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Manpower Resources

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News and views

AEC's Reactor Program

A SUMMARY of the Atomic Energy Commission's plans for future work in reactor development has been given by Commissioner Henry D. Smyth in an address on March 9th before the American Institute of Chemical Engineers at its meeting in Washington, D. C. The AEC, according to Dr. Smyth, has decided that six programs should be pursued during the next several years in order to arrive at an economical solution of the problems of nuclear power.

One of these is simply a continuation of the general program of research on fundamental properties of materials, on nuclear reactions, on components that might go into the reactors of the future, and on chemical processes.

In addition to this general research and development work, Dr. Smyth continued, the Commission plans to build five reactors of varying size and cost, of which the first is the so-called PWR (Pressurized Water Reactor) authorized last July. Designed to generate at least sixty thousand kilowatts of electric power, it will use slightly enriched uranium as fuel and ordinary water as a moderator and coolant. According to the AEC's *15th Semiannual Report*, submitted to Congress January 30th, "It is recognized that power from this first nuclear central station may not be competitive with power from modern conventional plants. However, nuclear power costs will really never be known until this and perhaps several large nuclear plants are built and operated." Preliminary estimates indicate that the plant should be in operation in three or four years. Development, design, and construction of the reactor have been assigned to the Westinghouse Electric Company. The generating plant is to be built and operated by the Duquesne Light Company of Pittsburgh.

The second proposed new reactor mentioned by Dr. Smyth is a breeder of intermediate size (essentially a scaled-up version of the existing breeder reactor in Idaho) which will have a capacity of fifteen thousand kilowatts of electrical power. Temperatures and steam pressure will be increased to values appropriate to a full-scale power breeder reactor.

The third reactor (5000 kilowatts) is an outgrowth of an experiment carried out last summer at the Idaho Test Site where a small reactor was built with the deliberate intention of making the water coolant boil. "When it was set up at the Idaho testing station," Dr. Smyth reported, "it had an arrangement in it which suddenly ejected the control rods so that the power generated by the chain reaction went up in a fraction of a second from a few watts to many thousands of watts. This had the expected effect on the water. It boiled. It boiled so violently in fact that it was ejected from the reactor in a small geyser. Repeated trials showed that in every case the boiling reduced the power of the reactor so rapidly that no serious damage was done." The proposed reactor would represent "an attempt on an intermediate scale actually to use boiling of the water as a method of heat extraction. We hope in this way to get a very cheap method of getting the heat out of the reactor and possibly eliminating one step between the coolant in the reactor and the turbines which turn the generator. It is planned to feed the steam generated in the reactor directly to the turbines."

The fourth reactor is to be a larger version of the Oak Ridge homogeneous reactor, described as a step in the direction of a practical power-producing unit. The ultimate goal calls for 65 000 kilowatts of heat in a homogeneous reactor that will breed uranium 233 in a blanket of thorium surrounding the chain-reacting core.

The fifth reactor experiment will test the feasibility of combining graphite as the moderator and a sodium-potassium alloy as the coolant in order to have the advantage of high temperature without high pressure from the sodium coolant.

"In addition to these new proposals," Dr. Smyth said, "we shall continue several other programs already under way. These include the so-called intermediate submarine reactor now under construction at West Milton, New York, near Schenectady, and the development of a reactor to propel aircraft. Though the aims of both of these projects are special, they will undoubtedly contribute to the general technology."

An independent announcement from the AEC in March revealed that the Commission is also studying the possibility of building a small nuclear power plant as the prototype of a "package" power plant for military use. The project is being undertaken at the request of the Department of Defense and with the collaboration of the Army Corps of Engineers. Fueled with enriched uranium and cooled and moderated by water, the reactor is to be built at some appropriate military base or at an installation of the AEC.

Manpower Resources

FUNDAMENTAL reorganization of the nation's military reserves has been urged in a report entitled "Manpower Resources for National Security" which was prepared for the Office of Defense Mobilization by its Committee of Resources for National Security under the chairmanship of Lawrence A. Appley, president of the American Management Association. The Appley Committee study, conducted in response to a request made on August 1, 1953, by President Eisenhower, was concerned with "the availability of man-

power simultaneously to operate a military training program, to supply military personnel for active service, and to meet the needs of the civilian economy". The report was submitted to the White House on January 6th by ODM Director Arthur S. Fleming together with proposals which were to have been formulated, at the President's request, into a definite program for presentation to the National Security Council not later than April 1st.

Observing that in the event of an emergency our trained manpower resources "will probably be the ultimate limiting factor" in our capacity for mobilization, the Appley Committee report recommended the establishment in the armed forces reserve of an "immediately callable reserve" and a "selectively callable reserve". The first category would consist of "substantial numbers of men who have critical civilian as well as military skills" chosen in such a manner that their availability for military purposes would not impair essential supporting activities. The "selectively callable reserve" would consist of reservists having critical civilian skills, and these men would be called to military service only in order to satisfy actual military needs for such skills.

The report also called for continuing screening of those in the immediately callable reserve for occupational and other reasons and for the provision of expert advice to the agency responsible for mobilizing the selectively callable reserve.

Mr. Flemming, in submitting the Appley Committee report to the President, made the following four recommendations:

1. That the National Security Council, on the basis of recommendations by the Department of Defense, determine the size and composition of military reserve forces needed in the light of current and future national security requirements.

2. That the Department of Defense prepare for the consideration of the National Security Council a program for the establishment of an "immediately callable reserve" and of a "selectively callable reserve" each of appropriate size and composition.

3. That the Department of Defense prepare for the consideration of the National Security Council a training program for the "immediate callable reserve".

4. That, pending a determination of the size, composition, and training of our reserve forces, we hold in abeyance any decision on the recommendations to put into effect the Universal Military Training provisions of the Universal Military Training and Service Act.

Recommendations of the Appley Committee report have received the support of the Engineering Manpower Commission, the Scientific Manpower Commission, and the Manpower Committee of the American Chemical Society. The three agencies, representing technical societies with a combined membership totalling more than 300 000 scientists and engineers, issued a joint statement in February commending the report for having offered a much needed "fresh approach" to the manpower mobilization problem.

Getting Older

THE AGE OF THE EARTH as suggested by a comparison of the ratios in meteorites of two isotopes of lead has been pushed back to 4.5 billion years, which is the earliest date yet obtained by analyzing the elements in the solar system. Studies made with a mass spectrometer at the University of Chicago by H. Brown, M. Inghram, C. Patterson, and G. Tilton on the lead content of meteorites have provided better agreement with astronomical estimates of the earth's age (about four billion years) than has other geophysical evidence. Comparisons of uranium to lead ratios in rocks, for example, have indicated an age no greater than 3.3 billion years. The present results, reported at a recent conference on geophysics and described in the University's publication *Reports*, depend on the fact that calculable amounts of lead 206 result from the radioactive decay of uranium 238 while larger amounts of lead 207 result from the more rapid decay of uranium 235.

Friction?

THE TIPPE TOP is a curious gadget that has plagued more than one physicist when pressed for an explanation. A small sphere having a short stem on one end, with the center of gravity of the top being below that of the center of curvature of the sphere, the top is first spun with the stem upright and its center of gravity at its lowest point; but then, apparently in contradiction to all the laws of mechanics, the top wobbles and ultimately turns over by itself so that it spins on its *stem!* In the latter position, it will be noted, its center of gravity is at its highest point. This is no trivial problem, having been treated already in the *Philosophical Magazine* by J. L. Synge and in *Physica* by C. M. Braams and N. M. Hugenholz.

In a paper in the January 1954 *American Journal of Physics* a domestic top expert, William A. Pliskin, discusses the problem of the Tippe Top in a slightly different way, and concludes that "the force due to sliding friction is in such a direction as to result in a torque which causes the angular velocity components to vary in a way which necessitates the rising of the center of gravity". This conclusion agrees with that of Braams and Hugenholz, but is diametrically opposed to Synge's interpretation where friction is held to have little effect on the motion of the top.

Russian Physics

A SUPPLEMENTARY NUMBER of the Italian journal *Il Nuovo Cimento* summarizing Russian research in several fields of physics has been announced. The quantity of copies available is limited, and those interested should write at once to Professor G. Polvani, Societa Italiana di Fisica, Via Saldini, 50, Milan, Italy. The price is thought to be about 2500 lira ($4).