of service. This problem of weakening with aging which occurs in cable insulation has been traced by Dr. Densley to causes that range from defects introduced during manufacture to the effects of the cable's environment.

For example, during the extrusion of the insulation on the central conductor, small voids of gas form. Under normal electrical stresses, sparks can occur within these voids and eat away at the surrounding material. The sparks, or partial discharges, burrow through the insulation at each peak of the 60-hertz (cycles per second) voltage. Total breakdown occurs after several years service. The voids, which can be controlled by careful manufacturing processes, continue to be of interest to Dr. Densley. "With the shortage of materials becoming acute in the future, we must look to the day when cable insulation is much thinner," Dr. Densley says. "Thinner isulation will give rise to increased electrical stress and we believe that, at some critical value, failure due to microvoids will occur. Microvoids are extremely small cavities which are always present in polymers but up to now have not caused electrical problems since normal electrical stresses are insufficient to cause partial discharge. With the possibility of thinner insulations and higher electrical stresses in the future, we are bound to run into problems. Partial discharges in microvoids are very difficult to detect and measure, so we are investigating the characteristics of partial discharge in thin insulations in which we have created artificially a known number of microvoids."

Dr. Densley has investigated the effect of different factors, such as temperature, voltage, frequency and mechanical stress, the processes that lead to insulation breakdown and, with the aid of these data, he is developing reliable accelerated aging tests. As an example, electrical discharge within a void occurs at each peak of a voltage cycle. Normal power-transmission takes place at 60 hertz but if a cable is tested at 600 hertz it will age ten times faster as a result of this destructive mechanism. Additional factors are also considered in such a test, such as application of elevated temperatures and mechanical stresses. In this fashion, a particular cable insulation could be comprehensively tested in six to ten months.

Low-temperature testing

The economics of power-transmission indicate that in the future cables will operate at extremely low temperatures using superconducting or cryoresistive conductors. These cables are capable of carrying exceptionally high power since the conductors exhibit little or virtually no electrical resistance. Such cables, at present in their developmental infancy, present new problems since they must incorporate insulations capable of functioning for many years at temperatures more than 200°C below freezing-point. Dr. Densley's laboratory is preparing to study this new region of extremely low temperatures, a study which will acquaint him with the problems of power-transmission of the twenty-first century.

Pipeline Commissioner new role for External Affairs deputy head

Basil Robinson, Under-Secretary of State for External Affairs, has been appointed as Northern Pipeline Commissioner, to co-ordinate all advice to the Government on the need for a northern gas pipeline, the choices open to the Government and the advantages and disadvantages of each.

Mr. Robinson, who will leave his position to spend full time in his new role, has been previously Deputy Minister of Indian Affairs and Northern Development. He will assist the Government in assimilating the existing analyses carried out by departments, the reports of the Berger Commission, the United States Federal Power Commission, the National Energy Board and two panels operating in the Yukon. Mr. Robinson's role will be to ensure the Cabinet has before it all the analysis and advice required to take a decision which is in accord with the broad national interest.

Mr. Robinson will not replace the ongoing work in the many government departments concerned with this issue, and these departments will continue to be the primary point of contact for outside groups to make their point of view known to the Government.

During Prime Minister Trudeau's recent visit to Washington, President Carter announced that James Schlesinger, Assistant to the President, would co-ordinate the U.S. position on the northern gas pipeline; Mr. Robinson will consult closely with Mr. Schlesinger and his officials.

Companies have filed applications with the National Energy Board in Canada and with the Federal Power Commission in the U.S. proposing either a joint pipeline to move Alaskan and Mackenzie Valley natural gas, or separate lines from the two areas.

John Evans

Basil Robinson, new Northern Pipeline Commissioner