PUBLIC SAFETY

New Dangers of H-Bomb

Victims of H-blast may face different but just as lethal radioactive products as persons near an A-bomb explosion. AEC warns about fall-out of fission products.

➤ DIFFERENT BUT just as dangerous fusion products may endanger H-bomb victims who escape the fission products of the old-fashioned A-bomb explosion.

Speculation about whether hydrogen bombs have fall-out of less dangerous radioactive dust than uranium or plutonium bombs is whetted by a special report of the Atomic Energy Commission on the Effects of High-Yield Nuclear Explosions.

Fission products are atoms of chemical elements newly formed, during the explosion, out of the fragments of uranium and plutonium atoms. Atoms of uranium and plutonium are among the heaviest that exist. Atoms of fission products are in the middle range of atomic weight among the chemical elements.

The fusion reaction, which makes the H-bomb possible, occurs in a different way. It explodes by releasing as energy excess mass that comes from combination of the lightest elements.

Hydrogen, which occurs in three weights, is the lightest of all the elements. But nuclear fusion reactions are known to be possible among several other elements that are slightly heavier. Besides hydrogen, these are helium, lithium and beryllium.

Beryllium is the villain element in this quartet. It is one of the poisonous elements, a group made up of arsenic, osmium, and a few others, including, as it happens, uranium and plutonium. These are chemical poisons, acting on the kidneys and throwing the body's waste-disposal system out of gear.

Deadly Bonus

This poisonous property is common to all forms of the elements mentioned. It has nothing to do with any fissionable or fusionable properties of any of their isotopes. Nuclear explosions are just a deadly bonus that can be achieved with a few of them.

But if beryllium is formed by fusion combinations among the light elements, its presence in fall-out dust from H-bomb explosions will be potentially dangerous to people in the contaminated area. If such beryllium should form in quantity and occur as a strongly radioactive isotope of medium long life, it might be as deadly as certain of the dangerous fission products.

Two fission products of uranium and plutonium are stressed in the Atomic Energy Commission's recent report. These are the radioactive forms of the elements iodine and strontium. They are not as violent poisons as beryllium and arsenic, but both are elements which the body takes up and stores for long periods of time.

Iodine is taken up particularly by the thyroid gland. Strontium is a near chemical relative of calcium. It can replace that common element in the bones. Both of these elements in their radioactive forms give off a high level of radiation.

Such radiation is given off by elements which are disintegrating radioactively. They always tend to destroy tissues, although some do this at a rate that is slow compared to the body's ability to repair itself.

The curative power of such rays in the case of cancer comes only from their power to kill cancer cells, thus helping the body fight the cancer and try to repair the damage it has done.

Disintegrate Quickly

Elements which have a high level of radioactivity are disintegrating fast. Some accomplish this so fast that all their radiations are given off within hours, minutes, or even fractions of a second after the triggering reaction that brought them into being.

Although these may be very "hot" during their lifetimes, they are not feared as much as those of medium length of life.

At the other extreme, radioactive isotopes with very long lives are apt to be mild in their effects on living matter. Carbon 14, for example, which requires nearly 6,000 years to lose half its radioactivity, is considered one of the less dangerous of the radioactive elements.

The fact that it is constantly present in living plants and animals has recently been utilized to date ancient materials which contain carbon.

The rate at which the radiation from the carbon in the material is given off can be interpreted to tell the date that carbon exchange in life processes ceased.

Damaging radiations which take many years to decay to a safe level may shorten human life. Radiations which stay at a dangerous level for the length of a generation or two may so damage the germ cells by which life is continued from parent to child that the existence of our species may be endangered.

The path of radioactive decay is always from heavier to lighter isotopes. The fission process hastens this decay by splitting the heaviest elements, which are the only ones subject to this process, into elements of medium weight.

Radioiodine and radiostrontium are products of the fission process. They come from uranium and plutonium. They are too heavy, so far as we can tell at the present time, to be products of the opposite fusion process which builds up the lightest elements into others nearly as light.

Since the dreaded fission products come from A-bomb material which is present, we are led to believe, in only small amounts in H-bombs, if at all, it might be argued that the fall-out problem is less serious with H-bombs, except for their greater size.

The fact is known that trouble from A-bomb fall-out is less when the bomb is dropped from a plane and exploded high in the air than when a comparable bomb is hung on a tower.

In that case bits of the vaporized tower mix with the dust of the desert which the explosion kicks up. Newly formed fission products settle on these relatively large grains of dust and are carried to earth by gravity. They arrive much sooner than the wind-borne molecules of radioactive materials let loose in the upper air when the bomb is dropped with a device to explode it high.

But H-bombs, because they are so much bigger, will strew their products wider over the countryside. These products will presumably contain fewer atoms of fission products. If they contain, instead, beryllium as a fusion product to ride the dust particles instead of iodine and strontium, the situation is much the same.

Poisons will still be broadcast, taking potential toll of generations yet unborn.

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PALOMAR'S "HORSESHOE"—This plastic replica of the two principal bearings that support the 200-inch telescope on Mt. Palomar is shown by Howard N. Kaufman, research engineer for Westinghouse Electric Corporation, which developed the system. A film of oil, three-thousandths of an inch thick, reduces the friction to the point where the huge 500-ton telescope can be moved with a ½-horsepower motor that is only slightly larger than the motor in a washing machine.