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X-Ray Missile to Be Key In Defense Against China

By JOHN W. FINNEY
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WASHINGTON, Nov. 15—The Atomic Energy Commission was reported today to be making significant progress in developing a radically new nuclear X-ray warhead that would be a vital element in the Sentinel ballistic missile defense system being erected against Communist China.

In contrast to past warheads, which were designed to destroy by blast and heat effects, the new type of thermonuclear weapon will give off bursts of X-rays to destroy incoming missile warheads.

In heavily censored testimony, published last May 10, before a Senate Disarmament subcommittee, Dr. John S. Foster Jr., the Pentagon's director of defense research and engineering, confirmed that the United States was developing a missile defense system that would use tremendous bursts of X-rays from thermonuclear explosions to destroy incoming missile warheads.

In atomic energy circles, the still secret warhead has been dubbed the Spectrum bomb — a name signifying that it will give off a complete spectrum of X-rays, from low to high energy.

Likened to Earlier Gain

The development of the warhead is regarded by atomic weapons experts as an advance in weaponry, comparable significance to the development a decade ago of a high-yield, low-weight warhead for an intercontinental missile.

Just as the earlier development made possible an intercontinental missile system, so the Spectrum opens up the possibility of developing an "area defense" against at least a small-scale missile attack.

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and Atomic Energy Commission left the impression that the warhead for the system would be based on weapons technology developed before the limited test ban treaty of 1963 prevented further testing in the atmosphere.

What has been kept secret by the Administration is that this step required the development of an entirely new type of atomic weapon and that development of the Spectrum bomb began in 1964 and has been pursued in intensive underground testing at the Nevada test site.

The Spectrum war head, with its explosive yield of about one megaton (equal to a million tons of TNT) will be carried by the Spartan missile a three-stage missile capable of intercepting incoming missile warheads above the earth's atmosphere. The Sentinel system that the Spectrum will serve has been ordered deployed by the Administration against the emerging missile threat from Communist China.

Against a limited attack such as Communist China would be capable of launching, the X-ray concept, in the opinion of the Defense Department, offers promise of providing an effective defense for all of the United States. But against a sophisticated, heavy attack such as the Soviet Union would be capable of launching, the Defense Department believes that a missible defense system would be ineffective. For that reason, the department has decided to deploy a "thin" antiballistic missile system aimed at Communist China. It refuses to deploy a much more costly "heavy" system against the Soviet Union.

The Spectrum's development has gone through a long, sometimes halting evolution in the Atomic Energy Commission's weapons laboratories. The theoretical concept of using X-rays in a missile defense system was advanced about a decade ago. It was not until the last few years, however, that atomic weapons scientists saw a way of designing a warhead designed to produce X-rays.

Rays of High Energy

The underlying principle of the spectrum bomb is that in the vacuum of space a thermonuclear exposition gives off most of its energy in the form of highly energetic X-rays that can travel hundreds of miles with the speed of light (about 186 000 miles a second). If these X-rays impinge on an object, such as a warhead, their energy is transformed into heat [illegible] destroys the object.

The problem confronting the weapons scientists, however, was to develop a warhead that would give off a whole spectrum of X-rays—from the low-energy ones that tend to be stopped by the outer casing of the warhead to the high-energy ones that can penetrate inside the warhead and upset its internal fusing mechanism. It is this critical technical problem that weapons scientists of the Atomic Energy Commission believe, on the basis of their underground tests with preliminary versions of the "spectrum" warhead, they have solved.

So long as the defensive warhead gave off only one type of X-ray, the designer of the offensive missile warhead had a relatively simple problem. He would just have to encase his warhead with some shielding material to stop and absorb the energy of that type of X-ray.

But the problem for the offensive missile is greatly complicated if the warhead must contend with a whole range of X-rays. Protection then calls for various types of shielding, requiring the weapons designer, because of the extra weight, to reduce the amount of explosive power he can pack into the warhead.

In secret testimony today before a Joint Congressional Atomic Energy subcommittee, representatives of the Los Alamos Scientific Laboratory in New Mexico, the Lawrence Radiation Laboratory in California and the Dandia Corporation — the A.E.C.'s three principal weapons laboratories — reviewed the progress being made in developmentof the specturum bomb.

This development according to weapons scientists, has been impeded somewhat by the test ban treaty, which has restricted all developmental shots to underground caverns and wells.

The underground testing has created difficulties in determining the explosions' output of

X-rays. It also has limited the size of the permitable explosions.

So far, a full-scale version of the spectrum bomb has not been tested. By digging deeper holes, however, atomic weapons scientists believe they can eventually test the planned Megaton version without releasing any radioactive debris, and thus violating the test ban treaty.

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Despite the treaty restrictions, the weapons scientists of the A.E.C. were said to have expressed confidence before the Congressional subcommittee that they could perfect the spectrum to deploy in the sentiel system on time, some five years hence. According to Administration officials, there is no pressure now from the weapons laboratories to violate the treaty by conducting at least one "proof test" in the atmosphere.

Some weapons experts and members of the congressional committee, however, are concerned that the Soviet Union, in intensive high-altitude testing before the treaty sent into effect, might have gained a technoligcal lead over the United States in developing the X-ray concept. Some experts speculate that such a technological advantage may help explain why the Soviet Union is committing billions of rubles to deploy a ballistic missile defense system against the United States.

According to officials involved in the Sentinel project, there is now conclusive answer to this question. But even if the Soviet Union has a technological advantage in use of X-rays, Pentagon officials remain confident that any Soviet defense system can be overwhelmed by American missiles.

In the case of Communist China, however, Pentagon officials argue that the X-ray concept gives the United States a technological advantage that makes an effective defense feasible. It is acknowledged that China is likely to turn to certain countermeasures, such as shielding its warheads against X-rays. But neither in terms of sophistication of technology nor numbers of missiles is Communist China believed capable of contending with a United States defense system at least into the 1980's.

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