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PWR UPPER/LOWER INTERNALS SHIELD

Keywords: RADIATION SHIELDING; REACTOR INTERNALS; REFUELING; INDIAN POINT 2

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Objectives: The goal of this research and development program was to design, develop, test and demonstrate a shielding system which would use the existing mass of the refueling pool water to provide shielding from the protruding components of the upper internals in order to reduce the radiation exposure of refueling personnel in containment.

Comments: During refueling of a nuclear power plant, the reactor upper internals must be removed from the reactor vessel to permit transfer of the fuel. The upper internals are stored in the flooded reactor cavity. Refueling personnel typically receive radiation exposure from a portion of the highly contaminated upper internals package which extends above the normal water level of the refueling pool. At Con Edison's Indian Point 2 plant, a method of shielding was devised which would use a vacuum pump to draw refueling pool water into an inverted canister suspended over the upper internals to provide shielding from the normally exposed components. The shield system consists of a 72" high cylindrical tank with an open bottom that is suspended from outside the cavity by two I-beams. The tank is positioned to provide 18" of immersion in the existing pool water. After installation most of the air trapped in the upper 54" of the tank is evacuated, and the vacuum draws water from the pool which fills the tank above the pool level. The "stand pipe" of water in the tank encircles the upper internals thereby providing the needed shielding.

Remarks/Potential for dose limitation: The development of the vacuum radiation shielding system resulted in significantly reduced dose rates to personnel. General area dose rates to refueling bridge personnel were reduced from 154 mR/hr to 25 mR/hr. Fourteen person-rem of exposure were saved as compared to the 1991 refueling outage. At 10,000/person-rem, the net savings for Con Edison is approximately \$140,000 per use.

References: Homyk, W.A., "PWR Upper/Lower Internals Shield," *1993 Radiation Exposure Management Seminar*, Westinghouse, Pittsburgh, Pennsylvania, 1993.

Duration: from: 1992 to: 1993

Funding: N/A

Status: Completed

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