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HIGH PRESSURE WATER SPRAYING FOR BOILER HEAD DECONTAMINATION

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Objectives: During outages at Ontario hydro CANDU plants, maintenance and inspection work is routinely carried out within the primary side of steam generator channel heads. Radiation fields at the base of the boilers are such that they are not work limiting, nor do they pose a significant risk to exceeding dose limits.

However, given that the CANDU system employs a large surface area of carbon steel piping in its heat transport circuit, there is a considerable inventory of activated corrosion products distributed throughout the system. The boilers are notorious sinks for the transported activity incorporated into the iron oxides. Upon entry into the channel heads on the primary side of the steam generators, personnel are confronted with this source of often loose oxide and activity. The potential for personnel contamination, and transfer of loose activity out of the channel heads into the immediate work area is a significant concern. The objective of the project is to reduce loose contamination levels and beta radiation fields within the boiler head.

Comments: Early decontamination attempts involved manual scrubbing and dry vacuuming. The approach proved to be ineffective and dose intensive. An improvement was to employ 3000 psi water sprays, delivered by means of a manually manipulated lance penetrating a plastic sheet taped over the manway opening. The plastic sheet quickly gave way to an engineered aluminum manway insert complete with inflatable seals, a Lexan face plate and a rubber lance boot. Even with improved insert, spraying operations were still manual and the effectiveness was highly dependent on the operator's skill. To eliminate the dependence on the operator, to minimize the dose associated with an operator beneath a boiler for a prolonged period of time, and to ensure reproducibility of the decontamination from boiler to boiler, BARC (Boiler Automated Rotary Cleaner) was born. It isolated the operator from head fields, provided for the use of higher spraying pressures (10,000 psi) and ensured uniform reproducible spray coverage within the heads.

Remarks: Decontamination factors in a head after it has been BARC'ed are typically two to three for gamma fields, and three to ten for beta radiation fields. This technique is now in general use at the Pickering NGS. A new larger tool is being developed for the Darlington NGS.

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References: T.A.Dereski, "High Pressure Water Spraying for Boiler Head Decontamination," Proceedings, EPRI Radiation Field Control and Chemical Decontamination Seminar, Tampa, Florida, November 1995, EPRI Distribution Center, P.O.Box 23205, Pleasant Hill, CA 94532.

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