



Thermal-hydraulics Laboratory

CNL's Thermalhydraulics Laboratory (THL), located at CNL's Chalk River Laboratories is one of Canada's largest and most well equipped thermalhydraulic laboratories. The THL has multi-storey test loops, which currently simulate the main water systems in a CANDU® nuclear reactor: the primary heat transport system, the secondary steam generator system, and the moderator system. There are also facilities within the THL that accommodate testing for smaller reactor designs, such as the NRU or SLOWPOKE reactors.

The main projects undertaken at the THL involve safety testing using simulated components, such as electrically-heated fuel replicas. During testing, these are subjected to extreme conditions like over-power or under-cooling. Such tests are performed in a Freon R-134a loop that simulates two-phase (liquid/vapour) flow behaviour in a CANDU reactor at a much reduced pressure and temperature. The THL has a 1.7 MW DC power supply that safely allows testing with full-sized bundle replicas.

Other projects involve flow visualization or pressure loss measurements. The THL also supports work for advanced reactors; a Passive Moderator Loop (PML) based on natural circulation of "flashing" hot water is currently in operation. There is also a program to develop advanced measurement techniques to better understand and characterize two-phase flows. A large Header Facility is currently under construction to represent the headers and feeders of a CANDU reactor, with state-of-the-art instrumentation for void measurement.

The THL recently completed extensive work for the Advanced CANDU Reactor (ACR) project. A sophisticated fuel bundle string simulator was fabricated and subjected to critical heat flux tests. The Moderator Test Facility was also fitted with an ACR test vessel to examine flow and temperature distributions in the moderator cooling system under upset conditions.

The Thermalhydraulics Laboratory would be a good partner in tests for evolutionary safety features of reactors, and for innovative safety features of integral reactors (i.e., small modular reactor) as well as the Generation-IV Canadian Supercritical Water Reactor.

The Thermalhydraulics Laboratory would welcome partnerships in simulation testing for any kind of heating/cooling water systems.

