

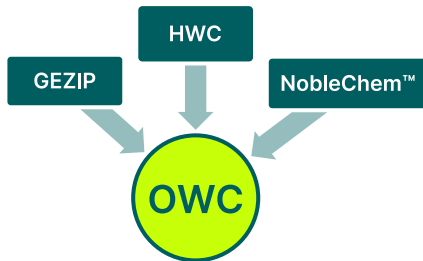


HITACHI

OPTIMUM WATER CHEMISTRY

Overall Strategy for BWR Chemistry Control

Optimum water chemistry (OWC) describes the adoption of zinc injection (GEZIP), hydrogen water chemistry (HWC), and NobleChem™ by the BWR fleet. When used in conjunction with adequate control of contaminant concentrations in the primary coolant of a BWR, OWC provides proven mitigation of both intergranular stress corrosion cracking (IGSCC) and dose rate increases.

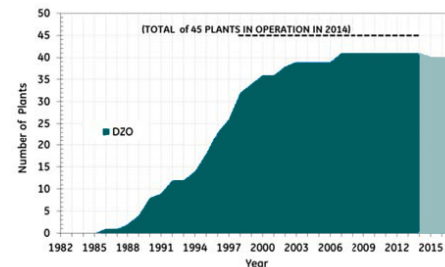


BWR Operating Experience (as of October 2014)	
Adoption Chronology	GEZIP Injection of zinc oxide depleted to an isotopic concentration of less than 1% Zn-64 to reduce Co-60 incorporation onto piping surfaces ~ 760 years
	Hydrogen Injection (HWC) Injection of hydrogen into the feedwater of a BWR to drive recombination of oxidizing species generated in the cores of BWRs ~ 760 years
	Classic NobleChem™ (CNC/NMCA) Deposition of noble metals on reactor piping and internals during a refueling outage to increase efficiency of HWC ~ 310 years
	On-Line NobleChem™ (OLNC) Deposition of noble metals on reactor piping and internals during reactor operation to increase efficiency of HWC ~ 120 years

Adoption of GEZIP in the GE Vernova Hitachi (GVH) BWR Fleet*

GEZIP was developed after early BWR experience showed that plants with a natural low-level Zn source in the feed water (from brass condenser tubing) had consistently lower recirculation piping post-shutdown dose rates. GEZIP was the earliest OWC technology to be adopted by the GVH BWR fleet.

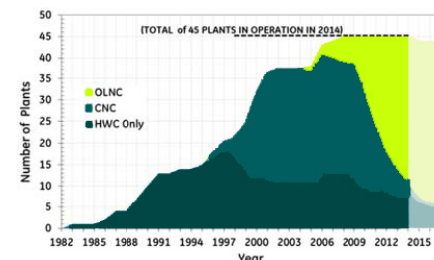
Adoption of GEZIP in GVH BWR fleet* outside Japan



Adoption of HWC and NobleChem™ in GVH BWR Fleet*

CNC and OLNC were developed to allow plants to mitigate IGSCC without elevated main steam line dose rates, which are caused by high hydrogen injection rates. The OLNC process improves mitigation by reducing the time between NobleChem™ reapplications. OLNC is the OWC technology adopted most rapidly by the GVH BWR fleet*.

Adoption of HWC and NobleChem™ in GVH BWR fleet* outside Japan



* GVH BWR fleet includes BWRs (outside Japan) for which GVH was the OEM.

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



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