PUBLIC HEALTH

# 300-Mile A-Bomb Bursts

**Atomic bomb tests high above the earth indicate the same physical principle that is predicted to operate in the laboratory can trap electrons in the earth's magnetic field.**

➤ THE EFFECTS of the three atomic bombs (fission type) exploded 300 miles above the South Atlantic in late August and early September were dwarfed by the hydrogen bombs exploded some 100 miles above the Pacific last July and August.

Only by direct blast action does it seem possible that any bomb explosions could stop an incoming missile. That radiation set up atomically could do this is discounted.

Although scientists are learning much about the earth's magnetic and electric fields by studying information from the Atlantic tests, they could have learned much more from the Pacific ones if there had been rockets and a satellite equipped to take the same kinds of measurements there.

As it is, using only the routine recordings made as part of the International Geophysical Year, scientists have spotted many effects caused by the charged particles released in the Pacific blasts.

A hydrogen bomb exploded high in the atmosphere has been described as affecting the earth's very high atmosphere and magnetic and electric fields as the sun would if it suddenly shone in the middle of the night. These effects included a blackout of radio communications, a visual aurora and pronounced changes in the earth's magnetic field.

The radio blackout was due to the sudden increase in the density of electrons in the upper atmosphere due to gamma radiation produced by the explosion. The magnetic changes resulted from charged particles propagated along the invisible lines of force of the earth's magnetic field.

These same effects were also found from the atomic blasts in the South Atlantic, but to a very much weaker degree. The atomic bursts were reported "low yield" ones by Deputy Defense Secretary Donald A. Quarles. This would be equivalent to about one to five kilotons (thousands of tons) of TNT. The hydrogen bomb blasts are rated in megatons, or millions of tons, and are therefore some 1,000 times stronger.

The records on which U. S. scientists base their studies are being forwarded to Russia under the International Geophysical Year program agreements.

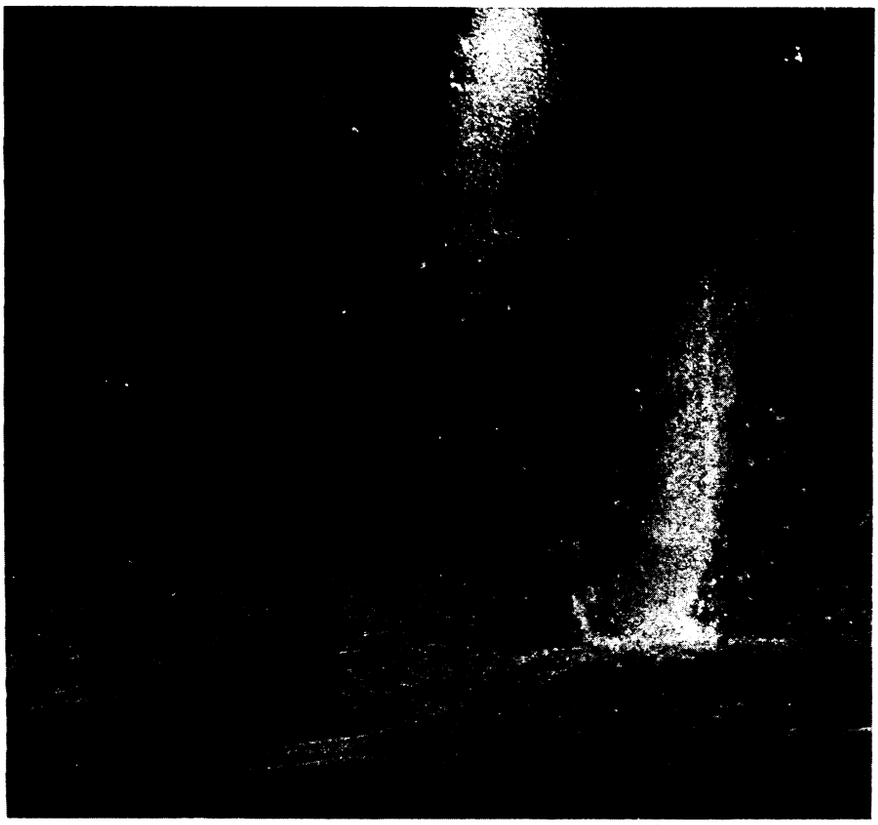
The Atlantic shots, it is suggested, may may have been carried out in a hurried and ill-planned manner, in order to make the tests before the U. S. suspended nuclear explosions last fall prior to the start of the Geneva talks with Russia and Great Britain on an agreement to ban future bomb tests.

The idea of the Atlantic shots resulted from research by Nicholas C. Christofilos physicist at the University of California's Radiation Laboratory, Livermore, Calif., while working on methods to tame the fusion reaction of hydrogen bombs for peaceful purposes, a program known as Project Sherwood. Last August, Mr. Christofilos reported to an American Physical Society meeting details of a proposed device to do this called "Astron."

Key to the Astron approach is a cylindrical sheet of high-energy electrons. This electron sheet, called the E-layer, would be responsible both for providing the magnetic confinement of the plasma, and for heating it to thermonuclear temperatures.

The Atlantic tests showed that the same kind of mirror effect predicted for the Astron model also works to trap electrons in the earth's magnetic field.

Science News Letter, March 28, 1959



*SEISMIC EXPLOSION—Ice thickness is measured along an antarctic traverse by using an explosion.*

GEOPHYSICS

## Antarctic Studies Yield New Findings

➤ UNITED STATES scientists covered more miles crossing the Antarctic continent and made more scientific observations during these traverses than all other nations combined.

Albert P. Crary, who recently returned from more than two years in Antarctica, said the concerted International Geophysical Year effort to study the unknown continent had already yielded much new information. He said that these studies included measurements of ice thickness and snow accumulations, and of temperature, winds and other meteorological information, some biological experiments, and charting of the gravitational and magnetic fields.

Among the findings was an ocean bottom depth beneath the Ross Ice Shelf of about 4,400 feet below sea level, at latitude 79 degrees, six minutes south and longitude 165 degrees, 30 minutes east.

Another discovery was the existence in the Horlick Mountains of sandstone-shale coal beds containing leaf fossils and petrified tree remains 12 feet long. The coal beds varied in thickness from a few inches to a few feet. The Horlick Mountains extend eastward from the southeast end of the Ross Ice Shelf for hundreds of miles.

The U. S. Antarctic expeditions covered nearly 8,000 miles, spanning Antarctica from the Weddell Sea to the Ross Ice Shelf and into the Victoria Land Plateau. Mr. Crary organized all of these traverses, and personally covered almost 3,100 miles of them.

Mr. Crary was on leave at the National Academy of Sciences' U. S.-IGY Antarctic program from the Air Force Cambridge Research Center. He has served as deputy chief scientist of the program since 1956.

Markers left at regular intervals over some parts of the routes taken during the traverses will help explorers in the future solve the knotty problem of whether the Antarctic glaciers are melting, growing or merely standing still, Mr. Crary said.

Science News Letter, March 28, 1959