

N247. Some Successful Techniques for Exposure Control

Some EPRI-developed applications have been shown to be particularly successful to utilities in the industry:

▪ Use of modified pH from startup to reduce radiation fields

Use of elevated pH is recommended in the "PWR Primary Water Chemistry Guidelines - Revision 2." This chemistry has the greatest impact on radiation fields when applied continuously from initial startup. Utility innovators at Vogtle, Comanche Peak, and Seabrook have noted the following:

"The benefits of using modified pH from startup on reducing radiation fields have exceeded our expectations." (Ken Duquette, Georgia Power Company)

"Modified pH plays an important role in the exposure-reduction efforts at Comanche Peak." (S.E. Bradley, TU Electric)

"The modified pH used from startup helped limit the collective dose to 82.6 man-rem during cycle 1." (Robert Sterritt, North Atlantic Energy Services Corp.)

The figure depicts the effect of modified pH chemistry during early operation on radiation field buildup.

▪ Zinc Injection in BWRs

EPRI sponsored an assessment of BWR radiation field trends by General Electric that resulted in the zinc passivation technology. Subsequent work demonstrated control and applicability of zinc injection in reactor systems. This work established utility confidence for adoption of this radiation control method at Millstone-1 and FitzPatrick.

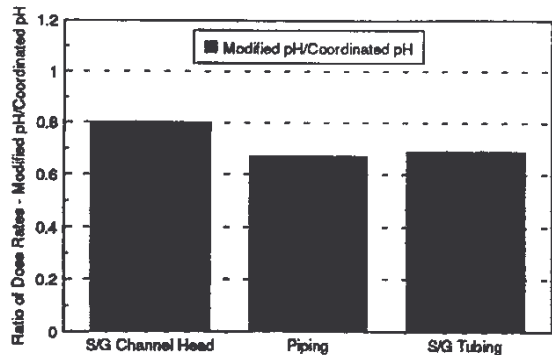
Regarding the Millstone-1 application, Michael Hudson of Northeast Utilities noted, *"After a decontamination and two cycles of operation with zinc injection, the recirculation pipe dose rates at Millstone-1 are 50% lower than previously experienced without zinc injection,"* and David Wilkens, also Northeast Utilities said, *"We were concerned about Zn-65 contamination, but this did not cause a problem due to our operational controls prior to and during shutdown."*

Following zinc injection at FitzPatrick, Jeff Goldstein, New York Power Authority, said, *"Zinc injection at the FitzPatrick plant has offset increased radiation buildup experienced in other BWRs when hydrogen water chemistry was introduced. Contact radiation field dose rates stabilized at about 100 mR/hr, which is 50% lower than values before hydrogen water chemistry and zinc injection commenced."*

Effect of modified pH on the BUILDUP
of rADIATION FIELDS in PWRS

Comparison of similar design plants starting operation
with modified pH of coordinated pH chemistry

(1 or 2 cycle data)



▪ **LOMI Decontamination of Nuclear Reactors Reduces Exposure and Critical Path Time**

For eight years, the EPRI-developed LOMI decontamination process has been a major utility tool for reliably removing radioactive species from component surfaces with minimum critical path time. Utility innovators note:

"Chemical decontamination was the major reason we were able to reduce worker occupational radiation doses to levels that were as low as reasonably achievable, as well as limit the collective dose." (Mark Miller, Philadelphia Electric.)

"LOMI decontamination performed at FitzPatrick yielded high man-rem savings. HWC and zinc injection did not alter the effectiveness of LOMI." (Jeff Goldstein, NYPA).

"LOMI has been used 15 times to reduce radiation exposure in Commonwealth Edison's BWRs." (David Haberkorn, Commonwealth Edison Co.)

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