Section 4.—Research in Geophysics and Astronomy

In this edition of the Year Book, research in the field of geophysics is covered in Chapter I under the heading of Geology and Economic Minerals of Canada, pp. 30-32. The following item on this subject gives brief additional data on current (1966) projects and facilities. A special article on Astronomy in Canada, appearing in the 1965 Year Book at pp. 47-55, indicates in some detail the advances made in astronomical research and educational facilities; the write-up on p. 400 mentions the highlights only.

Geophysics.*—Geophysics—the study of the earth, including the oceans and atmosphere by the methods of physics—embraces a number of fields, each a major science in itself, such as geodesy, seismology, terrestrial magnetism, meteorology, oceanography and hydrology. Work in geophysics in Canada is carried on by a number of Federal Government departments, some provincial governments, nearly all universities and by companies engaged in geophysical prospecting for oil or minerals.

Currently, in the field of seismology, the 25 seismograph stations operated by the Dominion Observatory, with the co-operation of universities in several cases, provide good coverage of the country for the recording of earthquakes; an additional station is being constructed at Suffield, Alta., by the Defence Research Board. The regular stations are supplemented by a special array of detectors at Yellowknife, N.W.T., which is operated by the Dominion Observatory as part of a world net of highly sensitive detection stations for nuclear explosions.

Measurements of both the gravitational and magnetic fields of the earth were extended during 1965-66 over land areas by the Dominion Observatory and the Geological Survey, and over the oceans by the Bedford Institute of Oceanography. These measurements provide information that is extremely useful in the study of concealed geological structures. Recent projects have included an intensive survey of Hudson Bay, which may be the site of a considerable accumulation of sedimentary rocks and therefore of interest in petroleum exploration, and the measurement of the magnetic field over the north Atlantic Ocean by airborne magnetometer. Because the north magnetic pole is located in Canada, studies of magnetic disturbances and their relation to conditions in the upper atmosphere are of importance in Canadian geophysical research. The National Research Council, on Jan. 1, 1966, assumed control of the rocket range at Churchill, Man., which was built by United States agencies (see p. 390). This facility is now available for both government and university research. McGill University has extended its program of launching experimental rockets from guns. A most interesting development has been the discovery that important information can be obtained by simultaneous measurements at "conjugate points", similarly located with respect to the north and south magnetic poles. For the conduct of this work, the National Research Council has constructed a laboratory at Great Whale River, Que., which is conjugate to Byrd Station, Antarctica.

The Canadian program for the International Hydrological Decade, a ten-year study of the world's freshwater resources, has been developed in detail. Experimental basins across the country have been selected for the observation of the effects of changes in surface features on the amount and quality of ground water.

Meteorology includes not only the routine forecasting carried out principally by the Meteorological Branch of the Department of Transport (see p. 75), but also research in special problems by the Branch and by at least 12 university groups. These problems include controlled experiments in weather modification, the mechanics of hail formation, and micrometeorology, which is the detailed investigation of meteorological conditions in regions of small extent.

* Prepared by Dr. G. D. Garland, Geophysics Laboratory, University of Toronto, Toronto.