

denly seized by any nation and thus removed from the control of the United Nations, that would be a virtual declaration of war because the seizing nation, if left alone, within a year or two, could produce an atomic bomb. An essential part of the control by the United Nations of fissionable material would be the ownership and operation of all deposits of uranium and thorium and the plants for extracting these elements. A first step would be an extensive geological exploration of the surface of the earth to discover all deposits of uranium and thorium.

Uranium and thorium are the only two elements, according to the report, which need to be controlled because without them no fissionable materials could be made.

The scientists working on the questions of whether other elements can produce atomic energy by a sustained reaction have relied greatly upon what is called the "packing curve," according to Dr. Charles Allen Thomas, vice president and technical director of the Monsanto

Chemical Co., one of the members of the board of consultants to the State Department's committee, here. According to theory developed from the packing curve, only the heaviest nuclei and the lightest nuclei have the subatomic configuration which would allow them to release atomic energy.

While the light atoms do furnish the energy that keeps the stars shining, the scientists who provided information for the report see no practicable way either to provide the millions of degrees of temperature necessary or to create the containers for materials at such temperatures under terrestrial conditions, so they have discarded the possibility of obtaining energy from the disintegration of these light elements.

One essential idea in the report is the distribution of stock piles of fissionable materials and the "dangerous" plants manufacturing fissionable materials throughout the world so that every major region contains them. Thus no one country or region would have a monopoly.

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would offer stimulating opportunity for untrammelled investigation by scientists of all countries.

New power sources, secrets of nature's production of food and fuel, and new hope in our struggle to understand and control cancer are some of the constructive problems awaiting settlement of the dangerous side of the atomic power question.

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Control of Cancer Instead of Atomic Bombs

► CONTROL OF CANCER instead of manufacture of bombs is the alternative program offered research scientists by the new report on international control of atomic energy issued by the State Department. Research on atomic fission by-products, although not as spectacular at first glance as atomic power or atomic bombs, will undoubtedly, in the long run, be the great achievement of the atomic age.

These by-products, which are the radioactive forms of the common elements, can replace the non-radioactive forms of the same elements in the tissues of plants and animals. By substituting them for the common forms, individual atoms can be traced through the complicated maze of life processes in plant, animal or man. By this means, chemists are learning the steps by which the plant builds carbon dioxide from the air into the starches and sugars on which we rely for food. Selective absorption of radioactive materials by cancer tissues can be used to place the remedial rays given off by these materials in the tissues they are to treat.

Researches of this type, already begun by scientists in the atomic power research program, have been greatly hindered by restrictions growing out of secrecy conditions deemed necessary on account of the military control of atomic power as a weapon. With the establishment of international control which will limit use of dangerous fissionable material but allow safely denatured material to be released for experimental use, great strides in man's control over his environment are to be expected.

In addition to the radioactive fission products which will play so important a part in chemical and physical researches in the atomic age, there will be developed from the atomic fission reactors considerable quantities of heat which may be usefully employed either for operating steam plants or for generating electricity. An earlier report of

CHEMISTRY

Uranium Is Vital Factor

It is the only essential element for constructing an atomic bomb, but thorium may also be used in chain reactions, report reveals.

► URANIUM STANDS OUT as unique among the 92 naturally occurring elements, according to new information released in the State Department's Report on the International Control of Atomic Energy. Only uranium can maintain the chain reaction which is the basis for all development of atomic power, whether for peace or war.

Uranium is one of eight or nine heavy, radioactive elements about which there has been speculation ever since the announcement last August of the principles of atomic fission. In particular, the role of uranium's sister element, thorium, largely used to make self-luminous watch dials and light switches, has evoked curiosity.

In the new report it is revealed that thorium cannot of itself maintain a chain reaction, but it can be used with uranium for that purpose. It could, in effect, be used to stretch the uranium supply. Thorium is therefore included with uranium under the restrictive provisions suggested in the State Department's report on atomic energy control.

The fact that thorium and uranium

frequently occur together in the same geological formation greatly simplifies this plan for control by international authority of the sources of fissionable material. Moreover, the type of geological formation where these strange minerals occur is unusual and relatively easy to spot.

We have the authority of the scientists who know all the secrets of atomic energy so far discovered that these elements, thorium and uranium, are the only ones over which it is necessary to maintain a watch to insure their use for constructive purposes. Familiar materials, such as iron and lead, may be used freely in construction of atomic power plants, with no danger of producing bombs as a by-product. Nobody is going to get fissionable atoms out of the clay at our feet.

With the world's supply of the dangerous elements, uranium and thorium, and their artificially created analogues, neptunium and plutonium, under international control, the race for fissionable elements as weapons would end in stalemate. At the same time, their use as sources of power and as research tools

the Secretary of War's Interim Committee on Atomic Energy, whose findings are in part incorporated in the statement just released, considers the present prospects for utilization of this power.

"We see characteristic limitations," says this report, "and characteristic advantages

in atomic power which make us regard it in great measure as a supplement to existing sources, and an incentive to new developments, rather than as a competitor, let us say, to coal or to petroleum products."

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GENERAL SCIENCE

International Control

An agency actively working on developments in the field of atomic energy is urged by State Department consultants for peaceful control.

► CONTROL OF ATOMIC energy by an international agency actively working on development in the field is the proposal handed the State Department by its board of consultants for peaceful control of man's most fearful weapon.

The 78-page report of the five-man board was released with a foreword from Secretary of State Byrnes stating that it is being made public "not as a statement of policy but solely as a basis for discussion."

The chairman of the board was David E. Lilienthal, chairman of the Tennessee Valley Authority, and it included Chester I. Barnard, president of the New Jersey Bell Telephone Co.; Dr. J. Robert Oppenheimer, University of California and California Institute of Technology scientist who directed work at the Los Alamos, N. Mex., laboratory of the Manhattan District; Dr. Charles Allen Thomas, vice-president of the Monsanto Chemical Co., St. Louis, Mo., and Harry A. Winne, vice-president of the General Electric Co., Schenectady, N. Y.

Pointing to the need for international control of the atomic weapon, the report introduced a new concept of the problem by asserting that "only if the dangerous aspects of atomic energy are taken out of national hands is there any reasonable prospect of devising safeguards against the use of atomic energy for bombs." It explains the difference between safe and dangerous activities with a promise that there are processes for utilizing radioactive materials that cannot be made into bombs.

The State Department's consultants emphasize that the group exercising international control must also assume a responsibility for the development of atomic energy.

"Only if the international agency was engaged in development and operation could it possibly discharge adequately its functions as a safeguard of the world's

future," the report declares.

New advances in technology may be confidently expected, the board said, and "Those in whose hands lies the prevention of atomic warfare must be the first to know and to exploit technical advances in this field."

Explaining that atomic energy cannot be policed out of existence, the group charged, "To 'outlaw' atomic energy in all of its forms and enforce such a prohibition by an army of inspectors roaming the earth would overwhelm the capacity and the endurance of men, and provide no security."

Comparing the enforcers of such a suppression to prohibition agents in the United States, the report urges the control body to be pioneers in a new and creative field. Referring to the unpublished findings of the Secretary of War's Interim Committee on Atomic Energy, the State Department document quoted portions predicting important peacetime uses for the war's mightiest weapon.

With the materials for atomic weapons kept out of national hands we can prevent war use of them, the report said, adding that the international agency must have absolute control over the raw material.

Thus, the board declared, the problem of enforcement is drastically reduced. The technical problems of what use a nation is making of dangerous materials will not enter into the control if the mining of uranium ore or possession of it are illegal, according to the State Department's consultants.

Summing up their case for international control of atomic energy, the board said, "We conclude that the international development and operation of potentially and intrinsically dangerous activities in connection with atomic energy would bring the task of security within manageable proportions because of the elimination of the hazards of rivalry between

nations."

Individual nations and their citizens would be licensed to carry on all safe operations with a minimum of inspection, according to the plan.

First function of the proposed agency would be to bring under its control all supplies of uranium and thorium and set up continuous surveys to locate new sources.

Plants such as those at Oak Ridge, Tenn., and Hanford, Wash., might be established to produce useful types of atomic reactors to further the peaceful development of atomic power. Research activities are contemplated to increase knowledge of atomic energy and extend its safe uses.

All dangerous products would be under the agency's strict control, but "denatured" materials could be leased to nations or individuals for safe uses.

"When the plan is in full operation there will no longer be secrets about atomic energy," the board said.

"We believe that this is the firmest basis of security," the group declared. "In the long term there can be no international control and no international co-operation which does not presuppose an international community of knowledge," they concluded.

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MEDICINE

Penicillin Is Better Than Streptomycin for Syphilis

► PENICILLIN is better medicine for syphilis than its sister-antibiotic, streptomycin, it appears from studies of rabbit syphilis reported by Dr. Wolcott B. Dunham and Dr. Geoffrey Rake, of the Squibb Institute for Medical Research. (*Science*, March 22.)

Streptomycin did cure some of the rabbits of their syphilis, but comparison of the dosage needed with the dose of penicillin that would cure syphilis led the scientists to conclude that "penicillin G is more than 3,000 times as effective" as streptomycin.

Treatment of four cases of syphilis in humans, reported by Dr. W. E. Herrell and Dr. D. R. Nichols of the Mayo Clinic, and referred to by the Squibb scientists, seems to bear out the results of the rabbit studies. The human patients improved but relapses occurred even when 10,000,000 units of streptomycin had been given over a period of 10 days.

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Sound travels more than four times as fast through water as through air.