



ACR Water Critical-Heat-Flux & Post-Dryout Tests



**Presentation for CNSC & US NRC
Inspection Visit to Stern Labs
D.E. Bullock
Thermalhydraulics Branch
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AECL
Atomic Energy
of Canada Limited

EACL
Énergie atomique
du Canada limitée



Outline

- **Objective**
- **Quality Assurance**
- **Scope**



Objective

- **Update the experimental database for use in AECL's Fuel-Channel Thermalhydraulic toolset (NUCIRC, CATHENA, ASSERT and TEP)**
- **Confirmatory Data for**
 - **Inlet-Skewed Axial Flux Distribution**
 - **Applicable Radial Flux Distribution**
 - **Channel outlet pressures >12 MPa**
 - **Flow Rates of 25 to 28 kg/s.**



Quality Assurance

- **Quality Assurance Plan to meet applicable requirements**
CAN/CSA-ISO 9001:1994,
(AECL Report 108-125000-490-001,
SL Report SLQP-068).
- **AECL audits are planned;**
 - 1 during design & fabrication of the ACR simulator
 - 1 during testing of the simulator.



Scope (1) Phases of the Project

- **Upgrade the Loop at Stern Labs to meet ACR flow conditions**
- **Design & Fabricate the Fuel Simulator**
- **Perform Critical-Heat-Flux and Post-Dryout Tests**



Scope (2) Loop Upgrade

- **Upgrade the Loop to Operate at**
 - 13 MPa channel outlet pressure
 - Up to 29 kg/s flow rate
 - 14.5 MW of power
- **Upgrade & Commissioning to be completed 2005 August**



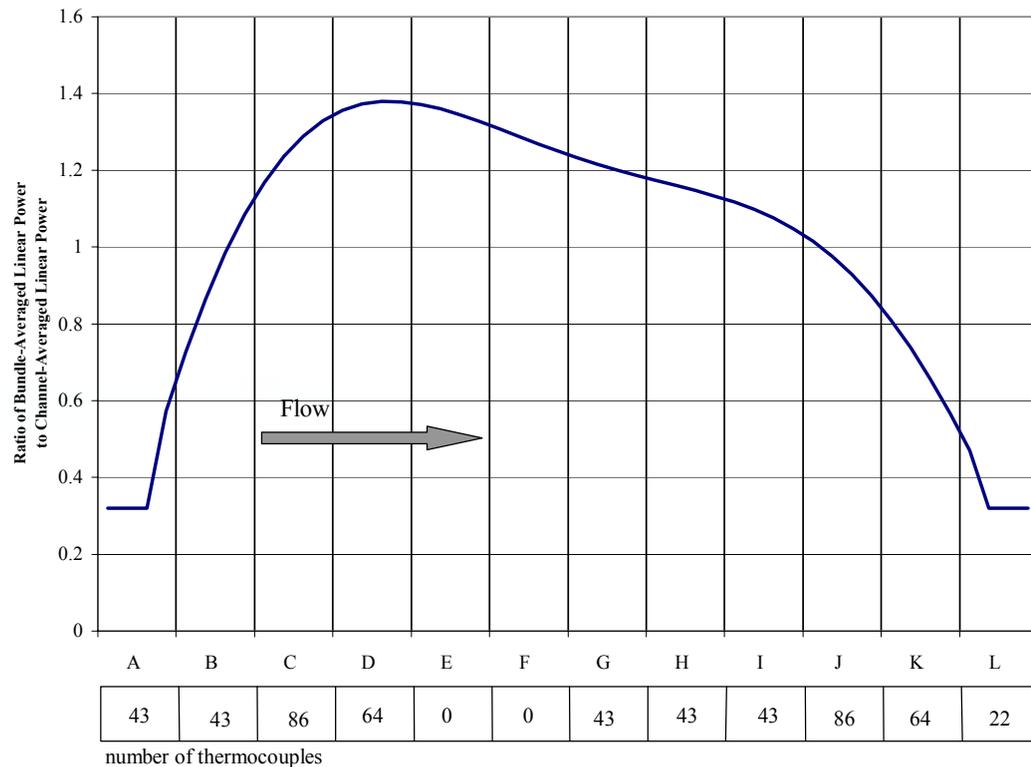
Scope (3) Fuel Simulator

- **Design & Fabricate the 6-m Fuel Simulator**
 - **To Operate at 14.5 MW of DC Power, 14 MPa Pressure, 30 kg/s Flow Rate and 600°C Maximum Sheath Temperature**
 - **Inlet-Skewed Axial Flux Distribution**
 - **Appropriate Radial Flux Distribution**
 - **Approximately 600 Sliding & Rotating Thermocouples**
 - **Three Ceramic Flow Tubes to simulate 0%, ~2% and ~4.5% diametral creep**
- **Electrical simulator to be completed 2005 September**



Scope (4) Fuel Simulator

- ACR 6-m Fuel Simulator Axial Flux Distribution





Scope (5) Testing

- **Single-Element Tests**
 - Establish Measurement Uncertainties
 - Report on Uncertainties, 2006 March
- **Critical-Heat-Flux Tests**
 - CHF Data Report (uncrept), 2006 June
 - CHF Data Report (4.5% creep), 2006 September
 - CHF Data Report (2% creep), 2006 December
- **Post-Dryout Tests**
 - PDO Data Report (4.5% creep) July 2007
 - PDO Data Report (uncrept) October 2007



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