ATOMIC POWER SYMPOSIUM PAPERS

FOR PRIVATE INDUSTRY: A 200-page report containing 15 papers presented at an Atomic Power Symposium held at Chalk River last September has been published by Atomic Energy of Canada Limited.

The publication of the symposium papers follows on the release of technical data by the Atomic Energy Control Board. The Board recently announced that the information released would facilitate the study of the feasibility of power-producing nuclear reactors.

"The publication of the Power Symposium papers is in keeping with the policy of Atomic Energy of Canada Limited of getting as much information as possible on atomic energy into the hands of private industry and other groups with a special interest in the development of atomic power", declared Mr. W.J. Bennett, President of Atomic Energy of Canada Limited.

RESEARCH RESULTS

The three-day Atomic Power Symposium was attended by 75 engineers, business executives and other representatives of private industrial firms who received the most comprehensive view of research results at Chalk River ever presented to private industry. Among the participating companies were the Hydro-Electric Power Commission of Ontario, Quebec Hydro Electric Commission, The Shawinigan Water and Power Company, and Calgary Power Limited.

Two months after the symposium the Hydro-Electric Power Commission of Ontario announced it was embarking on a joint feasibility study with Atomic Energy of Canada Limited to determine the general design and cost of a specific type of pilot atomic reactor to generate useful power and show the way to construct a larger reactor that would be fully economic.

The report, which costs two dollars and is available from the Scientific Documents Office of the Crown company at Chalk River, Ont., contains papers ranging from "Engineering Problems of Reactor Design" to "Power Resources of Canada, Their Potential and Utilization".

The atomic energy company's chief design engineer, Mr. I.N. MacKay, in his paper on "Engineering Problems of Reactor Design" declares: "The principal technical problem is to increase the temperature at which the heat from the fuel rods (of a reactor) can be removed. Most existing reactors, including the NRX and the partially completed NRU reactors, reject their heat at less than about 170 degrees Fahrenheit, a temperature too low for any sort of economic power generation." However, in his second paper, "Rod Reactors", Mr. MacKay says: "My conclusion is that, provided satisfactory solutions can be found to the problems I mentioned . . . the heavy water rod reactor is perhaps the type most easily adapted to generation of power at the present stage of development."

Problems associated with the operation of a nuclear reactor are outlined in the symposium report by Mr. G.W. Hatfield, Works Manager, Industrial Operations, who points out that the fissioning or splitting of uranium atoms gives off three million times as much heat per pound as is given off in the burning of coal.

In a paper entitled "Neutron Physics Considerations in Reactor Design", Dr. G.C. Laurence, Director of the Chemistry and Reactor Research Division, discusses the many factors which influence the number of neutrons available to maintain a chain-reaction in a nuclear reactor. Some materials, such as stainless steel, absorb a large number of neutrons and therefore must be used sparingly in a reactor structure.

REACTOR CONTROL

In a paper on "Reactor Control", Mr. F.W. Gilbert, Manager, Operations Division, points out that if the reactivity of a reactor is increased by one half of one per cent, the power (which is a measure of the quantity of heat produced in the NRX reactor) will double in three and one-half seconds. The reactivity of a reactor can be increased by adding more uranium fuel or by moving a control rod. "There is practically no upper limit to the temperature that can be reached," Mr. Gilbert declares, and thus, "reactors must depend on extremely critical control systems."

Dr. A.M. Aikin of the Chemical Engineering Branch discusses the "Disposal or Uses of Large Quantities of Fission Products". Each uranium-235 atom that splits in a reactor breaks up into two fragments of somewhat similar size, such as an atom of barium and an atom of krypton. The uranium atoms split up in more than 30 different ways and the resulting fragments are known as "fission products". They are highly radioactive. These are the "ashes" produced in an atomic "furnace" and they must be removed from time to time for they absorb neutrons.

Steam-electric generating stations are discussed in the symposium report by Mr. H.S. Dennis of the Hydro-Electric Power Commission of Ontario. "Power Systems Planning for Ontario" is the title of a paper by another member of the H.E.P.C., Mr. G.C. Floyd. He points out that the average growth of the load in the Commission's Southern Ontario System from 1922 to 1953 has been about six per cent per year and that this growth means a doubling of the load every 12 years.