PHYSICS

Foresee H-Power Soon

➤ A FULL-SCALE, power-producing plant harnessing the awesome fury of hydrogen bombs for peaceful purposes may be built within the next 10 or 20 years.

Only "ingenuity, hard work and a sprinkling of good luck" are needed to obtain controlled fusion power.

"Project Sherwood" is the name given to the U. S. program aimed at controlling thermonuclear reactions to produce power. The first detailed account of the program's successes and failures, a book-length report, is now available to the public as part of the U. S. participation in the Second United Nations International Conference on the Peaceful Uses of Atomic Energy.

The official fusion story has been likened to the famous Smyth Report of 1945, which outlined the development of the atomic bomb to the public for the first time. The controlled thermonuclear report is less technical because the methods are more difficult to describe without using mathematical equations.

Because of the enormity of the problems involved, progress in harnessing fusion reactions for power may be "slow and halting." There, however, is "no basic obstacle" yet uncovered to prevent attainment of the final goal, Dr. Amasa S. Bishop, who prepared the report for the Atomic Energy Commission, concludes.

Successful completion of the program, "one of the most important and challenging" ever undertaken, would yield a new and practical source of energy to meet man's energy needs for "as far into the future as he can see" since the deuterium fuel to be burned can be obtained in virtually unlimited supply from the world's oceans.

To control thermonuclear energy, the deuterium or deuterium-tritium fuel must be ionized and heated to a temperature of a hundred million degrees centrigrade or more and the resulting plasma confined at this temperature long enough to allow a substantial portion of the nuclei to fuse. The energy thus released must then be harnessed and converted to usable power.

Three basic methods, each with many variations, are being tested as ways of plasma confinement in the four main laboratories and other institutions conducting thermonuclear research. They are pinch-type, stellarator-type and magnetic mirror confinement. (See SNL, May 17, p. 307.)

Two other promising approaches are the molecular ion injection method and the Astron concept in which a circular sheath of high-energy electrons acts to confine and heat the plasma. (See SNL, Sept. 6, p. 151.)

In the seven years since Project Sherwood was initiated, plasma temperatures of a million degrees, more than 30 times higher than those reached previously, have been obtained.

One device, known as Scylla and built by the Los Alamos Scientific Laboratory, has yielded a rather intense burst of neutrons, the neutral particles found in atomic cores whose production is an important measure of fusion reactions. Although the exact origin of the neutrons has not been determined, there is as yet no disproof of their thermonuclear origin.

The scientific team at Los Alamos, under the direction of Dr. J. L. Tuck, is concentrating its efforts for the most part on the pinch approach, in which the plasma is pinched into a narrow stream away from the container walls due to its own magnetic field.

At Princeton University a staff of scientists and engineers, including some from industry, are building several models of a stellarator, the largest of which should achieve 100 million degree temperatures for experimental purposes. The stellarator approach, proposed by Dr. Lyman Spitzer Jr., director of Princeton University Observatory, consists of confining the plasma in an endless tube by means of an externally imposed axial magnetic field.

In the magnetic mirror approach, which is being tested along with others at the University of California's Radiation Laboratory in Berkeley and Livermore, plasma confinement is provided in a straight cylindrical tube by means of an externally imposed axial magnetic field with mirrors at the two ends.

In the molecular ion approach being investigated at Oak Ridge National Laboratory, deuterium ions are injected transversely into a static magnetic field and dissociated by a special carbon arc. This method of plasma ignition to very high temperatures, if successful, should also be useful for other approaches, such as the stellarator.

New York University, the Naval Research Laboratory and Massachusetts Institute of Technology are also investigating various aspects of controlled thermonuclear research. The over-all coordination and administration of the entire program is under the direction of Dr. A. E. Ruark of the Atomic Energy Commission.

At the Conference there has been talk of joint research efforts with other nations, especially Russia, now that the U. S. progress has been released from secrecy and displayed. Whether this will ever happen is for the future. It involves political policy which scientists do not decide.

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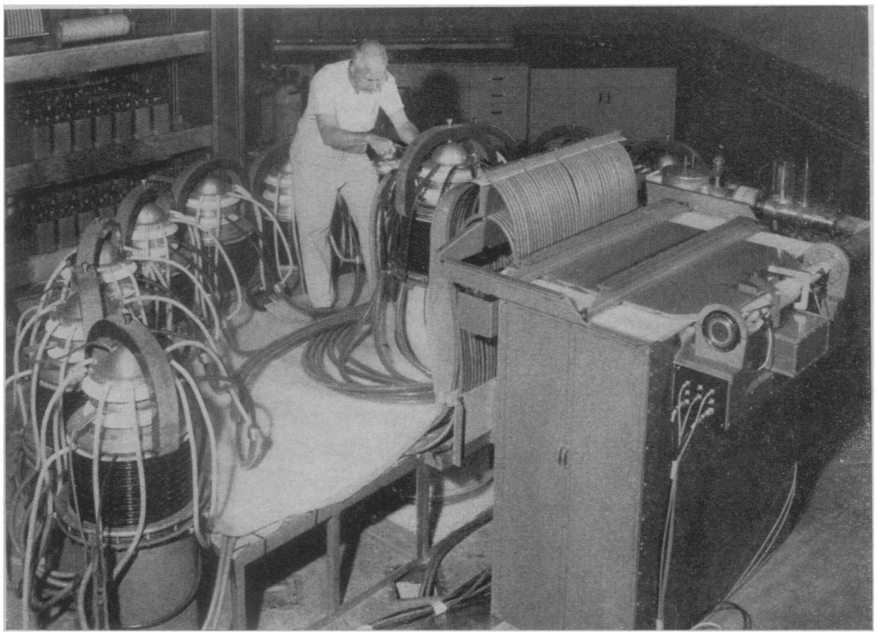

SCYLLA—Prof. William C. Elmore of Swarthmore College, a consultant to the Los Alamos Scientific Laboratory for the past year, makes final adjustments on the fusion device Scylla. The semicircular bank of capacitors is charged to 80 kilovolts and then discharged around the tube shown at the right of the photograph.

BACTERIOLOGY

New Bacterium Found, Resembles That of TB

➤ A TYPE of microorganism has been found, so closely resembling that of tuberculosis that it is mistaken for the real thing in treatment.

Called atypical mycobacterium, it was isolated from a group of children thought to be afflicted with scrofula, a tuberculosis of the lymph glands, and 25 adults being treated for tuberculosis of the lungs.

Drs. John Chapman and Ruth Guy, who isolated the bacterium at the Southwestern Medical School of the University of Texas, Dallas, said the microorganism resembles that of TB except it is more beaded, longer and fatter.

Other researchers have found other atypical mycobacteria during the past few years.

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