NUCLEAR PHYSICS

Spotting Soviet A-Bomb

Discovery of the Russian atom bomb burst may have come from cosmic ray studies by American scientists. Bomb fission fragments in the atmosphere would be a give-away.

President Truman announced on Sept. 23: "We have evidence that within recent weeks an atomic explosion occurred in the U.S.S.R.

"Ever since atomic energy was first released by man, the eventual development of this new force by other nations was to be expected. This probability has always been taken into account by us."

There was no official explanation of how the explosion was detected.

➤ CLINCHING proof of Russia's atomic bomb activities could have come from cosmic ray studies by American scientists who have been keeping a careful watch this summer on all radioactivity in the upper atmosphere.

Their studies would show, as no spy could, whether the Soviets were trying to start a false "scare" rumor.

The existence of bomb fission fragments in the atmosphere could not be faked. Such fission fragments would be viciously "hot" strange atoms, radiating furiously, and of a kind never found in nature outside of a bomb or atomic pile. And these fragments could have been detected by cosmic ray scientists.

Here is how it might have been done:

The first indication to a cosmic ray scientist of an atomic explosion in Siberia would be an apparent increase in the number of cosmic ray particles coming in from outer space. In California or Oregon, the increased cosmic ray intensity would be noticed on instruments for a day or two before it subsided. At just about that time the increase would first be noticed in the Midwest, in the balloon flights by the Minnesota observers at Fort Ripley, Minn., or in observations by the Chicago group.

Jump in Cosmic Rays

In Climax, Colo., on the mountain-top observatory where both cosmic ray intensity and sunspot activity are continuously studied, the scientists would simultaneously note the jump in cosmic rays—and without the usual sunspot configuration. Their suspicions might be aroused.

Then, three or four days after hitting the California coast, cosmic ray instruments at Columbia, Princeton and Harvard would kick up all together, and just a little too much for the scientists to believe that it was the usual course of events.

Suspicions aroused, the check-up would begin. The scientists would soon realize that it was not a cosmic ray burst, which would have hit all the stations simultaneously, and with an accompanying solar flare or sunspot. They would guess that there must be an airborne radioactive contaminant, highly dispersed, that was blowing along with the western prevailing winds clear across the continent.

The routine reports that would at this point arrive from the Peruvian cosmic ray observatory at Huancayo, high in the Andes, would show no cosmic ray increase on or about the dates of the rise in California.

Christchurch, New Zealand, would fail to report any change in their readings. A radio query to the Danish cosmic ray observatory in Godhavn, Greenland, would bring the report of an insignificant wriggle in the record, but which was over a week after the marked increase had been found in California.

Scientists would now be sure there must be a radioactive contaminant in the air, but which was confined to the northern hemisphere of the globe, and which was slowly blowing along in the steady western flow of the atmosphere.

All doubts would disappear when the balloon flight photographic plates showed an enormous increase in the number of low-energy alpha particles—particles thrown out in profusion from the sizzling fission products of uranium, but which are much rarer in cosmic radiation. The first reports of this might have come from the Minnesota group. Immediate confirmation of the Minnesota reports would come from the University of Rochester team, followed quickly by the University of Denver group.

Cosmic rays could not be the cause, that would be definite. Still to be excluded would be the bare possibility of natural radioactive dust blown from some desert perhaps. The Colorado plateau sands are the United State's major source of uranium.

Was it a Russian atomic explosion in Siberia, or was it a natural freak of the winds? Pollen and dust samples, filtered from the air by high-flying airplanes on the dates of the "cosmic ray bursts" would be dug up out of the files. Chemical tests, radiation "sniffers," Geiger counters, spectrographic tests, and mass spectrograms would be run. Strange products, found in such proportions only in bomb products, such as yttrium, neodymium, strontium and krypton might be discovered instead of the usual earth elements of calcium, silicon and iron. There could be no doubt now. The test results could mean only that an unreported atomic explosion had occurred somewhere in the world.

Whether it was a uranium or plutonium bomb would be found from the proportions of the different elements found in the air.

What could not be known—not unless the Russians tell us—is whether it was a real "bomb" or a fizzled experiment in nuclear energy which blew up a laboratory releasing the radioactive fragments to blow around the world.

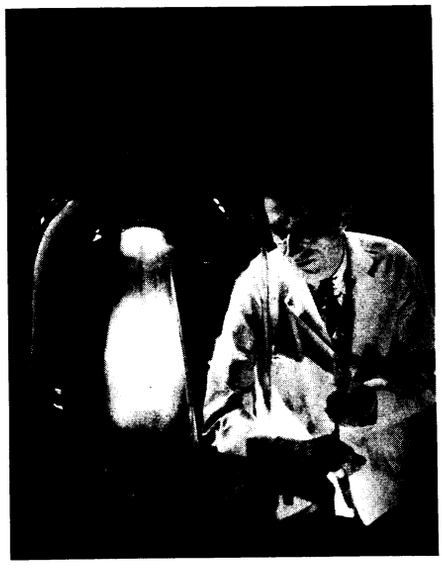
Instrument Detection

There are two possibile instrumental methods of detecting atomic explosions, additional to the radioactive clouds of debris considered the most likely way.

Earthquake-like waves are started by any large explosion, but natural seismic disturbances are immensely greater than an atomic explosion. The first atomic bomb at Alamagordo in 1945 was detected on seismographs nearby but not on instruments more than 300 miles away. Three world-shaking earthquakes whose origins were near Russia were recorded in July but scientists are sure that they had nothing to do with the Soviet explosion. These were: July 4 in the Persian Gulf region, July 10 in eastern Turkistan, July 23 near west coast of Turkey.

A pressure-wave in the air is set up by a gigantic explosion and might be detected by a sensitive barograph. The great meteorite fall in Siberia in 1908 was detected on a microbarograph in England but this immense missile from outer space released more energy than a hundred atom bombs. (*See SNL,* Oct. 25, 1947; Nov. 22, 1947)

Science News Letter, October 1, 1949



***METAL-ETCHING METHOD—** Metal is placed in a partial vacuum containing argon gas, and then the gas is charged with 12,000 volts of electricity creating argon ions which bombard the metal's surface. Thus the physical features of metal can be examined under a microscope and its performance under certain conditions predicted. This is a development of the Ford Motor Co.*