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Processes and Practices Related to Occupational Dose

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FORWARD PUMPED HEATER DRAINS (BWRs)**Keywords:** FORWARD PUMPED HEATER DRAINS; HEATER DRAINS; EROSION; CORROSION; MAGNETIC FILTRATION**Description:**

Many modern BWRs achieve greater thermal efficiency by pumping forward the effluent from feedwater heater drains, which means that about 30% of the total feedwater flow reaches the reactor system without passing through the condensate cleanup system. A potential disadvantage of this process is an increase in the feedwater concentrations of corrosion and erosion products. The latest plants with forward-pumped heater drains (FPHDs), such as Forsmark 3 and Oskarshamn 3 in Sweden, use turbine-component materials that are resistant to erosion-corrosion. EPRI sponsored this work to determine whether the feedwater in these plants is of lesser quality than feedwater in plants without FPHDs and whether magnetic filtration is an effective cleanup method.

The use of erosion-corrosion-resistant materials limited the passage of corrosion products through the high-pressure FPHDs to the reactor. Efficient operation of the condensate cleanup system is crucial to good feedwater chemistry because the low-pressure drains are a large potential source of corrosion products. Higher radiation fields in Forsmark 3 were attributed to low-pressure FPHDs, but the effluents were subsequently rerouted back to the cleanup system. The magnetic filter efficiently removed iron particles but had little effect on radiation buildup. Reactor water activities, fuel deposits, radiation fields on piping, and gamma-scanning results indicate higher cobalt-60 and cobalt-58 levels in both plants than in the older BWRs. These higher levels are attributed to higher cobalt input through the FPHDs.

References and Selected Abstracts:

1. Wegemar, B., "Influence of Forward-Pumped Heater Drains and Magnetic Filtration on Water Chemistry and Radiation Buildup in BWRs," EPRI Final Report NP-5864, June 1988. (Available from Research Reports Center, Box 54090, Palo Alto, CA 94303.)