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U.S.A. **R-408**

COST EFFECTIVE RADIATION EXPOSURE CONTROL

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Objectives: How to achieve a downward trend in radiation exposure in the most cost effective manner:

- Down ward trend in radiation exposures has slowed
- Major benefits of reducing time on the job already obtained
- Cost control is the key issue today
- Need cheaper, easier, better techniques that are quicker to apply

Comments: The sources of radiation fields are:

1) Corrosion products are released into the coolant from out of core surfaces.
2) They deposit on the fuel: Cobalt is activated to Co-60 and nickel to Co-58. In-core sources are also activated.
3) Activated material is transported and deposited on out-of-core surfaces, becoming incorporated in growing oxide film.
4) Co-60 and Co-58 are the main sources of radiation fields, generally greater than fission products.

The main principles for controlling radiation fields are:

1) Control the source through reducing cobalt hardfacing alloys and cobalt impurities in alloys
2) Reduce transport and activation through water chemistry control
3) Reduce deposition through preconditioning of replacement components
4) Remove activity through coolant cleanup and chemical decontamination

Remarks: A host of techniques have been developed which are cost effective. They involve reducing the source term, reducing cobalt in valves, controlling recontamination, controlling radiation fields while using Hydrogen water chemistry in BWRs. Some examples are:

1) Stabilized chromium passivation of PWRs
2) Use of enriched boric acid and zinc injection for PWRs
3) Using zinc injection while implementing hydrogen water chemistry in BWRs
4) Minimizing corrosion product input from feedwater in BWRs
5) Using chemical decontamination in BWRs before implementing hydrogen water chemistry
6) Utilizing chemical decontamination, with replacement of cobalt containing control blade pins and rollers and zinc injection in BWRs

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The goal should be to reduce radiation exposures while at the same time reducing operations and maintenance costs.

References: Wood, C.J., "Cost Effective Exposure Control", Proceedings EPRI Radiation Field Control and Chemical Decontamination Seminar, Tampa, Florida, November 1995, available from EPRI Distribution Center, P.O. Box 23205, Pleasant Hill, CA 94523.

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