

BNL ALARA CENTER

Processes and Practices Related to Occupational Dose

ID: 13

ELECTROPOLISHING OF STEAM GENERATOR CHANNEL HEADS

Keywords: ELECTROPOLISHING OF STEAM GENERATOR; STEAM GENERATOR CHANNEL HEADS; PWR; STEAM GENERATOR; PASSIVATION; ELECTROPOLISHING; PRECONDITIONING

Description:

Cobalt deposition rates can be reduced by polishing the surfaces and by prefilming to minimize oxide formation. Polishing reduces the surface area available for cobalt pick up. However, mechanical polishing alone is not very effective because it leaves a surface of microscratches which are good sites for deposition. Electropolishing, on the other hand, is very effective because it leaves a smooth microstructure. It smoothes the "hills and valleys" from the surface.

From the viewpoint of occupational exposure, the most important area of a PWR is the steam generator channel heads. Radiation fields in this area are typically 10 to 20 times those found on BWR recirculation piping. These high fields are a consequence of the extremely rough surface on the channel head bowl, because of the weld overlay method used in manufacture. Therefore, the smoothing of these surfaces is expected to have a very significant effect on reducing radiation buildup. Because of the roughness of the surfaces, mechanical grinding or grit blasting is necessary before electropolishing is carried out. Tests have shown that smooth surfaces can be obtained without intergranular attack. Full-scale field tests have been carried out.

EPRI has recommended electropolishing for application to both new PWRs before start up as well as for replacement steam generators. In-situ treatment is feasible but should be evaluated on a case-by-case basis. EPRI is developing a palladium passivation process which promises a large reduction in radiation buildup.

References and Selected Abstracts:

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3. Khan, T.A. and Baum, J.W., "Data Base on Dose Reduction Research Projects at Nuclear Power Plants," NUREG/CR-4409, Vol. 3, May 1989, p. 171 & 172. (Available from National Technical Information Service, Springfield, VA 22161.)
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