

### **N3412. EFFECT OF INJECTION OF DEPLETED ZINC ON RADIATION FIELDS OF LASALLE 1 BWR**

Injection of depleted zinc oxide at both LaSalle units has significantly lowered shutdown radiation fields and has prevented Zn-65 from becoming a concern in our low-level waste streams.

The major contributor to occupational radiation exposure at commercial BWR reactors is the radioisotope Co-60. The presence of natural zinc in the coolant of BWRs has been found to lower shutdown radiation fields due to Co-60. Subsequently, controlled amounts of zinc were added to the coolant to achieve these benefits. BWR plants injecting zinc have seen shutdown dose rates measured at standard locations being reduced by more than a factor of two. However, at some plants, Zn-65 was found to contribute significantly to shutdown fields and to place an added burden on processing of low-level waste.

The precursor of Zn-65 is Zn-64, which constitutes ~40% of natural zinc. Isotopic depletion techniques permit the level of Zn-64 to be reduced to ~1%, thereby reducing the formation of the undesirable Zn-65 isotope. The high cost of depleted zinc oxide (DZO) led a number of BWR utilities to cosponsor a Tailored Collaboration project to address the issue. This project typically includes monitoring of coolant chemistry, characterization of fuel deposits, and measurements of deposited activity, all with the long-term aim of identifying cost-effective techniques for injecting DZO. Seeing the shortcomings posed by the use of natural zinc, LaSalle 1 and 2 became the first BWRs to implement zinc injection using depleted zinc without having first operated for any time on natural zinc.

The use of depleted zinc oxide was determined to have saved ~150 person-rem of personnel exposure at the first refueling outage following its implementation. Projected subsequent savings are estimated to be ~140 person-rem at the next outage and average ~200 person-rem at each of the subsequent four outages.

*Contributed by Paul Nottingham, Commonwealth Edison LaSalle Station.*