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R-400

THE EFFECT OF ZINC ON CARBON STEEL AND STAINLESS STEEL IN LITHIATED COOLANT

Keywords: OPERATIONAL AND MAINTENANCE TECHNIQUES; ZINC ADDITION; WATER CHEMISTRY; CORROSION; ZINC

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Project Manager:

Objectives: Study the effects of zinc on carbon and stainless steel in a nuclear power plant.

Comments:

Potential Benefits of Zinc Addition:

- Lower rates of Co-60 buildup
 - lower dose rates; reduced man-rem
- Reduced corrosion rates
 - thinner oxides; less ion exchange resin required during a decontamination
 - less activity transport
- Decontamination performance
 - 410 SS was decontaminated without an oxidizing pretreatment

Comparison With PWR Results - Corrosion Rate Reduction:

Westinghouse (Esposito et al., 1991)

- zinc borate 50 ppb
- corrosion rate reduction by factor of
 - 3 on 304 and 316 SS
 - 1.7 to 11 on nickel based alloys

AECL

- corrosion rate reduction by factors of
 - 3 on carbon steel
 - 8 on 410 SS

Remarks/Potential for dose limitation: When 15 to 60 ppb of zinc was added to lithiated coolant:

- Corrosion was reduced by a factor of 3 on carbon steel, and 8 on 410 SS
- Corrosion-product release was reduced by a factor of approx. 18 on both CS and 410 SS
- The affinity for Co-60 was reduced by a factor of 3 to 5 for CS and approx. 60 on 410 SS
- 410 SS was effectively decontaminated using CAN-DECON without an oxidizing pretreatment
- Similar decontamination effectiveness was obtained with CAN-DECON on CS with and without zinc

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References: Allsop, H., Godin, M., and Miller, D., "The Effect Of Zinc On Carbon Steel and Stainless Steel In Lithiated Coolant," *Radiation Field Control Seminar*, Electric Power Research Institute, Seattle, Washington, 1993.

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