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Processes and Practices Related to Occupational Dose

ID: 26

MAGNETIC FILTERS

Keywords: MAGNETIC FILTRATION; RADIATION BUILDUP; HIGH TEMPERATURE FILTRATION; RADIATION REDUCTION; FORWARD-PUMPED HEATER DRAINS

Description:

For achieving greater thermal efficiency, the special design of forward-pumped heater drains (FPHDs) is adapted by many modern BWR plants, which means about 30% of the total feedwater flow is introduced into the reactor coolant system without passing through the condensate cleanup system. This process results in a higher corrosion and erosion products concentrations, and the radiation levels around components in the primary systems or pipes to the reactor water cleanup system are higher than those identical BWR plants without FPHDs due to somewhat higher amounts of Co-60 and Co-58 input through the FPHDs.

Methods to have lower the disadvantages caused by the FPHDs which have been tested in plants and proved effectively include: (a) the use of erosion-corrosion-resistant materials (b) efficiently operating condensate cleanup systems to obtain good feedwater chemistry (c) the installation of magnetic filtration which can efficiently remove iron particles > 0.45 μ to approximately 75% and 14% removal efficiency for cobalt, and other elements respectively. The operation of the filter has so far been troublefree and the need of supervision is very limited. Due to the minimal effect on cobalt removal and feedwater iron contamination reactor water low plant radiation fields have not been observed.

Therefore, magnetic filters in forward pumped heat drains are not considered justified at this time as a valid means of reducing radiation fields. Careful selection of the point of application together with reasonable crud removal efficiencies can be achieved and is of considerable interest to utility control engineering personnel considering purification of BWR FPHDs.

(For information on high temperature filters for PWR, see item 22.)

References and Selected Abstracts:

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3. Henzel N., Meier, M., and Greger, G.U., "High-Temperature Filtration Measurement at the Isar BWR plant." EPRI Report NP-2936-54, Vol. 1 and NP-2936, Vol. 2, March, 1983. (Available from Research Reports Center, Box 50490, Palo Alto, CA 94303.)

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