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CHEMICAL DECONTAMINATION OF THE RESIDUAL HEAT REMOVAL SYSTEM

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Project Manager:

Objectives: Outline the procedure and summarize the results of a recent chemical decontamination performed on the CP&L Brunswick Unit1 Residual Heat Removal (RHR) system using a one step CITROX process.

Comments: The CITROX solvent was chosen because the process is regenerative and determined to be more effective in removal of high levels of iron oxide formed on the carbon steel. The process is one of acidic dissolution and reductive dissolution with the metal ions being removed from solution by the cation resin.

The solvent was injected into each loop at the two four inch flanges located on the suction side of the RHR pumps. The heat exchangers were bypassed for approximately the first six hours of the decontamination because of concern about corrosion of the 70/30 Cu/Ni heat exchanger tubes. A flange was installed in the demineralized water bypass line around the RHR loop isolation valve for return of the chemicals back to the decon equipment skid. At the decon skid, the solvent flowed through the in-line filters ion exchange and the heaters, and was injected back into the RHR loop.

The expected corrosion rate for carbon steel is <1 micrometer/hr and for austenitic stainless steel and nickel based alloys <0.1 micrometers/hr. No measured data for 70/30 Cu/Ni is available.

Remarks/Potential for dose limitation: The following results were achieved: (1) 3.3 Curies (primarily from Co-60) were removed, (2) 152 lbs of iron oxide were removed, (3) Average Decontamination Factor = 26, (4) Average Dose Reduction Factor = 9. A total of 240 cubic feet of ion exchange resin was used during the decon process. The total cost of the RHR decon was \$850,000 and 6.6 person-rem was expended to complete the project.

References: Kury, R., Bozeman, J. and Ferguson, J., "Chemical Decontamination of the Residual Heat Removal System," *Fifth Workshop on Chemical Decontamination*, pp. 12.1-12.16, Electric Power Research Institute, Charlotte, North Carolina, 1993.

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