TO : Distribution DATE: May 2, 1960

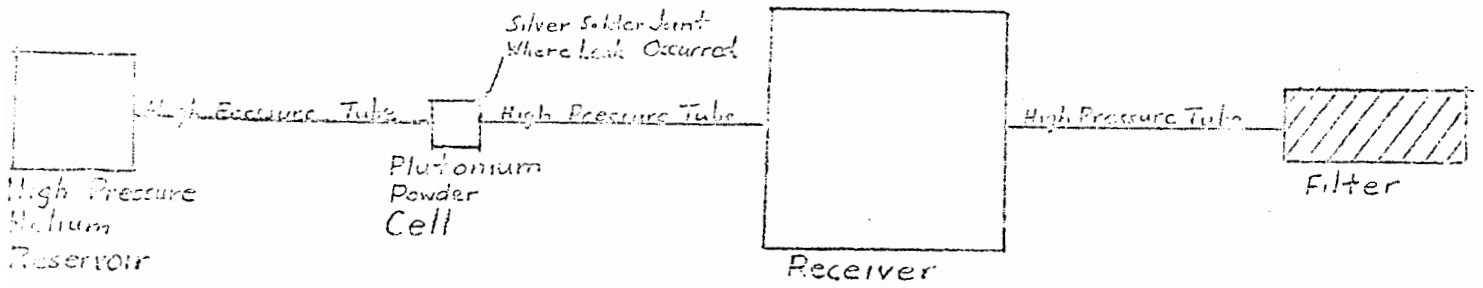
FROM : Safety Office, LASL

SUBJECT: PLUTONIUM SPILL AT TA-33 ON APRIL 13, 1960

SYMBOL : H-3

A spill of plutonium powder occurred in Building HP-21 at TA-33 on April 13, 1960 during an experiment. The building where the spill occurred was designed for "hot" operations. The building consists of three rooms; a hot lab, a change room with shower and washroom facilities and a cold lab for instrumentation and control purposes. These three rooms are directly connected by doorways with the change room in the middle. The building is equipped with a ventilation system which is intended to provide a pressure differential between the hot side and cold side.

The spill occurred as a result of the failure of an experimental device used to inject plutonium powder into a receiver. A sketch of the experimental device is shown below:



To operate the system, a valve between the He reservoir and the Pu powder is opened by hand. The He gas is then rapidly released from the reservoir. As the He flows through the Pu powder cell, the Pu powder is ejected and carried by the gas flow into the receiver. A needle valve, located between the receiver and filter is slowly opened by hand, allowing the gas to exhaust from the system. The Pu is retained by the filter and may be recovered.

The He reservoir, Pu powder cell, and receiver had been tested with pressures of 10,000 psi, 7000 psi and 750 psi, respectively. The pressure of the system after the gas has stabilized is approximately 170 psi. The joint which failed was a silver soldered joint on the exhaust side of the Pu powder cell. This joint had not been pressure tested but the system had been operated three times, using inert powders, without showing signs of leakage.

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For the operation in which the spill occurred, the powder cell was loaded with 1.5 gm. of Pu 239 oxide, of about 1 micron particle size.

At the time of the experiment there were six people in the cold room. Three constituted a monitoring team and were dressed in protective clothing. About a minute or two after the first valve was opened the monitoring team left the cold room and two of them entered the hot room to check the device for leaks. On opening the door to the hot room a high count was evident. The pressure gauge on the receiver read zero, indicating that a leak had occurred. They immediately closed the door, returned to the cold room and had the other people leave.

All of the monitoring meters were contaminated so the Rad-Safe Group was called for assistance and uncontaminated meters.

Subsequent examination of the experimental system showed that all high pressure fittings were tight. Disassemblation of the high pressure tubing on the exhaust side of the Pu powder cell indicated that a leak had occurred in this silver soldered joint.

It is estimated that 300 mg. of plutonium powder was released into the room and will probably take about three weeks for decontamination of the building and equipment. Two of the personnel who entered the room received no plutonium in the body and the other received a trace amount. Estimated decontamination costs are $2500.

Future experiments of this nature should be done incorporating the following recommendations:

1. All joints should be threaded high pressure fittings or welded joints.

2. The entire system should also be placed within a container which can be sealed before the system is operated.

3. A remote indicating alpha meter should be installed so that it could be read without entering the hot lab.

4. Over-pressure pre-testing of the entire assembled system should be done before plutonium is placed in the system. The over-pressure should be about 50%.

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