PHYSICS

Dig Ditches With Atoms

Peace-serving excavation with atomic explosions may never be conducted if present suspension of underground testing is maintained, Ann Ewing reports.

➤ DIGGING EARTH by atomic explosions is proving successful, but if President Kennedy's suspension of underground atomic testing on Jan. 26 is maintained, the method may not be used practically.

Future excavation experiments are described for the first time by the Atomic Energy Commission in its annual report to Congress.

The AEC says underground blasts can be used for canal construction, harbor excavation, recovery of minerals, oil or water, processing of chemicals and desalting water.

Detonations of useful, peace-serving atomic and hydrogen "bombs" are of two kinds—cratering, or earth-moving, and confined explosives.

There are 11 projects, collectively named Plowshare, for both types on the AEC underground explosion schedule, at the rate of about two per year for the next four years.

Two of the 11, Project Sedan for excavating and Project Gnome for containment, have already given scientists much valuable information.

Project Buggy, planned for this year, explodes a cluster of five nuclear explosives, each with a yield equivalent to about 10,000 tons of TNT, set off at the same time. Effects of the interaction of several simultaneous detonations will be determined, such as the size and shape of the ditch formed, as well as information on fallout, seismic shock and air blast. The ditch is expected to be about 2,300 feet long, 700 feet wide and 125 feet deep, with a ridge of ejected material along each side. Less than 10% of the radioactivity is expected to reach the atmosphere, and thermonuclear (H-bomb) explosives are planned.

Project Schooner calls for the detonation of the equivalent of 100,000 tons of TNT in hard rock to form a crater about 1,100 feet in diameter and 300 feet deep. This would mean moving 7 million cubic yards of material.

Project Dogsled would involve exploding about the same size atomic device in sandstone, in order to compare dimensions of the crater formed with those in plain earth and in granite.

Project Galley would explode a row of nuclear devices simultaneously in hard rock at differing elevations.

Project Phaeton would detonate a device equivalent to a million tons of TNT, in order to judge the effects of very large explosions.

Plans for controversial Project Chariot, the nuclear excavation of a harbor in Alaska, are now on the shelf, with decision either to cancel or to conduct the blast deferred.

Contained explosions, the AEC said, have reached the point where "atom smashers" stood when they were first used as a research tool in studying nuclear structure—they can provide radiation, temperature and pressure not available from other sources to provide information on the atom.

Future contained experiments include:

1. Project Coach to create a mighty burst of neutrons in a target of uranium, in the hope of producing as yet undiscovered man-made elements. It is scheduled for this year.

2. Projects Shoal and Dribble, part of the AEC participation in the Vela-Uniform program to develop techniques for detecting underground nuclear explosions.

Project Shoal, when authorized, would involve a nuclear detonation in granite to compare the signals with those from earthquakes. Project Dribble would be a series of three detonations, two of 100-ton and one of 5,000-ton TNT equivalence, at a depth from 2,000 to 2,700 feet below the surface.

The most important research advance in the Plowshare program, the AEC reported, is that large excavations free of serious radioactive contamination can be dug by nuclear explosives.

The AEC also reported the unexpected discovery and perfection of the fact that the Heavy Ion Linear Accelerator, or Hilac, at the Lawrence Radiation Laboratory, Berkeley, Calif., can be operated at varying energy levels rather than only the one for which it was built. This, in effect, gives many machines in one, without building new machines.

• Science News Letter, 83:95 February 9, 1963

GENERAL SCIENCE

Future Space Scientists Rarer Than Astronauts?

➤ IT IS HARDER to identify future space technologists and scientists than it is to select astronauts, Dean L. M. K. Boelter of the College of Engineering at the University of California, Los Angeles, believes.

"It appears to me to be much easier to find qualified candidates for the U. S. astronaut program than it is to discover students in engineering or the sciences with the right attitudes, self-discipline, and academic background to become well-trained space technologists and scientists," he said.

"Yet the less adventurous roles of the space scientist and technologist are just as important to the success of our national space program as astronauts."

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Studies suggest that *vitamin E* requirements of humans are influenced by the quantity of polyunsaturated fatty acids in the diet.