Nuclear accidents: The 10-minute myth

For better or worse, the nuclear power industry will probably long be viewed as operating in two distinct eras: Before TMI and After TMI. The accident at Three Mile Island continues to have many repercussions, but the most positive effect, from behavioral scientists' point of view, is an enhanced emphasis on the human factors involved in the design and operation of nuclear plants and other modes of high technology. Though public awareness of this field may just be emerging, a cadre of engineers, psychologists and others has been studying human error for a number of years (SN: 2/23/80, p. 122).

In fact, two years before the TMI incident, the Electric Power Research Institute decided to undertake perhaps the most extensive study yet of human performance in power plants. EPRI, based in Palo Alto, Calif., and General Physics Corp. of Columbia, Md., combined to develop a system of recording and measuring all aspects of a plant operator's performance. The system was applied to operators being trained at nuclear control room simulators in Tennessee. Such simulators — about 20 now exist in the United States — have historically been used to train and retrain plant operators in a way similar to the cockpit-simulator method of training airplane pilots. But it was not until the EPRI experiment that scientists decided to utilize the apparatuses, which simulate either pressurized water reactors (such as TMI) or boiling water reactors, for collecting data on human error.

"The data base for errors in nuclear plants is not that good," says Tom Sheridan, director of the Manned Systems Lab at the Massachusetts Institute of Technology. "This is primarily because big accidents do not occur very often, and plants do not want to advertise their own goofs... [which are] covered up a little bit." The Nuclear Regulatory Commission does require the filing of "licensee event reports" following a mishap. But those reports are frequently equivalent in depth and accuracy to a "traffic report filled out by a policeman," says Sheridan.

Now, however, the first 500 to 1,000 experimental exercises with operators in the EPRI study have been completed, according to Sheridan, who is a consultant for the project. The exercises range from tasks as routine as a plant startup to minor instrument failures to loss of coolant and other major accidents. Each exercise is evaluated by weighing the experience of the operator against the type of equipment, severity of the error and other factors. This is the first time in this country or abroad that these kinds of data have been collected, he says.

Though the preliminary results will not be released until August, Sheridan revealed several significant findings to SCIENCE NEWS last week at a human error conference in Columbia Falls, Maine. As might be expected, the first results show that "operators do make errors, most of which are trivial, and have a tendency to recover from those errors," Sheridan says.

What may not be quite so expected, though, is the finding that it takes most operators two or three times longer to regain their composure and resume their jobs after a major accident than is widely believed. The currently accepted "10-minute-rule" in the United States stipulates that a nuclear plant operator may not be depended upon for 10 minutes after a major mishap; most plants, therefore, are designed to perform fully automatically (to correct the situation or shut down the plant) for that period before control is returned to humans.

"But on the basis of our data, it appears as though the operator needs 20 to 30 minutes" to get his wits about him after a major accident, says Sheridan. "He needs the time to figure out what's going on, then the time to act." This finding—more in line with European estimates (15 to 20 minutes), Sheridan notes — could have major implications in the future design of plant auto-mechanisms, which might logically require enhancement to accommodate longer post-accident operation. The simulators, he emphasizes, are extremely realistic: "You can get the same stress reactions ... people sweat and panic." □

Laetrile trial underway

The National Cancer Institute announced in 1978 that it would be conducting a clinical trial to test the effectiveness of the drug Laetrile against cancer. This trial is now underway. It will be conducted by Charles Moertel of the Mayo Clinic in Rochester, Minn., Charles Young of Memorial Sloan-Kettering Cancer Center in New York City, Gregory Sarna of the University of California at Los Angeles and by Stephen Jones of the University of Arizona Health Sciences Center in Tucson. Approximately 200 cancer patients for whom no other treatment has been effective will receive Laetrile along with a special diet and supplemental vitamins and will be followed for the next two years. Patient data from all four institutions will be coordinated at the Mayo Clinic.

Before the Food and Drug Administration allowed this trial, Laetrile had to be tested in a small number of cancer patients to be sure it wasn't toxic. Such testing took place at the Mayo Clinic (SN: 7/5/80, p. 6).

Cancer patients interested in participating in the NCI study should call the National Cancer Information Service toll-free number 800-638-6694 (in Maryland, 800-492-6600; in Alaska and Hawaii, 800-638-6070). Eligible patients will be referred to one of the participating institutions. □

Mt. Hood: Awakening or troublemaking?

U.S. Forest Service

Rumbling Mt. Hood grabs attention.

The brief round of earthquakes recorded last week near Mt. Hood may have been only "normal" activity, albeit ill-timed for the volcano-besieged Northwest, but scientists are keeping tabs on the mountain just in case. The region has been quiet since a rash of about 60 small earthquakes shook instruments and rattled some nerves between July 6 and 12. With each passing day of quiet, scientists become more willing — though still cautious — to attribute the quakes to regular adjustments of the earth rather than to an awakening of Mt. St. Helens's neighbor.

The activity at the 11,235-foot Oregon volcano, located about 50 miles east-southeast of Portland and about 60 miles from Mt. St. Helens, was recorded by a year-old regional network of U.S. Geological Survey seismic stations installed for geothermal resource assessment. The quake series began at 6:17 p.m. local time on July 6 with a Richter magnitude 3.3 earthquake near Mt. Hood and was followed by aftershocks as well as by other quakes located 10 miles southeast of Mt. St. Helens. Another 3.0 shock occurred near Mt. Hood early July 7 and two magnitude 3.2 quakes and aftershocks struck on July 8 and 9. Since then, no tremors larger than 1.5 have occurred.

Unlike the "volcanic" quakes — continuous, moderate-sized quakes due to the movement of magma — that preceded the March 27 eruption of Mt. St. Helens, the Mt. Hood series appears to show the main-shock-aftershock sequence typical of earthquakes due to tectonic stresses, says Survey scientist Eliot Endo. "It's always a little obscure," says Dave Hill of the USGS in Menlo Park, Calif. "They may be due simply to some adjustments in the crust related to the load of the volcano." Geologists have noted that similar sequences occurred at Mt. Hood in 1975 and 1978. Just to be sure, however, the Survey has moved four more seismic stations and leveling instruments close to the mountain. □