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MAINE YANKEE LOOP STOP TO LOOP STOP CHEMICAL DECONTAMINATION

Keywords: CONTAMINATION REMOVAL; DOSE; DOSE RATE;
DECONTAMINATION; DECONTAMINATION FACTORS; MAINE YANKEE;
STEAM GENERATOR

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Objectives: Seventy percent of the dose received by workers during plant refueling outages is acquired through outage activities in areas of the plant in proximity to the steam generator (SG) channel head and associated Reactor Coolant System (RCS) piping. The objective of this project was to reduce the dose rates in the Reactor Coolant System by half.

Maine Yankee is a three loop PWR that has an eight inch bypass line on the steam generator side of loop isolation valves for each loop. This allowed the plant to decontaminate the SG channel heads, the reactor coolant pumps (RCP), the bypass lines and sections of the RCS loops. Sections of the letdown system and drain headers were also decontaminated. Based on artifact testing, Maine Yankee used the four step AP-CITROX process. RCS Loop 2 and the letdown system were decontaminated together, Loops 1 and 3 were also done together. 400 curies of gamma emitting isotopes were removed, 400 cu. ft. of resin waste were generated, and 122 filter cartridges were used. DFs ranged from 1.3 to 7.4, average being 3. High pressure wash of SG channel heads increased DFs by a factor of three, reducing fields from 20 R/hr to 1 R/hr.

Comments:

- * Communications among key players were established two years in advance. A team concept was developed.
- * Mock-up training on SG man-way adapter installation was beneficial. Key evolutions were rehearsed.
- * More information on hose runs and manifold layout should have been obtained prior to performing the equipment setup.
- * Vendor should have had more spare parts for temporary equipment.
- * Assigning a Maine Yankee Operator to this project was an excellent idea.
- * Communications could have been a problem. Day and night shift Field Engineers, however, kept everyone informed of ongoing work.
- * Critical path or not, shift turnovers need to be made face to face away from the ongoing work.
- * The response of the decon system volume to heat up and cooldown evolutions was slow.
- * The letdown regenerative heat exchanger's relative height to the bulk decon system elevation

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presented problems with flow and volume control. The heat exchanger acted like a volume control tank/pressurizer.

- * Hose removal was a laborious task. Better planning was needed to ensure that all hoses were thoroughly drained.

Remarks: The estimated dose for the project was 25 person-rem. The actual recorded dose was 32 person-rem. The dose overrun was due to longer than expected setup time and failure of the vendor's computer driven remote operation system.

The estimated outage dose saving resulting from the decontamination, based on work prior to SG tube sleeving, was 70 person-rem. The dose savings for the steam generator sleeving work was 300 person-rem considering the effects of the chemical decontamination and high pressure spray wash combined.

An NRC audit of Maine Yankee radiological controls for the SG sleeving outage noted:

"....the chemical decontamination of the steam generator loops was a significant and commendable licensee ALARA effort...."

References: Biemiller, E. C. and P. Plante "Maine Yankee Loop Stop to Loop Stop Chemical Decontamination," Proceedings, EPRI Radiation Field Control and Chemical Decontamination Seminar, Tampa, Florida, November 1995, EPRI Distribution Center, P.O. Box 23205, Pleasant Hill, CA 94523.

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