Soviet Radwaste Spill Confirmed

An investigation by two scientists at the Los Alamos National Laboratory has concluded that a large area near the city of Kyshtym in the Soviet Union was contaminated with radioactive wastes in the 1950's because of incredibly sloppy practices at a nuclear weapons plant. According to the study, which is based largely on classified information, "death squads" of prisoners were sent into the region in the 1960's to clean up the mess; many died from radiation sickness.

The study, conducted by chemist Diane M. Soran and physicist Danny B. Stillman, was prompted by a series of articles and a book by dissident Soviet geneticist Zhores Medvedev claiming that a region of the southeastern Ural Mountains was contaminated in 1958 by a nuclear explosion in a radioactive waste dump. Medvedev's claims touched off a heated debate, and many analysts scoffed at the idea that such a major area of radioactive contamination could have gone unnoticed in the West for so long. The new Los Alamos study concedes that a contaminated region does exist, but it challenges Medvedev's explanation of how the damage occurred. "Soviet carelessness coupled with general disregard for the citizenry and the environment are the prime causative factors, not a nuclear waste accident," the report concludes. Ironically, scientists from Los Alamos, including Stillman, published an article in 1979 disputing Medvedev's claim that the region had been badly contaminated; a look through classified data since then seems to have convinced them that Medvedev was at least partially correct (see *Science*, 26 October 1979, p. 423).

The Los Alamos study argues that rivers and lakes in the Kyshtym area were contaminated in the late 1940's and early 1950's by radionuclides from military plutonium production reactors. Modeled on the U.S. reactors at Hanford, Washington, they operated on an open cooling cycle, pumping radioactive cooling water into a holding pond which in turn emptied into the Techa River. "Additional information" (that is, classified data) indicates that the holding pond had become "dangerously radioactive" by 1953 and that it was seriously polluting the region's waterways with radioactivity, says the report.

In addition, the area around the military complex was devastated by acid rain from a plutonium separation plant, the Los Alamos scientists argue. "Information indicates that once this plant was operational, smoke was exhausted from the stack 24 hours a day for months and then years in a row," says the report. It describes the smoke as yellowish and says that "For a distance of 15–20 km from the stack, the grasses and trees yellowed and died." Moreover, Soran and Stillman note that if, in the rush to produce atomic bombs, the Soviets failed to permit irradiated fuel elements to cool off for 6 months, the stack gases would have contained substantial quantities of radioactive iodine.

The Los Alamos study speculates that this gradual environmental contamination was compounded in the late 1950's by a catastrophic release of radioactivity from yet another source. Soran and Stillman suggest that high-level radioactive wastes from the reprocessing plant were initially discharged into an open pond, which was allowed to evaporate, leaving a layer of intensely radioactive crud attached to fine, red clay particles. This material, they believe, may have been whipped up by high winds and scattered widely around the surrounding area, or it may have been dispersed by a series of powerful chemical explosions.

Dispersal by wind is plausible, the Los Alamos scientists suggest, because gusts in the Kyshtym region frequently reach 100 kilometers per hour in the spring. But dispersal as a result of a chemical explosion is equally plausible. They note the Soviets may have used a plutonium separation process that employed ammonium nitrate and hexone—such a process was examined during the Manhattan Project but never used in the United States—and that these compounds may have ended up in the waste pond. Together, they form a highly explosive mixture, and when the water evaporated the conditions would have been ripe for a devastating blast to occur. "If such an explosion did occur," says the report, "aerosol contamination could be spread over a vast area."

Medvedev speculated that the region was contaminated as a result of a nuclear explosion, caused by plutonium in waste material which reached critical mass. The Los Alamos report does not examine this thesis in detail, but suggests instead that a chemical explosion is a more likely explanation.

In any case, Soviet authorities took steps in the early 1960's to prevent further airborne release of radionuclides from the dry lake bed by covering the material with soil. "Information indicates that they used volunteer prisoners to dump truckloads of sand on top of the contaminated soil," says the report. When the dump trucks became too contaminated, they were simply abandoned and covered with soil. "The truck drivers were referred to as 'death people' or 'death squad.' They were prisoners with 10- to 15-year sentences whose time in prison would be reduced through their volunteering for this duty. They lived in special barracks, and it was thought that they would probably die there."

Medvedev has noted in his writings that the area around Kyshtym is devoid of people, and that houses and farms have been abandoned and burned. This has been corroborated by Lev Tumerman, a Soviet scientist who emigrated to Israel in 1972. In 1960, Tumerman drove along a highway that crosses the contaminated area, and he told Soran and Stillman that he saw "a large area . . . in which any normal activity was forbidden, people were evacuated and villages razed, evidently to prevent inhabitants from returning, there was no agriculture, or livestock raising, fishing and hunting were forbidden."

The Los Alamos study suggests that this was the result of forced evacuation of the local population in the 1950's, when the waterways became contaminated with radioactivity from the reactor cooling water. The region was sparsely populated by poverty-stricken people known as Bashkirs, whose chief livelihood was farming and fishing. They were moved out, the report claims, and their houses were burned.

The study is perhaps the most convincing explanation so far of what happened near Kyshtym. But, because it relies so heavily on classified information which cannot be evaluated independently, it is unlikely to put an end to the debate. Medvedev, for one, has said that he is skeptical of some of its conclusions.—COLIN NORMAN

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