BNL ALARA CENTER

# Processes and Practices Related to Occupational Dose

**ID:** 4

## CAVITY WALL AND OTHER SPECIAL DECONTAMINATION MACHINES

**Keywords:** CAVITY WALL; CAVITY WALL DECONTAMINATION; DECONTAMINATION MACHINES; WEPA; REFUELING POOL; DECONTAMINATION; MECHANICAL CLEANING; ALARA 1146 DECON; ROBOTIC CLEANING; SPENT FUEL POOL; SCAVENGER

## Description:

Post-refueling reactor cavity pool surfaces decontamination following draining is a difficult but essential operation. This job has requirements health physics concerns due to high levels of contamination and radiation, high probability for radioactive airborne contamination, significant manpower, potential for critical path, and typically contributes several rem committed dose. Therefore, a properly Decontaminated refueling pool can result in labor cost reduction, exposure savings and radwaste reduction.

Hydrolasing and hand scrubbing were traditionally the major decontamination methods used by plants. In 1981, the strippable paint method, ALARA 1146 Decon, was utilized and did prove to be an effective decontamination method but exposure savings were not dominant. The WEPA decontamination system are special scrubbing machines consisting of a crane-supported wall scrubber, a person-operated floor scrubber, and a hand-held scrubber has been successfully employed.

This system has resulted in an annual dose savings of 2.4 rem, reduction in airborne contamination level, shortened outage time via reductions of critical path time for the crane and much less rad waste. The cleaning of spent fuel pool by robot has also been utilized and proved to be cost beneficial, especially if it is used for other cleaning operations. The remote or robotic underwater cleaning method can be considered for commercial application in the near future.

## References and Selected Abstracts:

1. Watson, B.A. and D.L. Montana, "Calvert Cliffs Refueling Pool Decontamination: An Update," Radiation Protection Management, 45-51 (1986).

ABSTRACT. Baltimore Gas & Electric Company described its first experience with the use of Sigma Engineering's WEPA mechanical cleaning equipment for a refueling pool decontamination in the April 1984 issue of Radiation Protection Management. Since the initial refueling pool decontamination at Unit 1 of the Calvert Cliffs Nuclear Power Plant in 1983, three additional refuelings and subsequent refueling pool decontaminations have occurred. Additional operating experiences with the WEPA process are discussed in this new article, including a revised job sequence that has resulted in a 66% reduction in critical path time. A new model RM-3 WEPA floor scrubber is described and an inexpensive, American-made replacement for the RM-2 hand-held scrubber is introduced.

2. Roman, H.T. and F.A. Marian, "Robotic Cleaning of a Spent Fuel Pool," Radiation Protection Management, 31-36 (1987).

ABSTRACT. Spent fuel pools at nuclear power plants are not cleaned routinely, other than by purifying the water that they contain. Yet, debris can collect on the bottom of a pool and should be removed prior to fuel transfer. At Public Service Electric & Gas Company's Hope Creek Nuclear Power Plant, a submersible mobile robot -- ARD Corporations's SCAVENGER -- was used to clean the bottom of the spent fuel pool prior to initial fuel loading. The robotic device was operated remotely (as opposed to autonomously) with a simple forward/reverse control, and it cleaned 70 to 80% of the pool bottom. A simple cost-benefit analysis shows that the robotic device would be less expensive, on a permission basis, than other cleaning alternatives, especially if it were used for other similar cleaning operations throughout the plant.

3. Baum, J.W. and G. R. Mattews, "Compendium of Cost-Effectiveness Evaluations of Modifications for Dose Reduction at Nuclear Power Plants," NUREG/CR-4373, December 1985.

4. Watson, B.A., Hudson, S.B., and Koranek, S.D. "Refueling Pool Decontamination Utilizing the WEPA System," Radiation Protection Management, 59-66 (1984).

5. Patton, P., "ALARA 1146 Decon Coating Highly Effective for Reactor Cavity Decontamination Following Refueling," The Forum of Westinghouse, Vol. 1, No. 1, June 1981.

6. Fero, A., "Use of ALARA 1146 Decon Coating for Reactor Cavity Decontamination," Summary Proceedings of the 1981 Westinghouse Radiation Exposure Management Seminar, October 1981, pp. 1-2.