



# Molten Fuel Moderator Interaction Facility

Under some rare conditions, molten metal coming in contact with water can boil violently leading to steam explosions. The Molten Fuel Moderator Interaction (MFMI) Facility at CNL's Chalk River Laboratories (CRL) was constructed to study such extremely violent boiling phenomena and vapour generation during an energetic interaction between molten fuel and water.

The MFMI Facility was built in collaboration with the CANDU Owners Group to examine the potential for steam explosions inside a CANDU® reactor when impaired flow conditions occur in a single-channel, which causes the fuel in the affected channel to heat up and melt. The experiments conducted in the MFMI Facility confirmed that a steam explosion at high ejection pressures is not plausible in CANDU reactors, thereby closing one of the generic safety concerns identified by the Canadian Nuclear Safety Commission.

A pool of experienced scientists, engineers and technologists are available in the MFMI Facility to improve the fundamental understanding of melt-coolant interaction phenomenon and mitigate the steam explosion risk in industries affected by the phenomenon. The MFMI Facility offers unique capabilities meeting the international standards in use by academia, industries, and research organizations.

The MFMI Facility is equipped with state-of-the-art specialized equipment such as:

- A high speed data acquisition system with sampling rates of 100,000 samples per second
- A piezo electric and a piezo resistive dynamic pressure transducers to monitor the molten-fuel water interaction pressure within the water and at the walls of the tank
- Precision accelerometers to measure the acceleration of the water tank
- Strain gauges on the water tank and the confinement vessel to measure vessel strain during the experiment, and
- A water tank and a confinement vessel (with 1.5 m inside diameter, 5.0 m high and ~80 mm thick steel wall) located in a 3 m deep pit provide safe confinement and direct gases and aerosols to a ventilation system

