techniques for metal forming, attention is focused on ensuring structural soundness of metal pipelines for the Arctic. Other programs are directed toward reduction of pollution and conversion of mineral waste into useful materials such as fillers and ceramics.

The centre is assisted by a national advisory committee on mining and metallurgical research, comprising representatives from industry, government and universities.

The geological survey maps and studies the geology of Canada. Its activities support two departmental programs — mineral and energy resources and earth sciences. A principal aim of the former is to ascertain available mineral and energy resource potential and the survey is active in estimating the amount and distribution of mineral and fuel resources. This is done by providing a systematic geological framework, by defining settings favourable to mineral and fuel occurrences and by appraising foreign resources. The earth sciences program is concerned with use and conservation of resources and preservation of the environment. The survey provides information on land resources and terrain performance derived from geological, geomorphic, geophysical, geotechnical and related studies of earth and rock materials, land forms and associated dynamic processes.

Each year the survey sends about 100 parties into various parts of Canada. The results of its studies are published in memoirs, bulletins, papers, maps and scientific technical journals. Its headquarters is in Ottawa and of several regional offices the largest are an institute of petroleum geology in Calgary and an Atlantic geoscience centre in Dartmouth, NS. The former studies geology of Canada's western and northern sedimentary basins and the latter investigates bottom morphology and structure of the continental shelves and the floors of the open ocean. A smaller group of geologists on the West Coast is developing similar marine geology studies.

The earth physics branch carries out geophysical work of interest to the mineral industry. It collects and publishes maps and charts on the geomagnetic field in Canada. Most of this information is obtained from airborne geomagnetic surveys which have ranged over all of Canada and as far as Scandinavia. The branch maintains a network of 11 permanent magnetic observatories, including an automatic magnetic observatory system at Yellowknife, NWT, which opened in 1974. It also operates a network of 33 seismic stations to study the earth's interior and assess seismic risk. In gravity research, another means of studying the composition of the earth's crust, the branch maps variations in gravity on a regional basis including the Arctic and the continental shelves. The results are available in a new gravity map of Canada on a scale of 1:5,000,000 or 50.7 kilometres to the centimetre for easy comparison with new geological and tectonic maps of Canada on a similar scale. Geothermal studies in mines and deep boreholes provide information to the mineral industry on underground thermal conditions, including permafrost.

No mineral development is possible without accurate, large-scale topographical maps. The mapping branch has completed topographical mapping of the country at the medium scale of 1:250,000, or about 2.5 kilometres to the centimetre. About 40% of the larger-scale mapping at 1:50,000 has been completed of more settled areas and those of greater economic importance. Also available for selected areas are maps at other scales. Another branch function is establishment of a basic network of survey control points across Canada that provide precise figures of latitude, longitude and elevation above sea level. In addition to topographic maps, the branch produces various multicoloured maps for other government agencies, aeronautical charts and the National Atlas of Canada, describing physical, economic and social geography. The branch's air photo library has on file over 4 million aerial photographs of Canada, both black and white and colour, taken over the last half-century from aircraft and more recently from space satellites.

The explosives branch administers the Canada Explosives Act, which controls the manufacture, authorization, storage, sale, importation and transportation by road of explosives.

The mineral development sector is responsible for research programs and policies in the field of non-renewable resources. It conducts fundamental and applied resource-engineering-economic research and field investigation into non-renewable resource problems on a total industry basis, in a regional, national and international context. The work covers all aspects of the mineral industry from resource to consumption. The