

BNL ALARA CENTER

Processes and Practices Related to Occupational Dose

ID: 57

USE OF ULTRAFINE FILTERS TO REDUCE RADIATION LEVELS; HOT SPOTS AND HOT PARTICLE PROBLEMS**Keywords:** FILTERS; ULTRA-FINE FILTERS; CRUD; PWR; PRIMARY COOLANT SYSTEM; WATER CHEMISTRY; HOT SPOTS; HOT PARTICLES**Description:**

Three PWR Plants have tried ultra-fine mesh filters (0.45 micron) to decrease particulate activity in the primary coolant, to reduce radiation fields, hot spots and hot particle problems. At first the filters had to be changed frequently due to pressure drop, but as the system became cleaner the filters had to be replaced less frequently.

The best results were obtained at the 350 MWe Obrigheim PWR where the employment of ultra-fine mesh filters upstream of the let-down demineralizer reduced activity in the primary coolant by several orders of magnitude. A 7-year program was implemented to reduce the collection of solids in the reactor and decrease filter pore sizes from 10 to 0.45 microns. This plant operates at a pH of 7.3 or higher. During start-up and shutdown a 1.2 micron absolute filter is installed to handle crud bursts. After 2-3 days, 0.45 micron filters are installed and remain in service until the next scheduled outage.

In the U.S. there has been reluctance to use the ultra-fine mesh filters, firstly because it required changing the existing filter housing and secondly because cobalt-58 concentrations are higher and filter life is considerably shorter because plants operate at a pH of 6.9. However, ultra-fine mesh size filters are now available to fit the existing housing and some plants are considering operation at higher pH values. As a result some U.S. plants are testing the new filters.

Reactor coolant activities and general area radiation levels were significantly lower at these plants. The radiation levels were low and easily manageable on the filters due to the lack of activation of the particles which were intercepted before they could get into the core.

References and Selected Abstracts:

1. Dengler, N. to Baum, J.W., private communication.
2. Roddy F., "Ultra Filtration", Data Base on Dose Reduction Research Projects at Nuclear Power Plants, Compilers: T.A. Khan and J.W. Baum, NUREG/CR-4409, Vol. 3, project T-124, May 1989. (Available from National Technical Information Service, Springfield, VA 22161.)