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CANADA **R-455**

DECONTAMINATION OF ONTARIO HYDRO PICKERING UNIT 1 STEAM GENERATORS

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Principal Investigator:

Terry Dereski
Technical Superintendent
Ontario Hydro
700 University Avenue, H13
Toronto, ONTARIO M5G 1X6
CANADA
Phone: (416) 592-6869

Project Manager:

Michael Upton
Senior Technical Engineer
Ontario Hydro
700 University Avenue, H13
Toronto, ONTARIO M5G 1X6
CANADA
Phone: (416) 592-5635

Objectives: To improve the technique for decontaminating steam generators. In April of 1994 a decision was made to chemically decontaminate 12 vertically oriented U-tubes steam generators in pickering NGS (PNGS) unit 1. The decontamination was undertaken about three months later in July. Many valuable lessons learned during this decontamination have been factored into current to further develop technologies for steam generator decontamination.

The concept applied to the decontamination of the PNGS Unit 1 steam generator was a cyclical process of fill soak and drain operations. Atomic Energy of Canada (AECL) recommended the CANDEREM plus solvent through a reagent selection process. Westinghouse nuclear Services provided the necessary field equipment and services.

Comments: Based upon laboratory tests, the process should have effectively decontaminated a pair of steam generators within 48 hours. Theory and reality proved to be entirely different things. Process chemistry control also proved to be a challenge. While the CAN-DEREM plus solvent was effective at oxide dissolution, the kinetics of the process were hampered by regeneration complexities and process hydraulics. In particular, ferric ethylenedinitrilo tetraacetic acid (EDTA) which is slowly removed across cation exchange resin had to be removed from the process circuit by use of a mixed bed resin. This necessitated frequent reagent and corrosion inhibitor additions. Maximizing the rate of oxide dissolution while minimizing the carbon steel corrosion rate was an exercise in process chemistry balancing.

In all cases decontamination of the steam generator pairs was terminated prematurely. Termination was on the basis of the corrosion limit being reached, as indicated by the in-line monitor. With the early termination, radiation fields on the lower half of the steam generators were reduced by factors in the range of two to five.

Remarks: Conclusions are:

1) Decontamination was successful. A dose rate reduction of >2 was obtained.

2) Corrosion was higher than predicted as a result of ferric ion corrosion of base metal.

3) Deposit dissolution rate was slower than predicted.

BNL ALARA Center Data Base

CANADA **R-455**

4) Process was wasteful of chemicals.

5) Process was wasteful of ion exchange resin.

6) process control was difficult.

References: T.A.Dereski & M.S.Upton,"Decontamination of Ontario Hydro Pickering Unit 1 Steam Generators: July 1994," Proceedings, EPRI Radiation Control and Chemical Decontamination Seminar, Tempa, Florida, November 1995, EPRI Distribution Center, P.O.Box 23205, Pleasant Hill, CA 94532.

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Status: Completed **Last Update:** February 28, 1996