

# BNL ALARA Center Data Base

FRANCE

H-205

## CORROSION PRODUCTS BEHAVIOR IN FRENCH PRESSURISED WATER REACTOR DURING SHUTDOWN OPERATION

**Keywords:** OPERATIONAL AND MAINTENANCE TECHNIQUES;  
SHUTDOWN CHEMISTRY; CORROSION PRODUCTS

**Principal Investigator:**

**Project Manager:**

Serge Anthoni  
Commissariat a L'Energie Atomique  
Fuel Research Department  
13108 Saint Paul Lez Durance, Cedex  
FRANCE  
Phone: 33-4225-7954

**Objectives:** The objectives of the experimental program are:

- 1) Primary water measurements
  - volumetric activity of corrosion products by gamma spectrometry
  - concentration of chemical elements by X-ray fluorescence
- 2) Deposited activity measurements with a portable gamma spectrometer
  - on steam generator tubing
  - on primary pipes
- 3) Measurements were carried out during 20 shutdowns for refueling (900 MWe PWRs)

**Comments:** During shutdown operation, cooling and injection of boric acid modify pH of the primary coolant leading to a significant increase in the activity of corrosion products. The modification from reducing to oxidizing conditions of the primary water produces a significant increase in cobalt isotope activity. The separate effects of cooling and oxygenation are quantified and studied. Analysis of concentrations and activities of corrosion products in the primary coolant enabled us to identify their origin.

**Remarks/Potential for dose limitation:** The evolution of contamination of the steam generator tubes and primary pipes using gamma spectrometry measurements during more than 20 shutdowns lead to the following conclusions:

- No significant reduction of out-of-core deposited activities occur during cooldown.
- The majority of the Co-58 and Co-60 activity released into the primary water come from the dissolution of in-core deposits (Ni or NiO).
- Aeration at temperatures >90°C increases the Co-58 deposited on the out-of-core surfaces.
- The use of H<sub>2</sub>O<sub>2</sub> reduces the outage critical path.

**References:** Anthoni, S., Ridoux, P., and Caramel, C, "Corrosion Products Behavior in French Pressurised Water Reactor During Shutdown Operation," *Radiation Field Control Seminar*, Electric Power Research Institute, Seattle, Washington, 1993.

**Duration:** from: 1992 to: 1994

**Funding:** N/A

**Status:** In progress

**Last Update:** January 12, 1994