

## N2. How Finer Filters Can Keep Exposures Down

Studies indicate that a large percentage of radioactivity in PWR coolant can be attributed to particles less than 1 $\mu$ m in size. New chemistry guidelines will reduce but not eliminate the process of metal transport. The best defence against radiation field increase is to stop the flow of particles to the reactor. This is best done with absolute rated filters which are fine enough to trap sub-micron particles.

PWR chemical and volumetric systems (CVCS) are fitted with filters either upstream or downstream of the let-down ion exchange beds. These filters have frequently been specified to be 5  $\mu$ m or 25  $\mu$ m nominally rated filters, which typically have absolute filtration ratings in the range 20 to 50  $\mu$ m. These filters are too coarse to remove particle borne activity effectively, either for control of out-of-core radiation or for protection of ion exchange beds. Filters of 1  $\mu$ m absolute rating or finer are needed to remove these particles.

Changes in coolant chemistry and the introduction of sophisticated new filter media now permit economical use of fine absolute rated filters to remove and control particle-borne activity in reactor coolants.

The use of absolute rated filters on coolant let-down helps to control out-of-core radiation by removing irradiated particles from the system, preventing crud from passing to the reactor (so becoming irradiated) and by minimizing ion exchange resin fouling so that capture of soluble nickel and cobalt during cool-down oxygenation is effective on a single pass. Since a substantial part of the released irradiated cobalt inventory is removed by ion exchange, prevention of resin fouling is a major benefit, and constitutes the reason for installing fine filters upstream of the ion exchange beds.

Other benefits of fine filters are that reactor coolant pump seals are left clean and there is substantial reduction in seal water leak-off from the reactor coolant pumps.

Absolute rated glass fibre filters with positive Zeta potential are now in service in the U.S.A., Canada, France, Germany, Sweden, Spain, and Belgium. They will be used at Sizewell B in the U.K. Even finer absolute rated nylon filters are in service in France, Germany and Holland for reactor coolant filtration, pump seal protection, and fuel pool and effluent filtration.

*For more, see Scowen, P. Nucl. Eng. Intl., V.34, N.423, October 1989, p.44.*