N3422. JAPAN PLANS ALL-PURPOSE ELECTRONIC DOSIMETRY SYSTEM

Development is nearing completion in Japan of an advanced computer dosimetry system for nuclear facilities based on a new electronic personal dosimeter which combines the capabilities of current systems and will also collect trend dose data, provide radio data transmission, and be used for area access control.

In Japan, as elsewhere, radiation workers at nuclear power stations often wear an electronic dosimeter that can display real-time radiation doses and provide a high dose alarm function in addition to a film badge or thermoluminescent dosimeter used for legal recorded dose monitoring and evaluation. The use of multiple dosimeters places an extra burden on workers and the Japanese consider it a practice in need of updating.

Based on the rapid progress in electronic technology in recent years, a highly reliable new electronic personal dosimeter has been developed in Japan by nine nuclear utilities, the Japan Atomic Power Company, and two manufacturers, Fuji Electric and Matsushita Electric. The new dosimeter has a dose evaluation capability as well as all the functions of an alarm dosimeter.

Electronic Dosimeter Project

In setting up the project, the target specifications for a new type of electronic personal dosimeter were defined to match the range of functions, performance, and reliability of instruments currently in use. In addition, it was to have the capability of collecting trend dose data (including the ability to collect and store dose data every minute) and be highly resistant to impact damage and to electromagnetic interference.

To meet the targets, a range of very small individual silicon solid-state detectors, which can measure x-rays and gamma rays, as well as beta and neutron radiation, was developed and incorporated into a single dosimeter. A radio transmission system is included as a means for data communication with a computer to provide a single point of collection and recording of measurement data.

Many of the components of the dosimeter are incorporated into LSI chips to minimize the numbers of parts, contacts, and switches to realize a compact unit, weighing about 130 g, which has a low probability of breakage or other physical problems. As a result, the dosimeter has a reliability about 10 times greater than conventional electronic personal alarm dosimeters.

An extensive test program has verified the performance to be comparable to that of conventional film badge and other dosimeters. The new dosimeter can be linked with computers to set up a system of control access to radiation areas, and can provide information for analyzing collected data for purposes of reducing dose.