

Engineering problems include long-distance transmission of high-voltage direct current, radio remote-control of navigational aids, current and potential transformer calibration, high-frequency standards, and the development of electronic medical instruments and operating-room facilities. Electronic systems have been installed in the Toronto General Hospital for monitoring the condition of patients undergoing cardiovascular surgery and intensive therapy, and a system synchronizing X-ray photography with electrocardiogram has been developed for the Ottawa General Hospital. The Division maintains the best-equipped antenna laboratory in Canada and provides considerable assistance in the development and manufacture of antennas and radomes.

Among other projects are a microwave system for determining precisely the position of vessels engaged in hydrographic surveying, infrared scanning cameras to further Canadian research in cancer detection and treatment, and a creative tape recorder much in demand in electronic music studios. A highly mobile counter-mortar radar designed by the Division went into commercial production in 1961.

Fundamental studies are carried out on radio wave propagation, radio astronomy, upper atmosphere research, and electronic and solid-state research. A new radio observatory is being developed in Algonquin Park, where a 33-foot diameter radio telescope is in operation. The Canadian rocket program at Churchill has introduced a new trend in upper atmosphere research, and a variety of instruments have been developed to study auroral displays and meteor showers.

Atlantic Regional Laboratory.—The Atlantic Regional Laboratory is engaged in practical and fundamental studies related to the resources and industries of the Atlantic Provinces. The work follows three general lines—chemistry and physiology of plants and microorganisms—especially marine organisms, animal nutrition, and chemical reactions at high temperatures. Specific studies are under way on the formation of slimes in the ‘white’ water of paper mills, the dietary effects of seaweed components, and the discoloration of New Brunswick potatoes during commercial cooking. At the request of the adhesives industry, a fundamental study is being carried out on the properties of collagen—a protein in cod skin used as the mother substance for photoengraving glue.

The long-term investigation of the basic chemistry involved in the fabrication of steel has progressed. Magnesia refractories capable of holding molten basic slags were constructed, and current theoretical studies are expected to produce improved methods for measuring and controlling temperature and oxygen concentration during steel-making.

Recent engineering work included the development of a semi-continuous dryer for use on seaweed and other commercially important plant material. This work was carried out in co-operation with industry, and provided a model for mobile dryers to be used throughout the Atlantic Provinces. A portable automatic methane detector for use in mines was also produced; operated off a miner’s battery, the instrument continuously samples the air and automatically gives warning of dangerous concentrations of combustible gases.

Prairie Regional Laboratory.—One of the chief aims of the Prairie Regional Laboratory is to develop wider uses for crops grown on the prairies. This is achieved by determining potential uses of crops now in production and by encouraging the production of new crops to meet specific needs. Research is therefore carried out on the properties and reactions of plant components, and on the biological, chemical and engineering processes for turning them into other compounds. The development of oil-seed crops as alternatives to seed crops has received considerable attention.

For some time, the Laboratory has studied major plant constituents such as carbohydrates, protein, starch, lignin and fibres. An example of this work is the definition of the chemical structure of several polysaccharides found in cereal grains and important in