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Protecting People and the Environment

RIC 2010
Next Generation Nuclear Plant (NGNP) Research

Brian G. Woods

Oregon State University

March 11, 2010

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Cooperative Agreement

- **Agreement started in September, 2008.**
- **Task 1—Quantifying the State-of-the-Art in Gas Reactor Data.**
  - All agreement partners: NRC, DOE, Oregon State, Michigan, Texas A&M.
- **Task 2—Coupled Reactor Physics and Thermal Hydraulics Modeling.**
  - NRC, Michigan, Texas A&M, Oregon State.
- **Task 3—Initial Separate Effects Tests for Gas Reactor Thermal Hydraulic Phenomena.**
  - NRC, Texas A&M.

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Cooperative Agreement

- **Task 4—Integral Effects Tests and Code Validation for Gas Reactor Thermal Hydraulic Phenomena.**
  - NRC, DOE, Oregon State, Texas A&M.
- **Task 4.A: Scaling and Design of OSU High Temperature Test Facility.**
  - Preliminary scaling and design complete.
  - Final scaling and design—August 2010.
  - Includes instrumentation plan and preliminary test plan.

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Cooperative Agreement

- **Task 4.D: Procurement, Construction and Shakedown of Test Facility.**
  - Procure pressure vessel—September 2010.
  - Shakedown testing—commence Spring 2011.
- **Matrix testing**
  - Spring 2012—September 2013.
  - Quality Assurance Program stand up August 2009.

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Experimental Objectives

- **Driven by NRC Phenomena Identification and Ranking Table**
- **High Temperature Test Facility**
  - Designed to model the depressurized conduction cooldown transient.
  - Variety of break size and location.
  - Four distinct phases.
  - Reactor Cavity Cooling System as boundary condition.
  - Modular design to allow for the examination of different core types.

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Experimental Objectives

- **Other scenarios examined for applicability of facility**
  - Pressurized Conduction Cooldown.
  - Normal operations.
- **Reference Design**
  - Modular High Temperature Gas Reactor.

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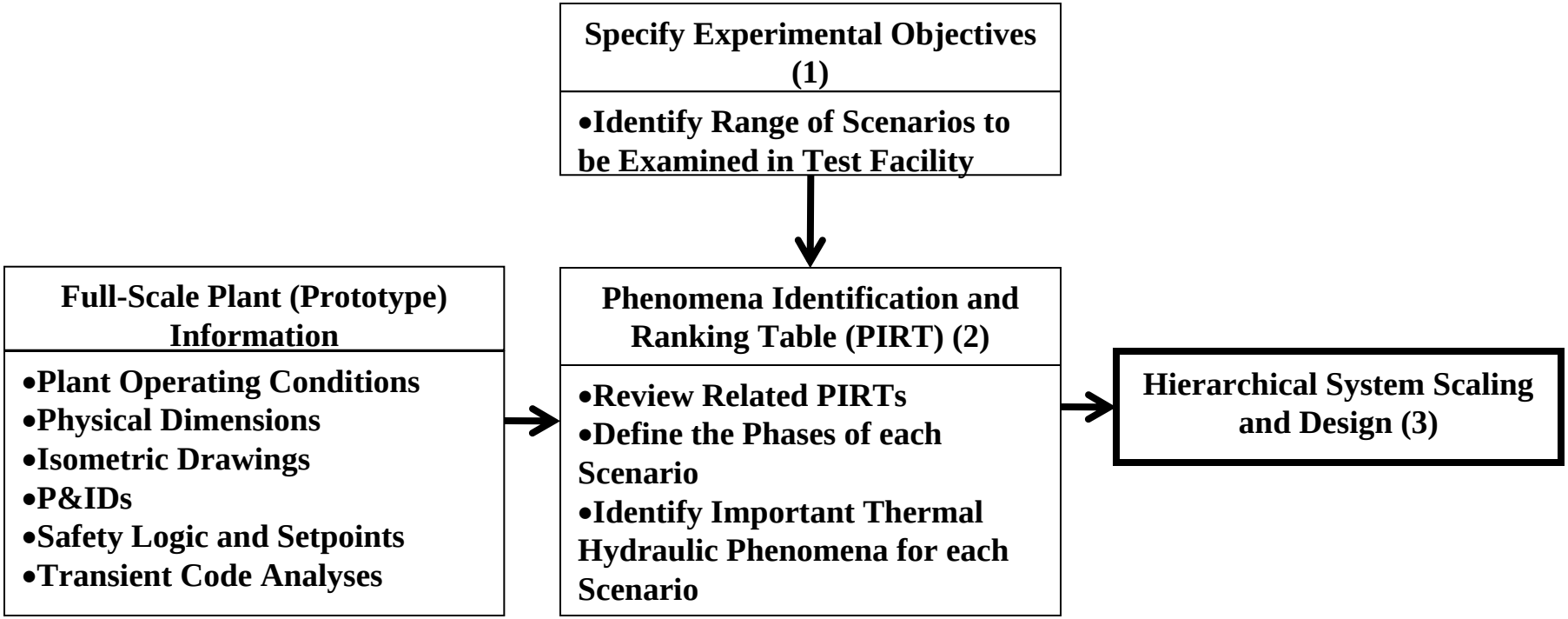
General Scaling Methodology



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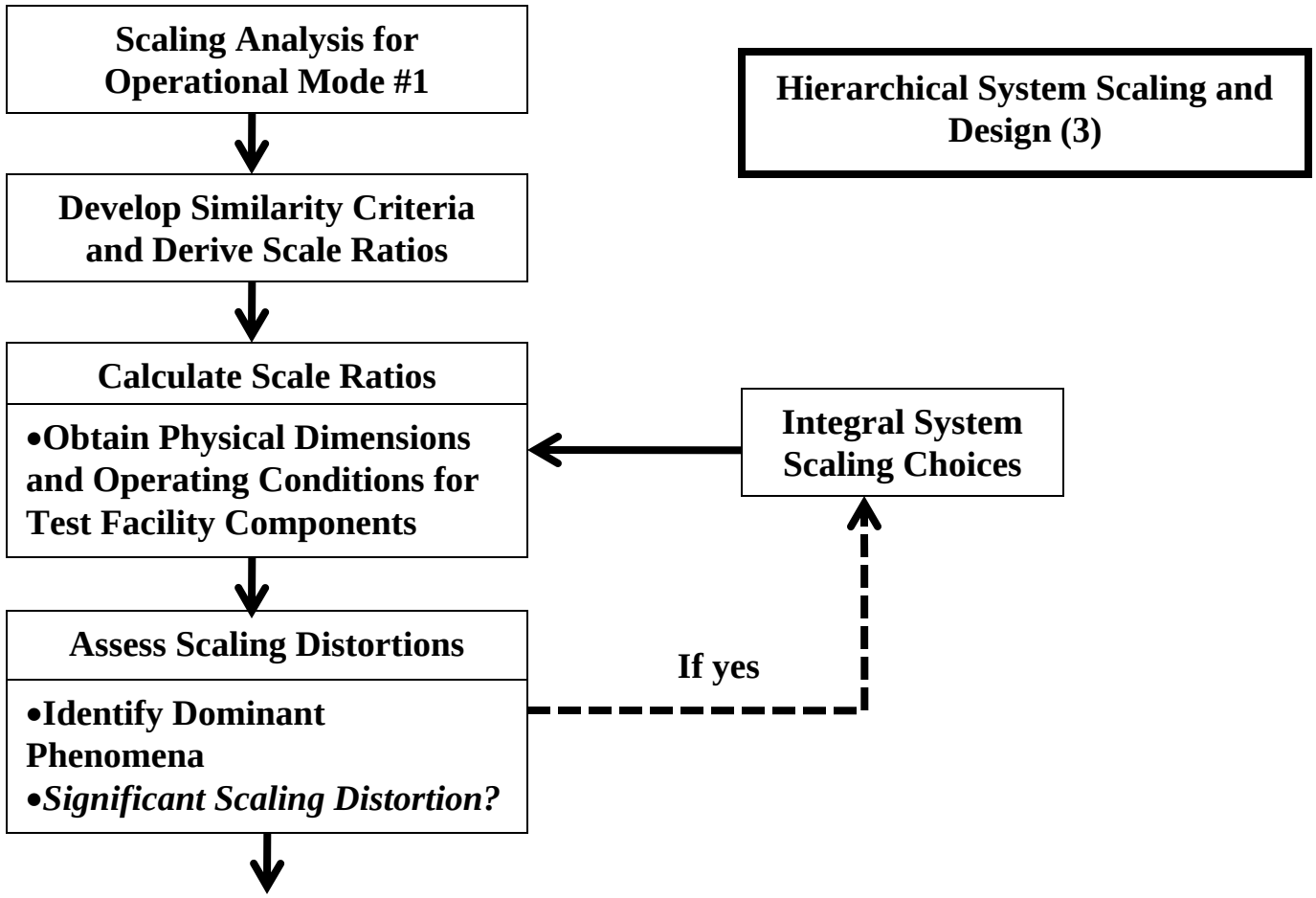

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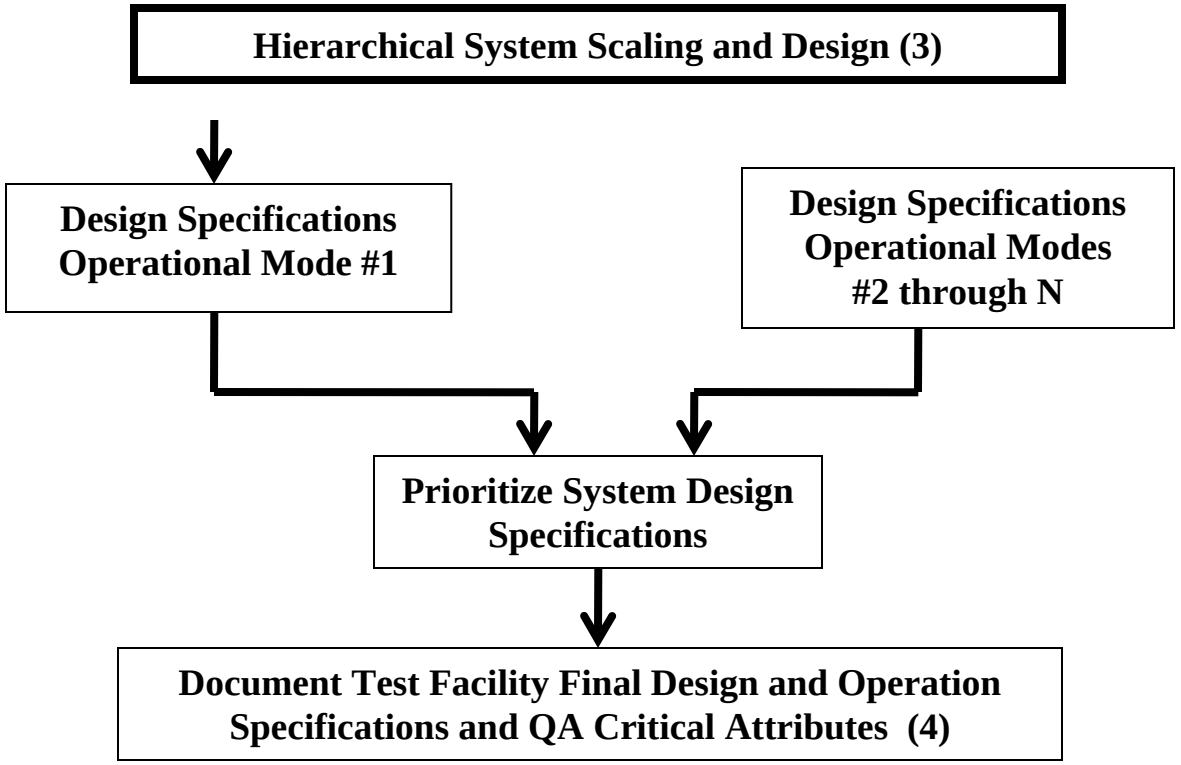

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Design Description

- **High Temperature Test Facility Vessel**
  - ¼ length scale—6.1 meters tall.
  - ¼ diameter scale—1.92 meters vessel outside diameter.
  - Material—Stainless steel (SS304).
  - ASME pressure rating of 9.65 bar at 550ºC.
  - Pressure scale of facility 1:8.75 at 8.0 bar.
  - Upper and lower heads utilize an inner ceramic liner.
  - The lower head provides for instrument taps and penetration of the electric heater rods.
  - Prismatic block core.

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Test Facility Operation Conditions

Parameter	Value	Units
Coolant	Helium	
Maximum Core Power	600	kW
Maximum Coolant Pressure	0.8	MPa
Mixed Outlet Helium Temperature	670	C
Inlet Helium Temperature	235	C
Maximum Mass Flow Rate	0.32	Kg/s

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High Temperature Test Facility