



Large-Scale Vented Combustion Test Facility

CNL's Large-Scale Vented Combustion Test Facility (LSVCTF) is designed to:

1. Systematically quantify effects of key thermodynamic and geometric parameters affecting flame propagation and pressure development during vented combustion under conditions relevant to deliberate ignition, and
2. Test and qualify Passive Autocatalytic Recombiners (PARs) of hydrogen mitigation in nuclear reactors. The LSVCTF has been used for research and development projects and commercial contracts dedicated to combustion and hydrogen mitigation.

The LSVCTF was designed to ensure high accuracy monitoring and controlling of test parameters with the emphasis on temperature, hydrogen concentration and humidity. Many of the features of the LSVCTF make it a one-of-a-kind facility in Canada. Some of these features include a variable vent opening, removable end walls, accurate control of initial thermodynamic conditions (up to 100°C) and variable geometric configurations between single or inter-connected multi-rooms, which mimics rooms in nuclear reactor containment.

The LSVCTF also offers a complementary facility, the Containment Test Facility (CTF), which consists of a vertical cylinder (10 m³ in volume and 5 m high), sphere (6 m³), and interconnecting pipes (30 or 50-cm diameter). The CTF is rated for pressure up to 10 MPa and has a mean temperature of up to 150°C. It can be used to investigate the fundamentals of hydrogen combustion phenomena, including flammability limits, ignition, turbulent combustion, flame acceleration, detonation transition, and dust explosion. It can also be used to study hydrogen removal at high pressure and low oxygen concentration.

Both facilities are located at CNL's Whiteshell Laboratories in Manitoba and are operated by members of the Fuel and Fuel Channel Safety Branch. In addition to the hands-on operation of the facility, branch professionals have extensive knowledge of the behavior of nuclear reactors under upset conditions, and are able to leverage existing expertise in this field to enhance any project.

