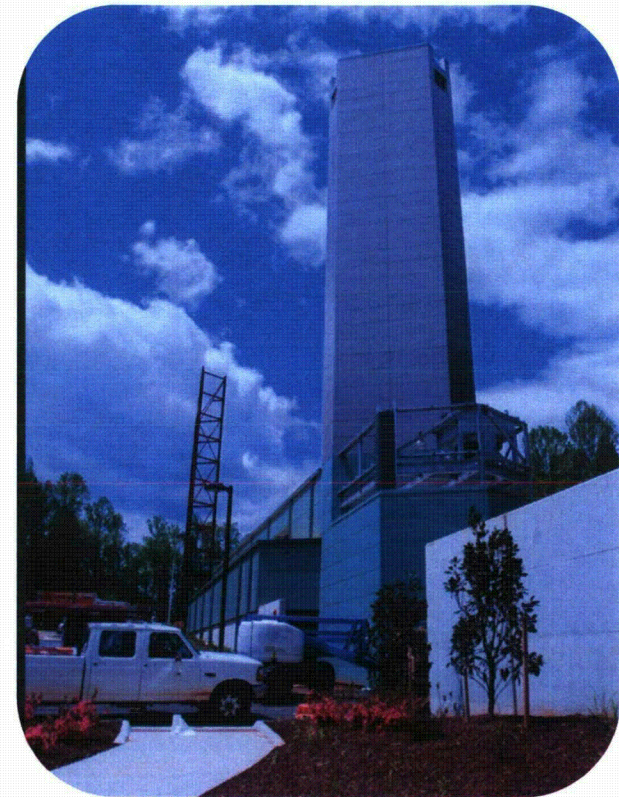
**Component & System
Testing Programs
(Redacted)**

March 22, 2012

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Testing Program Objectives

- Integrated system performance
- Thermal-hydraulic and component performance
- Computer code benchmarking and validation
- Licensing support
- Regulatory requirements compliance
- Control and protection systems verification
- Design enhancements
- Simulator development and verification
- Life & wear prediction (design life and warranty limitations)
- Operational procedures and training development
- Customer demonstration



A broad spectrum of objectives identified



Development Testing Programs

- Fuel & Fuel Assembly

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

- Reactor Vessel Internals

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

- Integrated Control Rod Drive Line (ICRDL)

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

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

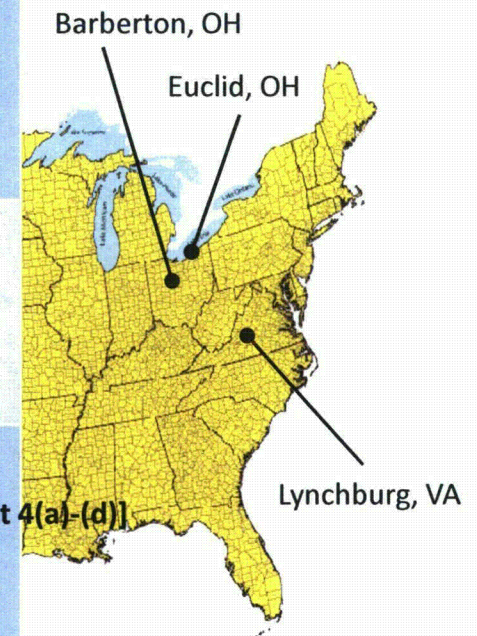


Development Testing Programs (Continued)

- Vessel Model Flow [
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[CCI per Affidavit 4(a)-(d)]
- Emergency Condenser
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 -] [CCI per Affidavit 4(a)-(d)]
- Integrated Systems Test
 - [] [CCI per Affidavit 4(a)-(d)]
 -] [CCI per Affidavit 4(a)-(d)]

Component Test Program Locations

Location	Testing
Barberton, OH <ul style="list-style-type: none"> • Cold Flow Test Loop • Small autoclaves • Vessel Model Flow 	<ul style="list-style-type: none"> • [• • •
Euclid, OH <ul style="list-style-type: none"> • Large autoclaves (Air & Hot Tests) 	<ul style="list-style-type: none"> • • • •
Lynchburg, VA <ul style="list-style-type: none"> • Static Test Facility • Fuel Assy mechanical test system • Instron & Fixtures • CAER - Integrated System Testing (IST) 	<ul style="list-style-type: none"> • • •] [CCI per Affidavit 4(a)-(d)] • Fuel assembly and component mechanical testing • Integrated Systems • Operational simulations



ICRDL Test Program

- Inclusive of various safety related tests
 - Quality assured components and equipment required

- Test program includes

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

- Components include

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



ICRDL Test Program

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



Static Test Facility (STF)

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Location	Lynchburg, VA
Material	[
Design Conditions	
Capabilities	
Components Accommodated	
Testing]

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

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



Cold Flow Test Loop (CFTL)

Location	BWRC / Barberton, OH
Material	[
Design Conditions	
Capabilities	
Components Accommodated	
Online	
Testing] [CCI per Affidavit 4(a)-(d)]

* Initial Testing for DCD Support

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

Hot Test Facility (Autoclaves 3A & 3B)

Location	NOG - E / Euclid, OH	
	3A	3B
Design Conditions		
Capabilities		
Components Accommodated		
Online		
Testing		

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

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



CRDM Sub-Component Testing

[

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CRDM Sub-Component Testing

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



Connector Test Program

Test Objectives	• []	
Equipment		
Test Conditions	• []	
Test Start Dates		
]
Standards	[CCI per Affidavit 4(a)-(d)] IEEE electrical standards where applicable	

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

CRDM Electrical Penetration Test Program

Test Objectives	<ul style="list-style-type: none"> • Assist in FOAK development • Final design verification • Simulate service life and wear 	
Equipment	BWRC small autoclaves	
Test Conditions	<ul style="list-style-type: none"> • [• • 	
Testing		
]
Standards	IEEE electrical standards where applicable ASME Section III Sub-section NB	

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

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

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Incore Insertion Testing

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Test Objectives	• [
	•	
	•	
Equipment		
Test Conditions		
Testing		
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[CCI per Affidavit 4(a)-(d)]

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Fuel System Component Mechanical Test

Test Objectives

- Prototype component and sub-assembly tests to support design development
- Design verification tests using qualified components

Equipment

Instron Mechanical Test System + Fixtures

Test Conditions

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Component Tests

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

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



Fuel Assembly Mechanical Tests

Fuel Assembly
Mechanical Test System

Test Objectives	• [
Equipment	
Test Conditions	
Assembly Static and Dynamic Tests	
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[CCI per Affidavit 4(a)-(d)]

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

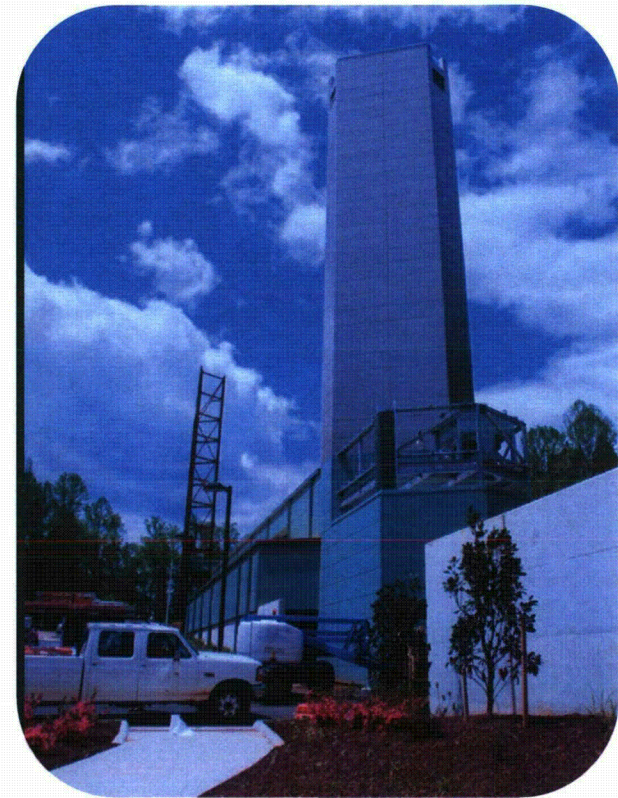


[CCJ per Affidavit 4(a)-(d)]

generation
mPower

IST Objectives

- Integrated system performance
- Steam generator and component performance
- Computer code validation
- Licensing support
- Control and protection systems verification
- Design enhancements
- Simulator development and verification
- Operating procedures and training development
- Demonstration to potential customers



A broad spectrum of objectives identified



IST Design Requirements

Location	Lynchburg, VA	[
Material	[
Design Conditions		
Standards		
Components Accommodated		
Online		
Testing] [CCI per Affidavit 4(a)-(d)]	
]
[CCI per Affidavit 4(a)-(d)]		

generation
mPower
IST Approach

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

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



B&W mPower – IST Design Comparison

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

425MWt

IST

530MWt



Systems Included in the IST

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generation
mPower
IST Installation

[

generation
mPower
IST Test Scope

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

A Multi-year Test Program is Planned

generation
mPower
Status

- Building complete

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

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

Testing will begin this year

generation
mPower
Testing Schedule

TEST FACILITY	START	END
IST	[
STF		
CFTL		
SMALL AUTOCLAVES		
LARGE AUTOCLAVES		
AIR TESTING (CRDM)		
VESSEL MODEL FLOW		
RCPs		
ECCS TEST CONDENSER		

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

Testing began in 2010