MILITARY SCIENCE

# Another Chinese Bomb?

**The explosion of a hydrogen bomb in the near future would mark a significant shortening in the time gap between fission and fusion device explosions—By Ann Ewing**

➤ IF THE CHINESE Communists blow up a hydrogen bomb in their next nuclear test, they will have set a record of the shortest time between detonation of an atomic device and explosion of a fusion device of any nation to date.

The U.S. has announced that it believes Communist China is preparing for "another nuclear test." Its first atomic blast was last Oct. 16, a shot predicted in advance in order to reduce psychological fallout.

The reportedly imminent second test may not be a thermonuclear device. Experts hope that it is not, because such progress in so short a time would mean that the hydrogen bomb could soon be available to many other countries.

The jump from atomic to hydrogen bombs has taken other nations years, and experts have predicted it would take Red China at least two years, possibly five.

However, technically it is no longer a big step from fission to fusion devices, even though it was once when the U.S. exploded its first in 1952, seven years after the first atomic bomb devastated Hiroshima in 1945. The Russians needed only four years, from 1949 to 1953, to join the club of those detonating the most devastating weapon known.

Great Britain became a member in 1957, and France is now preparing for a thermonuclear explosion in the Pacific later this year.

It is believed that the following nations now have the capability of producing the atomic bomb: Canada, India, Israel, Italy, Japan, Sweden, the United Arab Republic and West Germany.

Once a country has developed a fission device, using this as a trigger for setting off a fusion blast is relatively straightforward.

Neither the U.S. Atomic Energy Commission nor the Russians have ever released an official statement about how a thermonuclear bomb works.

It is known, however, that a fission bomb is needed to start the fusion reactions of lightweight elements, creating in effect a miniature "star" on earth. The most probable compounds are lithium deuteride or lithium tritide.

The thermonuclear bomb is reported to go off in three steps, each of which happens in a fleeting part of a second.

First, an atomic device is set off to generate the sun-like heat required for fusion reactions.

The fission of atoms in this atomic device also releases neutrons that interact with the lightweight element lithium to produce tritium, triple-weight hydrogen.

Then deuterium and tritium, the main elements of a hydrogen bomb, fuse together to form helium, releasing great quantities of energy and also more neutrons having very high speeds.

The last step is for these neutrons to cause a casing of uranium 238 to fission.

Many experts agreed that the most impressive fact about the detonation of the first Chinese Communist atomic device last October was that it used uranium 235, produced in a gaseous diffusion plant. A country that has built such a plant has great flexibility in nuclear technology, since it can produce uranium 235 of very high concentration.

The enriched uranium can then be used in reactors to produce tritium from lithium. Thus the Communist Chinese can use their large natural supply of lithium to make tritium as needed.

As far as is known, there are only about six gaseous diffusion plants in operation in the world. They are far more difficult to build than the atomic reactors that produce plutonium 239, the only other fissionable atomic bomb material. The bomb dropped on Nagasaki was fashioned of plutonium.

Huge quantities of electrical power are needed to operate gaseous diffusion plants.

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General Dynamics/Aeronautics

*RADIATION SHIELD—A scientist at General Dynamics Corporation, San Deigo, Calif., readies samples of the Centaur rocket's aft radiation shield for a heat test. He is securing samples of the shield material, wrapped in different kinds of tape to be tested against heat, on the suspended metal bar.*

GENERAL SCIENCE

## Scientific Revolution Brews in Red China

➤ A SCIENTIFIC REVOLUTION is underway in Communist China.

There is a tremendous enthusiasm on Mainland China for science and innovation, C.H.G. Oldham, a geophysicist who spent a month visiting Chinese universities and research institutes, found.

He was impressed "not so much by what has already been achieved—China is still a poor country—as by the solid educational foundation she is laying for future development."

Mr. Oldham reported his impressions of the scientific revolution in Science 147:706, 1965.

He concluded that as significant as the growth of genuine science may be, even more significant are the efforts being made to bring science to the Chinese people.

"Everywhere I went," he said, "I was told about the importance of combining theory with experiment" both by scientists and non-scientists.

Although such a combination seems natural to a person of Western tradition, it is a new thought for the majority of people in the less developed parts of the world who make decisions on the basis of superstitions, faith and intuitions.

Mr. Oldham believes that accepting the concept of combining theory with experiment is the basis of the Chinese scientific revolution.

Students trained in universities in Mainland China can fit satisfactorily into courses leading to advanced degrees at a university with British standards, he concluded.

Mr. Oldham is now living at 27 Lugard Road, The Peak, Hong Kong.

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TECHNOLOGY

## Reactor to Be Wrecked In Test for Safety

➤ SCIENTISTS are already making plans to destroy a nuclear reactor, although they have not finished building it yet. The scientists will break the water-cooling-system pipeline—the most hazardous accident possible in the reactor—to prove that reactors for electric power generation are safe to operate near heavily populated areas.

The water-cooled nuclear reactor will be part of a new $17.6 million test center being built at the National Reactor Testing Station near Idaho Falls, Idaho. The new facility, called LOFT (loss of fluid test), will be operated by Phillips Petroleum Company, Bartlesville, Okla., for the Atomic Energy Commission.

The test, which is expected to quell the fears of persons living near proposed nuclear power plants, may also lead to safety engineering improvements and cost reductions in design and location of nuclear power plants.

The reactor, which was described in Chemical Week, 96-47, 1965, is expected to be completed sometime next year.

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