BNL ALARA CENTER

Processes and Practices Related to Occupational Dose

ID: 43

REFUELING MACHINE

Keywords: REFUELING MACHINE; REFUELING PLATFORM; OUTAGE OPERATIONAL AND MAINTANENCE TECHNIQUES; IMPROVED TOOLING; REMOTE SYSTEMS; REMOTE TOOLING AND DEVICES

Description:

During a refueling outage, around one-quarter of the fuel bundles are replaced and others are shuffled. In all Tokyo Electric Power's plants this work is done by the automatic refueling platform. This consists of a platform that runs on rails over the fuel pool and core, with a computer and panel from which the machine is controlled being located in a separate control room. The machine can shuffle the fuel bundles and transfer them between the pool and core with the operator merely specifying the locations in the core or fuel pool.

Using this machine not only reduces the length of refueling outage and the radiation exposure to workers, but its multi-redundant safety system reduces the chance of fuel elements being damaged by falling or crashing into the pool wall.

References and Selected Abstracts:

1. K. Ishii, "Tokyo Electric Sees a Future of Multipurpose Robots with AI," Nuclear Engineering International, April 1987, pp. 36-36.

2. EPRI, "Equipment for Removing Seized Closure Studs from Reactor Pressure Vessels," EPRI Final Report NP-3950, June 1985.

ABSTRACT: This project constisted of five major tasks for the purpose of reducing nuclear power plant refueling outage time: (1) developing an automatic refueling machine coordinate positioning system for backfit to currently operating plants; (2) developing equipment, tooling, and an associated work platform to permit instrument removal at the internals lay down area; (3) developing a method for cleaning guide tubes for use during detector change-out operations; (4) designing and developing improved special tooling to replace standard industry hand tools, and establishing a central registry of special tooling available to utilities; (5) reporting in monthly status letters the implementation, management, evaluation, and assessment of these tasks at the Fort Calhoun Nuclear Station.

3. Swelim, H., Stern, G., Fayed, E., Wittmann, R.H., "Dynamic Analysis of Refueling Machine For Fuel Assemblies," Intern. Conference on Structural Mechanics in Reactor Technology, Title 9, August 1987.

ABSTRACT: Refueling machine for fuel assemblies in nuclear power plants must be designed to withstand dynamic loads caused by an earthquake, an airplane crash, or an explosion. The