Advice has been given as to the suitability of a variety of leathers for different military purposes, and numerous dressing and waterproofing compounds for leathers have been examined for quality. Used military boots have been examined in order to determine means of overcoming certain weaknesses that developed with wear. Tensile strength tests and wear resistance tests have been made on composition sole materials. Soles composed of cotton fabric and suitable plastics have been made up and are undergoing field trials. The success of such soles would help to alleviate any short supply of sole leather. In addition, these soles have an advantage over leather in that rights and lefts are the same since both outer surfaces are identical.

Transparent sheet resins for military purposes have been tested for quality, and vulcanized fibre identification discs and other similar objects have been examined, general consideration being given to the substitution of plastics for metals in war materials.

A large variety of finishes is required for use on military vehicles and other equipment. Many of these materials are comparatively new to Canadian industry, and the research council has cooperated with government departments and manufacturers in facilitating the supply of these highly specialized coatings. Gas-detector paints, luminous paints, heat reflecting paints for armoured vehicles, finishes for rifle barrels, camouflage paints, fluorescent paints and fire retardent paints have been developed.

The commercial production of fuse powder charcoal was developed and carried on for some time by the council but the manufacture has now been turned over to a commercial concern. However, research on the fundamental problems involved in the operation is being continued. Indicators for war gases and chemicals for other war purposes have been synthesized and studied.

From a small cooperative effort between the national research council and the Canadian army, activities in chemical warfare have grown rapidly to the point where a highly coordinated project has been developed as an establishment of the Department of National Defence. The director general of this organization is a civilian scientist on the staff of the council. About one-half of the active personnel are civilian scientists, the remainder being members of the armed forces. This establishment is an outstanding example of active coordination of military and civilian agencies.

Several sections of the division of physics and electrical engineering are concerned almost exclusively with research and development for the Royal Canadian Navy. A shock and vibration machine based on British admiralty design, but modified to permit the use of Canadian materials, has been installed to test the resistance to shock of instruments and equipment for merchant and navy ships. The results of tests on this machine are used in devising instrument specifications. Other work of this general nature includes the construction and use of a rocking machine to simulate the movements of a ship in order to test instruments. Studies of gear for magnetic-mine sweeping have also been made. The acoustics section has been engaged in the design of special secret navy gear for offensive and defensive operations.

Apparatus for work in ballistics has been developed on an increasing scale, and measurement equipment for ammunition and gun proof has been developed and is now in use. Problems connected with directing gunfire and the armouring properties of various materials have been investigated. Work is also under way on the improvement of anti-aircraft projectiles. In this work the existence of a committee on ballistics and fire control has been of great help.

In the optics section, research and development in optical instruments and in photography and spectrochemical analysis has been accompanied by the construction of many and varied optical components for military instruments. A joint committee on photographic research sponsored by the R.C.A.F. and the council handles all photographic problems for the former organization. A great deal of research in this field has been completed.

Electrical measurements work has been largely testing for certain council laboratories and other government departments. There has been a marked increase in the testing of new insulation materials as a result of the rubber shortage and the manufacture of new materials in Canada. The mechanical testing of war materials in increasing volume has taken considerable time in the strength of materials section. In addition to routine tests numerous investigations on testing with radium and X-rays were carried out. A great deal of radiographic testing of steel, bronze and aluminum is also done outside by council-trained radiographers. The amount of X-ray diffraction work is gradually increasing.

In metrology, tests of such instruments as binoculars, sextants and thermometers run into the hundreds. The output of specially designed work on fire-control apparatus and teacher-training equipment for the army and navy has increased, and pilot models constructed in the council's shops have been sent for service trials.

In the gauge-measurement laboratory the number of gauges measured per month has been approximately 4,200, which appears to be the point at which production has finally settled. Improvements have been made on measuring technique and new equipment added, some of which was proposed, designed and constructed in the council's laboratories and shops.

The development of secret radio equipment continues apace. The sections on research and radio engineering design work hand-in-hand with the army, air force and naval sections. Equipment for radio location has been completed and successfully used against the enemy.

In the division of mechanical engineering many service projects are carried on. These include matters relating to marine engines and their lubrication and the design and test of ships of various types. Model testing basin results are useful to the naval architect and shipbuilder, and also to the designers of aircraft hulls and floats.

There is very close cooperation between the R.C.A.F. and these laboratories. Much of the work in progress in the new laboratories on the Montreal road has been suggested by air force authorities in Canada, the United Kingdom and the United States. The council has horizontal and vertical wind tunnels for the testing of the characteristics of aircraft. The results obtained are important in the development of superior fighting machines and in working out all possible safeguards for their crews.

The gasoline and oil laboratory has complete equipment for chemical and physical testing of fuels and lubricants, and this has been in constant use on war problems. An interesting