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PWR STARTUP AND SHUTDOWN CHEMISTRY GUIDELINES

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Principal Investigator:

Gary Brobst
GEBCO Engineering, Inc.
P.O. Box 1736
Sebastopol, CA 95473
U.S.A.
Phone: 707-823-5237

Project Manager:

Objectives: Develop PWR startup and shutdown chemistry guidelines.

Comments: The following guidelines originated from the study of industry data and experience by an ad-hoc committee formed by several utilities and EPRI.

Technical Basis for Shutdown Chemistry Control
- Field data did not strongly defend intensive or impacting chemistry controls during shutdown to reduce exposure rates
- Laboratory research indicated mildly acidic conditions would not likely affect long-term, Co-60 rich deposits that control plant exposure rates
- Some field data suggested that lack of chemistry control during shutdown may lead to release of particulate corrosion products and increased plant exposure rates
- The committee finally concluded that guidelines could identify the most appropriate shutdown chemistry scheme, though the technical basis was problem-avoidance, not radiation field reduction

Remarks/Potential for dose limitation:

Principles of Refueling Cold Shutdown Chemistry Control
1) Control reactor coolant pH during cooldown: Chemistry personnel should take measures to prevent increasing the alkalinity of the reactor coolant during cooldown. This is done by:
2) Maximizing the time with at least one reactor coolant pump operating.
3) Monitor coolant chemistry and maintain adequate cleanup capability.
4) Maximize letdown purification flow.
5) Maintain reducing conditions.
6) Ensure conditions in decay heat removal system do not adversely impact the chemistry of the RCS when mixed.
7) Create acid-oxidizing conditions to provide controlled solubilization of radiocobalt.
8) Reduce dissolved hydrogen to <5 cc/kg prior to opening the RCS.

References: Brobst, G., "PWR Startup and Shutdown Chemistry Guidelines," *Radiation Field Control Seminar*, Electric Power Research Institute, Seattle, Washington, 1993.

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