

A Light-Water Detritiation Project at Chalk River Laboratories

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The NRU reactor Rod Bays is a large, open pool of water that receives hundreds of fuel rods annually, each carrying a small amount of residual tritiated heavy water. The tritium concentration of the Rod Bays water has risen over the years, to a level that is of concern to the operations staff and to the environment. The long-term solution that is currently being studied is to reduce the Rod Bays tritium concentration by bleed-and-feed detritiation of the water.

The Combined Electrolytic-Catalytic Exchange (CECE) process is well suited to the light-water detritiation problem. With a tritium-protium separation factor greater than five, a CECE detritiation process can easily achieve the eight orders of magnitude separation required to split a tritiated light-water feed into an essentially tritium-free effluent stream and a tritiated heavy water product suitable as feed to a heavy water upgrader.

This paper describes a CECE light-water detritiation process specifically designed to reduce the tritium concentration in the NRU Rod Bays. Discussed are technology readiness issues, how the CECE process compares with an alternate detritiation process (water distillation) in terms of size and capabilities and how to utilize the detritiation capacity of the CECE process most effectively through the bleed-and-feed arrangement.