AN UPDATE ON CHEMISTRY RELATED DOSE REDUCTION EFFORTS AT MILLSTONE NUCLEAR GENERATING STATIONS

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Objectives: Describe the ALARA efforts at Northeast Utilities and the results from elevated pH, zinc injection, decontaminations, electropolishing, etc.

Comments: An aggressive chemistry and materials ALARA program was initiated at NE Utilities in 1986. It included:
- Elevated pH coolant chemistry control at MP3 (PWR)
- Zinc injection (GEZIP) at MP1 (BWR)
- Decontaminations, SG channel head electropolishing, and cobalt source removal

Millstone 3 End-Of-Cycle-3 Results (3.7 EFPY):
- Radiation fields remain low
- No evidence of adverse effects on I-600
- Continuing uncertainty about adverse effects of Li on high burnup zircaloy oxidation
- Standard coordinated pH 6.9 for cycle 4 and the future until
  - more information on cladding limitations
  - And/or fuel load with more corrosion resistant cladding

Millstone 1 Results After Decontamination and 2 Cycles of GEZIP:
- Recontamination dose rates leveled out at 50% less than without GEZIP
- Manageable side effects due to Zn-65 Production
  - dissolution during shutdown
  - food chain incorporation
  - personnel monitoring and detectability
  - extra waste curie load
  - zinc depleted in Zn-64 (GEZINC) is now being tested to reduce Zn-65 production

Remarks/Potential for dose limitation: Other Chemistry ALARA Efforts at NU
- Subsystem and SG channel head decons
- Early boration during shutdowns
- Acid reducing nickel clean up during start up after SG replacement at Millstone 2
- Modified elevated pH coolant chemistry control
- Participation in PWR Zinc Injection Program

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Summary

- Two cycles of operation with zinc injection at Millstone 1 proved successful in reducing worker radiation exposure.
- Two cycles of operation with elevated pH at Millstone 3 proved successful in controlling the increase of SG channel head dose rates. However, fuel cladding oxidation concerns have led to a temporary respite in this program.
- Activities such as decontamination, surface treatment, and cobalt source removal programs, in conjunction with the coolant chemistry programs, will continue to be evaluated as means to reduce occupational radiation exposure at NU nuclear plants.

References: Hudson, M.J., "An Update On Chemistry Related Dose Reduction Efforts at Millstone Nuclear Generating Stations," *Radiation Field Control Seminar*, Electric Power Research Institute, Seattle, Washington, 1993.

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