

N34. Effect Of Electropolishing, Preoxidation And Zinc On Radionuclide Buildup In BWR Recirculation Piping

Excerpts from the Executive Summary: During the years 1985 to 1989 a measurement program studying recontamination of boiling water reactor (BWR) primary coolant recirculation system (PCRS) piping was conducted. Measurements were taken at 10 operating BWRs with either chemically decontaminated PCRS or replaced PCRS piping, or new facilities with less than three fuel cycles of operation. The facilities at which measurements were made represented a broad range of PCRS pipe conditions and reactor coolant chemistry differences. Recontamination was measured at plants with chemically decontaminated PCRS piping, replaced PCRS piping, electropolished replaced piping, electropolished and preoxidized replaced piping, no previous power history, and replaced PCRS piping with "natural" zinc in the coolant. When results of the dose rate measurements were compared, several obvious trends were identified. First, the presence of "natural" zinc in the coolant provides an effective means for reducing the rate of increase in contact dose rates on the PCRS piping. Plants with zinc in the coolant consistently had lower contact dose rates with increasing fuel cycles than those plants that did not have zinc. Second, BWRs that replaced PCRS pipe with pipe that had been electropolished and preoxidized using a moist air process had a lower contact dose rate increase than those that did not. Their dose rate increase was similar to dose rates measured for "natural" zinc plants. Third, plants who electropolished pipe without preoxidation did not significantly reduce dose buildup any more than plants without electropolished pipe. Fourth, Co-60 recontamination factors for plants averaged 59% and ranged from 50-67% of pre-decontamination levels after the first fuel cycle. Fifth, multiple chemical decontaminations are an effective means for reducing pipe contact dose rates. The report contains 29 figures and 9 tables which depict surface activity or dose rates for various plants and conditions.

For more, see Duce, S.W., Marley, A.W., and Freeman, A.L., "Radionuclide Buildup in BWR Reactor Coolant Recirculation Piping," NRC NUREG/CR-5483 (Available from National Technical Information Service, Springfield, VA 22161).