

N60. EMPLOYEE ATTITUDES: THE KEY TO EXPOSURE REDUCTION AT OYSTER CREEK

A renewed emphasis on integrating exposure control into all stages of work -- from planning to post-maintenance testing -- and ongoing improvements in plant radiological conditions are yielding reductions in occupational exposure at Oyster Creek (U.S.A.). Occupational exposure and contaminations began trending downward late last year as a result of changes implemented at the 650-MWe BWR, which began commercial operation in December 1969. Oyster Creek's exposure levels had been above industry averages for several years because of major outages. The outages were needed to accomplish major modifications and system upgrades required by the Nuclear Regulatory Commission and to improve performance and reduce exposures. During the 20-month 1983-84 outage, exposure averaged about 2,000 person-rem/y. A 1986 outage, which completed most of the upgrades, averaged 2,300 person-rem. Major decontamination efforts and the installation of shielding inside the plant's drywell during the outages helped reduce exposure and contaminations in the long run. In 1988, during which the first half of a refueling outage took place, total exposure was 1,504 person-rem. The 1989 total, including the final half of the outage, was 910 person-rem, and the first half of 1990 (which did not include a major outage) amounted to less than 210 person-rem. Skin contaminations dropped by 82% and clothing contaminations dropped by 44% during that period.

The improvements were achieved through a plant-wide program to strengthen employee understanding of the need to reduce occupational exposure. About 200 managers and supervisors underwent advanced classroom training in radiological control theory and practice. Radcon is now a cornerstone of every task from job planning to hands-on work, into post-job interviews to develop future improvements. The plant's training department has expanded use of full-size training mockups so workers can practice a task before doing it in a radiation area. As part of an intensive 3-day course for craft workers and plant staff who routinely work in radiation areas, tasks are rehearsed in a containment area where heat and humidity are controlled to precisely mimic actual plant working conditions. In the interest of safety, the plant operations department has reduced reactor power on several occasions by up to 50% to reduce radiation fields for maintenance. Other reductions resulted from limiting the number of people assigned to the in-plant segment of tests and surveillances, and by deferring drywell work, when possible, to scheduled outages.

3D MODELING

The downward trend in occupational exposure is expected to be strengthened by a 3D solids modeling engineering graphics system that is coming on-line in time for a refueling outage scheduled to begin in the first half of 1991.

The system transforms information on blueprints, diagrams, and drawings into 3D views of systems, components, and equipment. A user can choose black and white, or color, and can view the model in three dimensions and from any angle.

The computer is being used to draw a scale replica of the drywell. From the information in one drawing, the computer deduces the reactor vessel, from another it takes the reactor water recirculation system and pumps, and from another the cooling and ventilation systems, and so on. With a few keystrokes, the computer can manipulate the drawings and display components on the screen or on paper exactly as they appear in the plant, answering many questions even before a worker, engineer, or designer sets foot on the site, and without exposing them to radiation. It also allows integration of different disciplines --

pipng, electrical conduit, instrument cables, walls, structural steel -- and it quickly shows where a problem exists.

Results of the ongoing programs are encouraging. As of mid-August, Oyster Creek's occupational exposure stood at 234 person-rem, the lowest total since 1971.

For more, see Neddenien, K., "Employee attitudes the key to exposure reduction," Nuclear Engineering International, p. 46, November 1990; or contact Karl Neddenien, Media Relations Manager, GPU Nuclear Corporation, P.O. Box 388, Route 9 South, Forked River, NJ 08731-0388, U.S.A.