

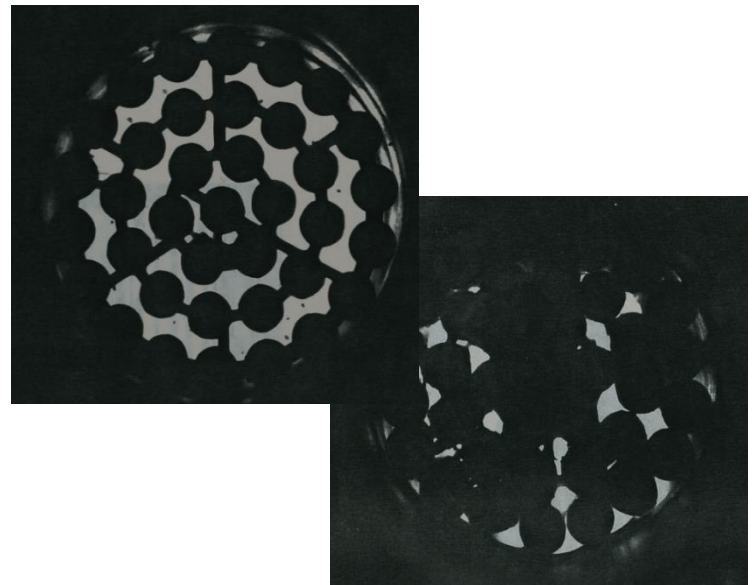
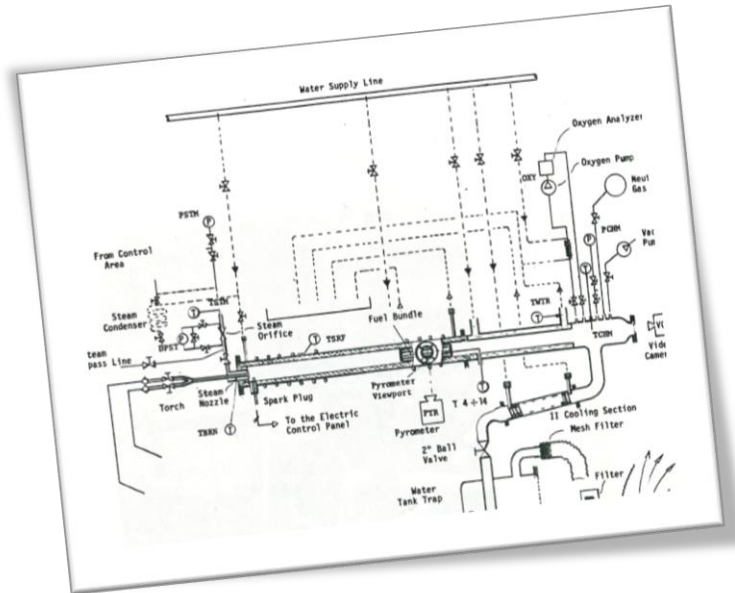
### **High Temperature Bundle Transient Sag** 1982-1987

In the event of a Loss of Emergency Coolant (LOEC) event, CANDU fuel bundles may be subjected to very low steam flow conditions, resulting in a large temperature rise due to the exothermic zirconium-water chemical reaction which occurs between the fuel sheath and the steam.

To understand the behaviour of the fuel and its ability to be safely cooled and contained after an event of this nature, it is necessary to determine the geometry of fuel bundle as a result of the rapid temperature transient.

In support of this need, Stern Labs (as its predecessor, Westinghouse Canada Nuclear Products Department) developed a unique, purpose-built facility and process to simulate the expected conditions in a LOEC event. This included the production of superheated steam with an oxygen-hydrogen torch, forcing that steam through the new fuel bundle, a full suite of instrumentation to characterize the conditions during the test and post-test inspection to determine the consequences.

The results of this work were used to support the continued safe operation of CANDU nuclear power plants.



***Example difference in cross section before and after a test***

Stern Labs was chosen to carry out this work due to the extensive experience of its staff in conducting unique, high energy testing with complex data acquisition, the world class facility to support testing of this nature and the licence to possess and utilize CANDU fuel bundles containing  $UO_2$ .

