GE VERNOVA HITACHI

FACT SHEET

ZINC INJECTION PASSIVATION (GEZIP)

Control of Shutdown Dose Rates

A passivation process developed by GE Vernova Hitachi Nuclear Energy (GVH) for stainless steel piping surfaces in BWRs has demonstrated that shutdown dose rates due to buildup of radioactive isotopes—predominantly Co-60 —can be reduced and controlled by the GEZIP process. The use of GVH's Zinc Injection Passivation process has shown reductions of up to a factor of 10 for plants which have decontaminated and then applied the GEZIP process according to GVH's recommendations. For plants which have not decontaminated, GEZIP has arrested the cycle-to-cycle increase in the first cycle of GEZIP operation, then reduced dose rates consistently in each succeeding cycle. Plants which have applied GVH's noble metal technology (NobleChem™) and continued the GEZIP process at GVH's recommended levels have achieved the best dose rate reductions. Those plants which have combined these efforts with aggressive Co source term reduction have had the lowest long-term low dose rates.

Depleted Zinc Oxide

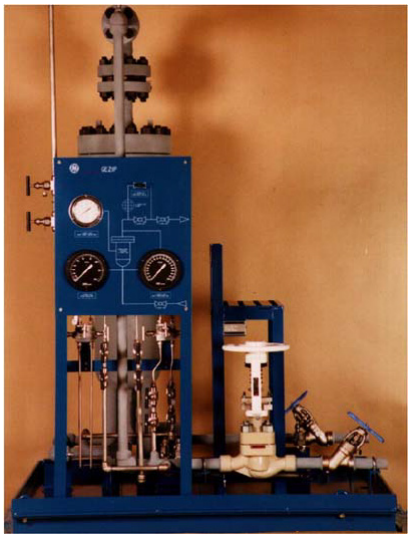
The GEZIP process adds zinc oxide in which the zinc has been depleted to an isotopic concentration of less than 1% Zn-64. This special material, known as depleted zinc oxide (DZO) forms little or no radioactive Zn-65 in the reactor. When added to the feedwater, the zinc oxide (as ionic zinc) becomes incorporated in the plant's stainless steel corrosion film, by occupying sites in the lattice structure where Co would be incorporated, thus minimizing or effectively excluding additional incorporation of Co–60 from reactor water. In addition, the zinc changes the structure of the stainless steel corrosion film, resulting in a thinner, more tightly adherent film, which is less able to hold Co-60. Zn injection also makes the crud deposits on the fuel more tenacious, (Zn-Fe spinel) so that activated Co-60 remains in the fuel deposits instead of being released to the coolant where it would be available to deposit on piping. The combination of these effects results in lower shutdown dose rates on plant primary system piping due to less Co-60 in the piping corrosion film.

GEZIP Skid

The passive GEZIP System is designed to continuously inject a dilute water solution of ionic zinc into the reactor feedwater. A stream of water taken downstream from the feedwater pump discharge is routed through a dissolution vessel containing depleted zinc oxide (DZO) pellets. The sintered DZO pellets dissolve in the diverted feedwater stream providing the ionic zinc. The stream containing the dissolved DZO is returned upstream of the feedwater pump suction and is blended with the main feedwater flow.

Plant Savings

The reduction of radiation levels from the application of the GEZIP process results in the reduction of personnel exposure during drywell work. Lower exposure translates directly into cost savings due to ALARA exposure reduction and more efficient work practices.



GEZIP Skid

For more information, contact your GE Vernova Hitachi Nuclear Energy sales representative.

Learn more at gevernova.com/nuclear

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