

### 3477. Experience With Depleted Zinc Oxide Injection in BWRs

Injecting zinc into BWR water reduces deposited activity and shutdown dose rates. Originally, utilities injected natural zinc oxide (NZO), but it had the undesirable effect of increasing the Zn-65 contribution to radiation fields and low level waste. Depleted zinc oxide (DZO) proved an effective countermeasure, reducing Zn-65 in the reactor water to values approximately 25 to 50 times lower than in reactors using NZO. DZO also significantly lowers the specific activity of deposited Zn-65 on system surfaces. This report reviews the plant experience to date with DZO injection.

The objectives are:

- To monitor coolant chemistry and radiation fields and characterize fuel deposits at BWRs injecting DZO
- To identify an approach for reducing the amount of costly DZO required to realize these benefits

Shutdown dose rates at units injecting zinc are a factor of approximately 2.5 lower than at other units, and DZO is clearly effective in reducing the contribution of Zn-65. In BWRs that now inject DZO but began the injection process with NZO, the largest drop in Zn-65 occurs following refueling, since the highest inventory of Zn-65 is removed. Very low dose rates and a negligible concentration of Zn-65 in the reactor water were measured at the LaSalle 1 and 2, the first BWRs to implement DZO injection without having first operated on NZO. Commonwealth Edison estimates that use of DZO will lower personnel exposure by some 150 person-rem during each outage at the LaSalle units over the next four years (EPRI *Innovator* IN-106796). Radiation fields at Monticello have been reduced by a factor of two over the last three years, for a utility estimated savings of \$1.6 million. This study identifies an approach for determining the optimum DZO level for individual plants. The approach is based on operation at progressively higher zinc concentrations over three-month periods, during which time reactor water zinc, soluble Co-60 concentrations, and feedwater iron input are closely monitored.

Compelling evidence now affirms that DZO injections are effective in reducing the buildup of Zn-65 which accompanies the use of NZO.

*For more information, EPRI TR-107188, Final Report, November 1996, 88 pages.*

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