strontium-90, he said, partly because the methods used to detect them are simpler.

The prevailing winds carrying the radioactive fallout at the time of the first test on Sept. 1 had a pattern heading eastward from the Lake Baikal region, then dipping southward into Manchuria. From there they headed northeastward toward the Japanese island of Hokkaido.

After heading toward the open ocean, the winds, picking up speed, went toward southern Kamchatka, then westward to the Aleutian island chain.

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PHYSICS

H-Bomb Research "Bottle"

➤ THE MASSACHUSETTS Institute of Technology has reported that a new kind of magnetic bottle will be built in its laboratories. Proposed by a graduate student, it may show how a major obstacle to the development of thermonuclear power plants can be removed.

Thermonuclear reactions, such as occur in the H-bomb, explain the tremendous energy of the sun and stars, but thus far have not been controllable on earth. Both in this country and abroad, magnetic containers of various shapes are being studied. But the better a container is, the harder it is to put the necessary fuel inside of it.

The desired reactions occur between isotopes of hydrogen at extremely high temperatures. Physicists call such a fuel a plasma. In a doctoral thesis written at MIT, Air Force Capt. R. C. Wingerson has proposed the use of a corkscrew-shaped magnetic field to overcome the difficulty and trap plasma in a magnetic container long enough for atomic nuclei to fuse and release energy.

Experimental apparatus embodying Capt. Wingerson's idea will be built by James S. Tulenko, another MIT graduate student, under the supervision of David J. Rose, professor of nuclear engineering. Prof. Rose believes Capt. Wingerson has found a solution to a problem with which nuclear engineers have grappled for the last decade.

One of the various types of bottles which they have studied consists of a long pipe, the walls of which are a magnetic field created by an electrical coil around it. The ends of this pipe are open but "mirror" magnetic fields are set up there to serve as stoppers. The Russian physicist, K. D. Sinel'nikov, proposed two years ago that an undulating field be used to fill and trap plasma in such a bottle. The Wingerson corkscrew effects should be more effective.

By making a magnetic field spiral like a drill, Capt. Wingerson's computations show, a beam of particles shot into the tube along its axis with a certain energy can be wound up or unwound. In other words, some of their longitudinal energy can be transformed into perpendicular energy. The mirrors then can be more effective, and more particles retained in the tube for sufficient time.

In effect, the device that will be built at MIT will be similar to a lobster trap. It should be easy for a particle to get into the thing, but difficult for it to escape because of the trap's geometrical configuration. The walls of this trap are to be complex magnetic fields created by an axial coil and mirrors, and the entrance will be determined by the corkscrew fields.

The experimental trap that Mr. Tulenko is designing will be eight feet long and will be used to hold electrons. The ionic charged particles needed for a thermonuclear reaction to occur are relatively heavy, and would necessitate a structure between 50 and 100 feet long. But Mr. Tulenko's device will be a scale model of a larger device.

Large-scale experimental machines of many types already have been built. MIT scientists have maintained, however, that the first step should be to acquire more fundamental knowledge of the nature of plasmas, their instabilities, and their behavior in magnetic fields.

Additional preliminary research inspired by Capt. Wingerson's discovery already is under way in the Atomic Energy Commission's Los Alamos Scientific Laboratory. It was described at an international conference on plasma physics and controlled nuclear fusion research in Salzburg, Austria.

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PUBLIC SAFETY

Local Fallout Worst

➤ IT IS LOCAL fallout that we should worry most about—rather than the worldwide variety circling the earth.

This is the belief of Dr. Willard F. Libby, professor of chemistry at the University of California, Los Angeles, a former member of the U. S. Atomic Energy Commission and 1960 Nobel Prize winner in Chemistry.

He divides fallout from nuclear explosions into three main types—local, tropospheric and stratospheric.

The intense local fallout comes down quickly and in heavy doses, generally over an area 200 to 300 miles downwind from the bomb-burst. As much as 80% of the total fallout may come down within the first few hours after an explosion.

In past nuclear tests, local fallout has been carefully controlled, but in a nuclear war it could represent the greatest danger to the civilian population. The danger can be largely countered by a nation-wide shelter program, Dr. Libby believes. Radioactive particles which are too fine to be caught in the local fallout start circulating around the earth on one of two levels depending on the power of the bomb and the height of its mushroom cloud.

As a rough rule, the fine particles from an atom bomb explosion are carried in the troposphere, the lower part of the atmosphere, in a fairly narrow earth-circling band of air, and come down inside a month.

Fine particles from the more powerful H-bomb explosions, with mushroom clouds pushing above 40,000 feet, are picked up by air masses of the stratosphere.

These particles circle the entire earth for about five years, losing most of their radioactivity, before coming down through gradual mixing with the lower tropospheric air.

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