N95. The Age Of The "Throwaway" Video Camera Is Here

A recent EPRI report highlights the production and dose-reduction benefits to be gained by the use of closed-circuit television (CCTV) in plants. Surprisingly, some very cheap ($300), off-the-shelf systems were found to work well. Nuclear power plants have long employed CCTV in a few applications, including fuel loading verification and fuel assembly inspections. These early setups were generally expensive, one-of-a-kind systems. However, at least three factors have improved the prospects for in-plant video over the past decade:

- The Three Mile Island cleanup efforts led to innovative new applications and configurations for video cameras.
- Prices for video systems have continued to fall.
- Advances in technology have improved system performance.

As the EPRI 1990 study shows, supervisors, engineers, and technicians using video now have a power tool for improving plant operations and maintenance. The study, "Video Camera Use at Nuclear Power Plants: Tools for Increasing Productivity and Reducing Radiation Exposure" (EPRI Report NP-6882) examines the types of video camera equipment used by U.S. utilities and discusses a broad array of specific plant applications. The report describes about 30 plant applications of video cameras for operations, maintenance, and repairs.

The greatest use of video is as a worker surveillance and monitoring tool. Remote health physics support was the largest reported use, with video cameras used by HP staff to watch over workers without having to enter the radiation area, or enter less frequently. They were also used to survey work areas to plan where workers should stand to minimize exposure and evaluate equipment placement. The second most common surveillance application was as an improved communications tool. The cameras allow supervisors, task engineers, and quality assurance personnel to provide review and technical direction from a low- or no-exposure area.

Radiation Reductions

At GPU Nuclear Oyster Creek plant, exposure savings of 6.4 person-rem to HP technicians were realized over the course of a 13-day drywell inspection and repair project. During this same time period, the cameras saved an additional 4.2 person-rem to other repair and inspection workers. At Union Electric's Callway plant, about 5.5 person-rem were saved during one refueling outage. Savings on individual jobs ranged from 0.2 person-rem for a manway removal and reinstallation task, to 2.8 person-rem during eddy current testing. Carolina Power & Light reported savings between 18 and 22 person-rem/y at its Brunswick plant by using voice and video supervision of operation and maintenance crews. That same plant reported saving 53.5 person-rem during a massive recirculation pipe replacement project. They used 20 cameras, including 10 for HP coverage alone.

Fixed-focus cameras were used to observe automated equipment; remote-controlled cameras on pan and tilt mounts were used to monitor workers, watch for fires during welding, and perform close-up inspections of equipment and welds. The study found some remarkable success with some very low cost CCTV systems. Several plants have used inexpensive systems (about $300) consisting of a black & white camera with built-in microphone, camera mount, a 12" monitor, and a camera control station. The systems, which are intended for home security, stand up surprisingly well to the demanding plant environment. One camera was used to observe a small steam leak and operated for 5 months in a humid environment

and a 5 R/h radiation field. The cost of these cameras is often so low that they can be considered disposable should they fail or become excessively contaminated.

Taken From: "The Age of the "Throwaway" Video Camera," Dennis E. Owen and John F. O'Brien, Nuclear Engineering International, May 1991, p. 36. You may also contact John O'Brien, EPRI, 3412 Hillview Avenue, Palo Alto, CA 94303, Phone (415) 855-2214.