

ENGINEERING

Ground Steam Tapped

A new natural power source is being used in New Zealand as engineers convert underground live steam to electric power.

► **STEAM PRODUCED** from nature's underground boilers is being converted to electric power in New Zealand on a major scale.

Dr. Frederick J. Llewellyn, vice chancellor of the University of Canterbury, Christ Church, South Island, N. Z., and former chemistry professor, visiting the United States, told *SCIENCE SERVICE* the project represents work begun a decade ago with surveys by his government.

The installation at Wairakei, North Island, which began operations August, uses live steam piped up from a depth of 3,000 feet to turn high and low pressure steam turbines. They will generate a total of 250,000 kw when the facility reaches its full capacity.

Use of steam from volcanic regions to generate electricity is not new. The Italians experimented with the technique at Lardarello prior to World War II, Dr. Llewellyn said, but New Zealand expects to exploit the principle on a larger scale.

The New Zealanders are still not sure

how big their source of steam is, but scientists believe the supply is "inexhaustible," Dr. Llewellyn said. Some bores drilled eight years ago have been blowing ever since with no appreciable slackening of pressure. Geysers erupt to a height of 60 feet.

The Wairakei Hotel, situated in the heart of the 3,000-square-mile steam region, uses the underground supply for its hot water system, and others heat their homes with it. Persons have journeyed to the area for years seeking relief of ailments by baths in the warm waters.

The power generated at Wairakei will be comparable to the output of Berkeley or Bradwell nuclear power stations in England. Most of New Zealand's power at present is hydroelectric. Since most practical dam sites have been developed and its coal and oil deposits are not commercially important, underground steam represents a substantial hope for meeting growing power needs.

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WARNING TUBE—An ultraviolet-sensitive tube that responds to flame, smoke and combustible vapors simultaneously indicates the presence of any of the three. Matthias J. Grundtner, a research scientist with the Minneapolis-Honeywell Regulator Company, demonstrates how the tube works when both fire, smoke and combustible gases (in the beaker) are present. The four-inch tube "sees" invisible ultraviolet light.

AERONAUTICS

Aircraft Designed For Agricultural Use

See Front Cover

► **THE "AG-CAT,"** a new antique-looking biplane designed specifically for the agricultural market as a crop-duster and sprayer, has completed its first flight, Grumman Aircraft Engineering Corporation has reported.

The photograph on the cover of this week's *SCIENCE NEWS LETTER* shows the plane which has an overall length of 24 feet, 4 inches, a wing span of 35 feet, 8 inches, and a height of 10 feet, 9 inches.

The airplane features interchangeability of upper and lower wings and all four ailerons, spring steel landing gear and a "sloping" nose which affords excellent visibility in normal flight attitude.

Science News Letter, November 15, 1958

● RADIO

Saturday, Nov. 22, 1958, 1:35-1:45 p.m. EST "Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Heinz Fraenkel-Conrat, professor of virology at University of California Virus Laboratory, Berkeley, Calif., and an Albert Lasker Award Winner, 1958, will discuss "Molecules in Inheritance and Disease."

ENGINEERING

U.S. Leads in Fusion

► **THE UNITED STATES** is "undoubtedly the world leader" in controlled fusion research to harness the energy of the hydrogen bomb.

Edward W. Herold, director of electronic research laboratory for the Radio Corporation of America Laboratories, told the annual meeting on electron devices of the Institute of Radio Engineers in Washington that Russia is probably in second place and Britain trailing third. Americans submitted 60% of the papers on controlled fusion at the Geneva Conference in September, and displayed the best equipment.

Britain may lose out in the race to convert H-bomb power to commercial use because of her overemphasis on one approach, the "pinch effect," he warned. At present, both Russia and the U. S. are exploring other ways to produce and contain extremely hot plasmas necessary for H-bomb reactions. To obtain power from such conditions, heavy hydrogen must be heated to about a hundred million degrees.

The numerous papers submitted on pinch-effect work left the impression at Geneva this year that there is some unknown action which causes a "tremendous loss of energy," he declared. The result is that scientists have been unable to heat the plasma (or highly energized gas) higher than one or two million degrees, only a fraction of the heat needed. The pinch effect is achieved by making the hot plasma contract in a

strong magnetic field, so that it does not touch any walls. Material walls would cool the gas, and no known material could withstand the extreme temperatures needed for thermonuclear reactions.

Mr. Herold said there has been increasing interest in the past year in solving the containment problem using microwaves. A U.S.S.R. paper at Geneva described successful experiments using a microwave "cavity" as a plasma reflector.

Russians also displayed a model of a large controlled fusion apparatus at Geneva which is not yet working, but which resembles a device at Oak Ridge National Laboratory known as the DC-X. The latter uses "mirror" containment with magnetic fields.

The speaker said the so-called "mirror" containment of the gases with steady magnetic fields is "still a very promising approach," and that this type of work now in progress at the University of California's Radiation Laboratory, Livermore, and Oak Ridge, promises to be fruitful.

"I believe that the next five to ten years will see the major scientific problems solved, but that it will take several decades beyond this to make controlled fusion power practically available to mankind," he said. He compared the state of the art now as equivalent to television in the year 1920.

Science News Letter, November 15, 1958