GENERAL SCIENCE

Swap Atomic Information

International Conference on the peaceful uses of atomic energy may open new era in which scientists and industrialists become more important than security officers.

By WATSON and HELEN DAVIS

➤ A DECADE of the atomic era has been needed to bring the nations of the world together to discuss how the atom can be harnessed for the world's good.

The first combat A-bomb that blasted Hiroshima on Aug. 6, 1945, seems remote in time. The accent at the International Conference on the Peaceful Uses of Atomic Energy in Geneva is on the usefulness of atomic energy, not its destructive dangers.

The big fact of the atoms conference is identical with that of the Big Four conference held in July in the same meeting halls:

Russians and Americans are sitting down and discussing their problems peacefully and constructively. The atoms meeting is much more inclusive, since not just the four top nations, but every nation that is working in the atomic field is participating, under the United Nations.

Few will be surprised to learn from the papers being presented that the Russians and many other nationalities have been able to dig out by the hard research way the facts that the Americans have also discovered and kept rigorously secret until now.

Remember that the Russians made A- and H-bombs by independent research.

For the good of the world, which but for atomic energy might die of slow energy starvation in the coming generations, there should be freedom for announcing all that is known about getting useful power from the atom, using the by-products of atomic energy for scientific exploration, industrial applications and medicine and health.

This will probably result from the discussions. We may be entering a period when scientists and industrialists will be more important than security officers.

Future Energy Needs

➤ THE WORLD will need eight times as much useful energy in the year 2000 as now, and only by the use of atomic energy can our civilization then meet the constantly increasing demand for energy without seriously depleting our reserves of coal, oil and gas.

In 1975 the need for useful energy will be the equivalent of 27,000 billion kilowatt hours of electricity compared with 10,200 billion kw-h in 1952 and 84,000 billion kw-h in 2000, Dr. Nathaniel B. Guyol, a United Nations expert predicted. More than half of this will be used in industry.

The earth will have a population of 5,000 million people in the year 2000, doubling the present world population. In 1975 it will be 3,500 million.

The world needs a new energy source, Dr. E. A. G. Robinson of Britain's Cambridge University and G. H. Daniel of the British Ministry of Fuel and Power told the conference.

Soviet Atom Knowledge

➤ THE FIRST detailed description of Russia's first atomic power plant by Soviet scientists at the International Conference on the Peaceful Uses of Atomic Energy brought the verdict that the Russians clearly understand the problems of atomic power development.

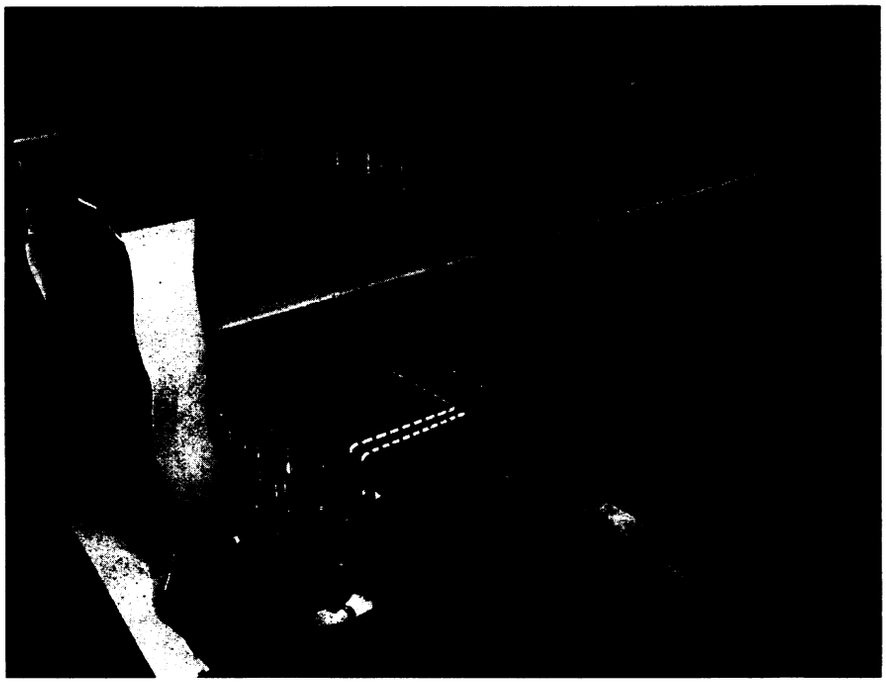
They have learned through their own research, as America has learned, the essential information to allow them to build and operate successfully an atomic power reactor.

The Russian power reactor with an output of 5,000 kilowatts began generating electricity at an unrevealed location on June 27, 1954, according to D. I. Blokhintsev and N. A. Nikolayev. Its fuel is enriched uranium containing five percent fissionable uranium isotope 235. Its total charge is 550 kilograms, 1,210 pounds.

The small Soviet power plant is described as the forerunner of a 100,000 kilowatt plant reported as being planned. Speculation is that it may actually be under construction and that, if completed in 1956, it could be the first large atomic power plant, nosing out the British 50,000-100,000 kilowatt plant at Calder Hall and the 60,000-plus kilowatt U. S. plant at Shippingport, Pa., due for completion in 1957.

The present Soviet plant is cooled by water under pressure and the fissioning of the enriched uranium is controlled or moderated by graphite. The heat transfer system consists of two circuits, with one flow of water circulating through the reactor under pressure of 100 atmospheres. Through a system of heat exchangers, the heat is transferred to another circuit of water which, transformed into steam, drives a turbogenerator.

Large power reactors building in the United States do not use exactly this scheme, but some of the reactors at the Hanford, Wash., plutonium plant do use water for cooling and graphite for moderating.



URANIUM TO ELECTRIC POWER—Shown in model form is the Experimental Breeder Reactor II, built to produce electric power. Designed by Argonne National Laboratory, the reactor uses enriched uranium as fuel. Heat is carried by liquid metal to the steam generator (center). The steam produces electric power in the turbo generator at right.

The Soviet scientists discovered, as Americans have, that neutron radiation and heat warp and change the form of the uranium and graphite used in the reactor, requiring them to be especially processed.

While the cost of electricity from the first Soviet atomic power station "exceeds considerably the average cost of electricity from powerful heat power stations in the USSR, "the Soviet prediction is that larger plants now being designed, from 10 to 20 kopeks per kilowatt hour, will produce in a cost range from that of present coal plant electricity to double that value.

The Russians are working on other types of power reactors, including those with liquid metal cooling, plants that use water for both cooling and moderating, a reactor that uses heavy water to absorb the neutrons, homogeneous reactors in which the fuel mingles with the moderator, and fast neutron reactors.

International Radiation

➤ INTERNATIONAL AGREEMENT on minimum standards of the amount of radiation that can be tolerated safely by the human body was called for by Dr. W. Binks of the British Ministry of Health and Medical Research Council's Radiological Protection Service.

A race among nations in developing nuclear power reactors and in attempting to capture world atomic markets is foreseen by Dr. Binks.

It is not "impossible," he said, that in such a race "competitive considerations will lead to drastic economies" of radiation protection.

Soviet Reactor Accident

➤ TWO CASES of acute radiation sickness due to gamma and neutron rays from an experimental nuclear reactor were reported by Drs. A. K. Guskova and G. D. Baisogolov. The victims had violated the rules for operating the reactor. One received 300 roentgens and the other 450 roentgens of radiation.

Doses of 400 to 600 roentgens are considered lethal or near-lethal.

The two victims recovered. Whether other fatal or non-fatal cases in personnel working with nuclear reactors have occurred in the Soviet Union was not stated.

The patients were able to return to work after three months and were still well a year and one-half later.

In treating the patients, a "complex of conventional drugs and methods was used," the Soviet scientists reported, including antibiotics, drugs to check hemorrhage, and drugs to stimulate blood formation.

The patients were taken to hospitals immediately after the accidents and kept in bed with a "sparing diet" rich in proteins and vitamins. At one stage the high calorie diet included raw eggs, milk, curds, meat, lemons and oranges.

As the patients' condition got worse, the "mortal danger" lay in hemorrhages and infectious complications. To fight this, especial attention was given to treating the oral cavity with antibiotic solutions such as gramicidin, furacillin and penicillin, and to hygienic care of the skin.

In order to react on the bacteria in the intestinal tract, acidophilous sour milk was given in amounts up to one or one and one-half quarts daily.

Blood transfusions were given in doses of about seven ounces by the continuous drip method. The patient who had had the biggest radiation dose, however, had severe post transfusion reactions, so before subsequent transfusions he was given pantopon (an opiate) and atropine.

As soon as the bone marrow showed signs of regeneration, more active stimulation of blood formation was undertaken by giving the following medicines: sodium-nucleinate, thesan, pentoxyl and campolon. Campolon is a crude liver extract. Sodium nucleinate is a salt of nucleic acid from yeast cell nuclei used to stimulate white blood cell production. Pentoxyl has been reported in a Russian ear, nose and throat medical journal as treatment for agranulocytic angina in which there is marked reduction in the number of white blood cells.

The Soviet scientists state that there are four stages of acute radiation sickness:

1. A period of primary general reaction lasting up to three days and characterized by the patients' poor general condition, derangement of functions of the digestive system and heart and blood vessels and blood changes.
2. A latent period when the patient seems to be in good health.
3. A period of marked sickness.
4. A period of recovery.

Changes in the nervous system's functioning are stressed by the Soviet scientists.

Western scientists may see in this emphasis on nervous functioning the continued influence on Soviet medical science of Pavlov, the Russian physiologist famous for his conditioned reflex theory.

Damage to the blood-forming organs, they believe, is due not only to the direct destructive effect on them of ionizing radiation but is caused also by a disturbance of nerve influences. Studies of other Soviet scientists supporting this are cited.

Changes in brain wave records and in reaction to stimulants such as caffeine were observed at different stages in the radiation sickness.

The Soviet scientists, like their Western colleagues, do not consider the treatment they gave specific as a cure for acute radiation injuries but, like Western scientists, they stress the importance of giving antibiotics and anti-bleeding medicines early to prevent or relieve the worst features of the illness.

Atom's Heart Larger

➤THE ATOM'S HEART, the nucleus in which almost all the mass of matter is located, may be somewhat larger than previously thought.

Dr. Victor F. Weisskopf of Massachusetts Institute of Technology announced theoretical computations that indicate a change in scientists' ideas of the atomic citadel's size.

Radius of the nucleus, he said, is approximately 1.4 times ten to the minus 13 centimeters. This is scientific shorthand for saying it is one five-hundred-million-millionths of an inch.

This seems large, Dr. Weisskopf explained, because it is a measure of the range of nuclear forces.

Science News Letter, August 13, 1955

SCIENCE NEWS LETTER

VOL. 68 AUGUST 13, 1955 NO. 7

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., NOrth 7-2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40, P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283), authorized February 28, 1950. Established in mimeographed form March 19, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 1 E. 54th St., New York 22, ELdorado 5-5666, and 435 N. Michigan Ave., Chicago 11, SUperior 7-6048.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees — Nominated by the American Association for the Advancement of Science: Kirtley F. Mather, Harvard University; Paul B. Sears, Yale University; Karl Lark-Horovitz, Purdue University. Nominated by the National Academy of Sciences: Edward U. Condon, Berkeley, Calif.; Harlow Shapley, Harvard College Observatory; George W. Corner, Carnegie Institution of Washington. Nominated by the National Research Council: Ross G. Harrison, Yale University; Leonard Carmichael, Smithsonian Institution; Jerome Hunsaker, Massachusetts Institute of Technology. Nominated by the Journalistic Profession: Neil H. Swanson, Ruxton, Md.; O. W. Riegel, Washington and Lee University; Michael A. Gorman, Flint Journal. Nominated by the Scripps Estate: Edward J. Meeman, Memphis Press-Scimitar; John T. O'Rourke, Washington Daily News; Charles E. Scripps, Cincinnati, Ohio.

Officers — President: Leonard Carmichael; Vice President and Chairman of Executive Committee: Charles E. Scripps; Treasurer: O. W. Riegel; Secretary: Watson Davis.

Staff—Director: Watson Davis. Writers: Jane Stafford, Marjorie Van de Water, Ann Ewing, Horace Loftin, Howard Simons, Dorothy Schriver, Helen M. Davis. Science Clubs of America: Joseph H. Kraus, Margaret E. Patterson. Photography: Fremont Davis. Production: Priscilla Howe, Marcia Nelson. Interlingua Division in New York: Alexander Gode, Hugh E. Blair, 80 E. 11th St., GRamercy 3-5410.