

as fission for the same amount of energy release. Tritium is thus crucial for boosting the energy released in nuclear explosions, allowing designers to build smaller and lighter weapons. In fact, boosting--and therefore tritium--is now considered an essential aspect of most US nuclear weapons.

Each year, approximately 0.5 kg of tritium is used for civilian purposes such as phosphorescent lights and fusion experiments, while approximately 11 kg are used for military purposes. Tritium decays at a rate of about 5.5 percent per year. With regard to nuclear weapons, this requires that their tritium supply be replaced from time to time.

Continued production of the tritium required for the US nuclear stockpile, however, has become an issue of increasing concern. In August 1988, the sole tritium-producing facility in the US--the thirty-eight-year-old Savannah River plant in South Carolina--was closed due to safety and management problems. The costs associated with repairing the facility are estimated at close to \$1 billion over a ten-year period. Even if repaired, however, the plant is not expected to operate with the power required to produce the tritium necessary for US needs.

Canadian CANDU reactors use heavy water to control the nuclear reaction. The heavy water--containing deuterium--captures neutrons from the main reaction chamber, converting deuterium to tritium. This process is peculiar to CANDU reactors, and therefore more tritium is produced as a by-product by the CANDU reactors than by any other type of reactor.

For health and safety reasons, the tritium by-products of CANDU reactors require removal. Ontario Hydro has constructed a tritium recovery facility at Darlington, Ontario. The facility, which opened in October 1988, is capable of producing an estimated 2.5 kg of tritium per year. However, technical problems have precluded regular operation of the facility, and the plant was shut down for repair in late February 1989. Resumption of operations is not expected before the fall of 1989.

Ontario Hydro is currently considering whether to market the tritium that will eventually be recovered at the Darlington facility. Tritium sells for approximately \$15 million per kilogram on the international market. In September 1988, a report produced by the Ontario Premier's Council on Technology urged this course as one way of making Ontario Hydro more profitable.⁴

Plans announced by the Federal Government in October 1988 for Canada's participation in an international research project aimed at building a fusion reactor for the production of nuclear energy have sparked additional interest in tritium production. The reactor--called ITER--will involve the cooperative efforts of the US, the Soviet Union, Japan and the European Community, and will take approximately ten years to build. Ottawa is considering the possibility of having the facility built in Canada. Once built, ITER will require an estimated 30 to 75 kg of tritium--an amount which could be supplied in full by the Darlington facility.

Tritium is not classified as a nuclear material by the IAEA, and is therefore not subject to international safeguards. It possesses a relatively short half-life and thus

⁴ Robert Sheppard, "Canada to Join Nuclear Fusion Project," *Globe and Mail*, 1 October 1988.