N178. CANDU Large Scale Fuel Channel Replacement Project: Individual & Collective Dose Reduction By ALARA Integration

Unlike American LWRs, Canadian CANDU Reactors use separate moderator and primary coolant circuits. The coolant flows through the core in a number of fuel channels, or pressure tubes. Large scale fuel channel replacement, referred to as the Retube Project, is a part of the rehabilitation program in the operating life of a CANDU Nuclear Station.

The Pickering CANDU Reactors contain 390 pressure tubes and their associated hardware which must be replaced during the Retube Project. This involves over 70 distinct work activities. At Pickering, Units 1, 2, & 3 have been retubed and Unit 4 is being retubed with a projected completion date of September, 1992.

The CANDU Retube Project has a high radiation dose expenditure and poses high risk situations and specific radiological hazards. At Ontario Hydro, the ALARA elements are integrated into the Radiation Safety Program to achieve individual and collective dose reduction in all phases of the project. The project phases are: defueling, channel decontamination, component removal, inspections, channel/hardware installation, and waste disposal.

The managed job planning system for the Unit 4 Retube Project provides improved personnel protection and productivity. It is based on experience gained about which dose reduction measures are worthwhile from the retubing of the other units at Pickering. The job planning system also helped to determine appropriate requirements for personnel qualifications, training, and hardware modifications.

This job planning system is expected not only to reduce dose but also to reduce outage time. Expected performance includes a reduction in collective dose from about 250 person-rem to 150 person-rem and an outage time reduction from 200 days to 150 days for Unit 4 compared to the Unit 3 removal phase. Based on these figures, Ontario Hydro's job management program is an example of cost-effective risk reduction techniques. Unfortunately, this approach hasn't received sufficient attention in ALARA programs.

Contributed by J.K. Mohindra, Retube Heath Physicist, Heath Physics Section, and B. Mark, Manager of Retube Construction, Pickering NGS. Additional information can be obtained from Ontario Hydro, Box 160, Pickering, Ontario, Canada, LIV 2R5.