

SL-1, IDAHO

JUST THE FACTS

Four incidents at nuclear power reactors dominate society's perception of the technology: SL-1 in Idaho (1961), Three Mile Island in Pennsylvania (1979), Chernobyl in Ukraine (1986) and Fukushima in Japan (2011). Few events in human history have generated such disproportionate reactions.

What happened?

On Jan. 3, 1961, after an 11-day maintenance shutdown over the Christmas holiday, employees were preparing to restart the reactor. Control rods, which absorb neutrons to regulate the fission reactions, needed to be reconnected to the drive equipment used to raise and lower them for operation. Workers were required to lift control rods to reconnect them.

One of the workers lifted the rod too far out of the reactor's core, prompting SL-1 to rapidly surpass full power operation, resulting in a nearly instantaneous sequence: a fission chain reaction that generated enormous amounts of heat and a steam explosion that thrust steam, water and metal at the three men working to prepare

the reactor for restart. All three men died, two instantly and one two hours after the steam explosion.

Investigators determined an operator was trying to reconnect the control rod, which had a history of sticking, to its drive mechanism. The rod was pulled 66.7 centimeters (more than 2 feet) out of the reactor, more than six times the 10-centimeter (4-inch) allowed maximum.

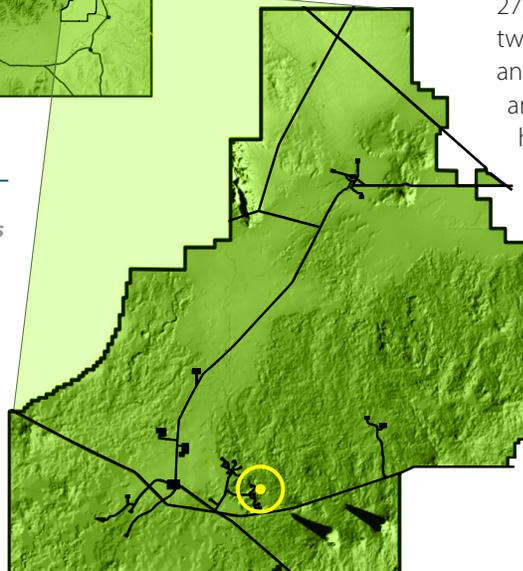
The reactor's confinement building remained intact. Because the steam explosion stopped the fission

process, the core did not continue to release fission products directly to the environment for a prolonged amount of time (as happened at Chernobyl).

How many people died?

All three men working at the reactor that evening died.

- **Navy Seabee Richard C. Legg**, 26, was impaled against the ceiling by a metal shield plug
- **Army Specialist John A. Byrnes**, 22, who improperly pulled the control rod, was slammed against a concrete wall, his ribs piercing his heart
- **Army Specialist Richard Leroy McKinley**, 27, was knocked unconscious and lived two hours, dying from head wounds in an ambulance waiting for a doctor to arrive from Idaho Falls to determine how best to care for him.



The Stationary Low-Power Plant Number 1 (SL-1) was a 3-megawatt experimental reactor designed for the U.S. Army to use in remote locations. The prototype was located at the National Reactor Testing Station, now known as Idaho National Laboratory, in the desert some 40 miles west of Idaho Falls, Idaho.

The SL-1 accident is considered the only fatal nuclear reactor accident in the United States. While there have been what are considered industrial fatalities at other generating stations, these are the only U.S. fatalities caused by the process of making nuclear energy.

How many were exposed to radiation?

Officials determined that 790 people were exposed to radiation. All were involved in the attempted rescue and recovery of the three men's highly radioactive bodies and the subsequent cleanup of the accident or burying of debris.

First responders initially thought nothing was wrong because the reactor building's exterior looked normal, and there had been two false alarms tripped earlier in the day. However, upon entering the building their radiation detectors immediately indicated high radiation levels. The rescuers rotated trips inside at 65-second intervals to reduce risks to their own safety.

Other Impacts

None. The facility was purposefully located in a remote part of the Idaho desert, limiting public exposure. The immediate plume of radiation quickly dissipated and no harmful amounts reached nearby communities.

Status Today

The initial cleanup took 18 months and consisted primarily of burying irradiated and contaminated materials nearby and adding additional cover and vegetation where needed. Most of the debris was buried 8 to 14 feet deep and covered with an additional two feet of clean backfill. The Environmental Protection Agency conducted inspections — with emphasis in 2000 and again in 2003 — to ensure the area is safe. Today the site is nearly indistinguishable from the surrounding desert.

Other Facts

SL-1 was an experimental type of boiling water reactor that began producing electricity in 1958. Its primary purpose was to conduct research for the U.S. Army's efforts to develop small reactors for the Arctic and the northern-most radar stations scanning for Soviet missiles fired at the U.S.

The bodies of the victims were highly radioactive and buried in lead-lined caskets.

Key Lesson

The Atomic Energy Commission, which owned the National Reactor Testing Station (NRTS), immediately surveyed the nation's 47 licensed reactors to assure shutdown procedures and operating parameters fell within safe specifications.

What's more, the design of nuclear reactors evolved to strongly emphasize safety. For example, the SL-1 design, which allowed the reactor to operate with the removal of only one control rod, is not allowed in modern reactors.

Pop Culture

In later years, the SL-1 accident has been featured in numerous magazine articles, and gotten a central role in various books and some short films. Much of the attention focuses on an unproven-but-persistent theory that two members of the three-man crew had previously squabbled and that one was having an affair with the other's wife, leading to speculation it was a murder-suicide.

/// The SL-1 accident was a big watershed point... It turned into a totally new way of doing business with reactors... Procedural documents that originally had been two pages long were expanded into thick books, and all activity became rigidly prescribed. ///

— Joe Henschel, an NRTS critical facility supervisor

Societal Reactions

Idaho newspapers followed the story for about two weeks before articles trailed off. Editorial comments characterized the SL-1 accident as a regrettable mishap, an inevitable occurrence if society were to accrue the benefits of a new technology.

Sources

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