

SCIENCE IN REVIEW

Atomic Laboratory Illustrates the Perils That Must Be Faced in a Reactor Plant

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Engineers who are studying the possibilities of atomic power are aware of the radiation hazards that must be faced by workers in a plant that depends on an atomic "reactor" instead of combustible fuel. Hence the importance of an announcement that comes from the Brookhaven National Laboratory at Upton, L. I., where professors of half a dozen universities are now carrying on research. The precautions that are taken at Brookhaven are much more elaborate than those with which the engineer who designs an atomic power plant must reckon. Still, they serve to drive home the perils that must be faced.

In what is known as the "hot" laboratory, recently completed at Brookhaven, radioactive isotopes taken from the reactor, or "pile," are separated and analyzed. This is dangerous work. It is done in a "block" of three cells that suggests the safe-deposit vault of a bank. Each stainless steel cell is sealed off by steel doors that weigh eleven tons. Flip a switch and a pair of doors silently opens or closes. The steel cell itself has concrete walls three feet thick. In spite of its weight and size (3.5 feet wide, 11 feet high) a door will close in five seconds and stop automatically at the right spot.

Studied on "Hot" Cells

Highly radioactive materials are studied within one of these "hot" cells. Samples of materials can be placed in small tubes and whisked underground at forty miles an hour from the reactor to the "hot" laboratory. Short-lived isotopes (their half life may be only a few minutes) are thus delivered into a "hot" cell before they have lost much of their radioactivity. The air supplied to the "hot" laboratory is filtered to decontaminate it.

The experimenter does not think of handling the radioactive material or even coming near it. He looks through a periscope and manipulates it and instruments by remote control. The equipment is first assembled on a panel, whereupon the assembly is fitted into the doors. After the experiment is over the equipment and panel must be decontaminated in a "clean-up" room.

In addition to the three "hot" cells there are five "caves" or "semi-hot" cells for experimentation with materials of lower radioactivity. The top of a cave looks like the hood over a kitchen stove. Even here precautions must be taken. A laboratory technician uses tongs and works behind a barrier of lead bricks, with mirrors and thick glass portholes through which he looks.

Risk in Decontamination

The process of decontamination is also attended with some risk. The clean-up room is lined partly with steel, partly with tile. Much equipment is scrubbed with soap and water or with acids in a polished stainless steel tank which looks like a small swimming pool and which is five feet deep.

The disposal of wastes is a problem in every nuclear laboratory as well as in plants like those of Oak Ridge and Hanford. At Brookhaven waste liquids from the cells pass through drains to hold-up tanks to be tested for radioactivity and analyzed. If no significant radioactivity is detected the waste runs into an ordinary sewer. Dangerous wastes are treated and diverted to storage tanks. Nobody is allowed to enter the treatment area—a maze of tanks and pipes under the "hot" laboratory building. Pressures, temperatures and other important information are registered on control panels upstairs.