

## DESCRIPTIVE NOTES

Map 33-1965: Cold-extractable heavy metal content of stream and spring sediments

### Geological

South of a line following the Millstream River and westward through Tetagouche Lakes, the area is underlain mainly by the Ordovician Tetagouche Group comprising a series of complexly folded and sheared metasediments, metavolcanics, and metabasic intrusives. These are intruded south of Bathurst by a granitic mass.

North of the Millstream River the rocks are mainly of Ordovician, Silurian, and Devonian age. The Elmtree Group, of probable Ordovician age, is composed of folded and contorted metasediments and some metavolcanics which are intruded by a granitic stock in the vicinity of Antinouri Lake. The Silurian and Devonian rocks comprise both sediments and volcanics that are faulted in places, gently folded, and on the whole are less metamorphosed than the older rocks in the district. In the Nicholas Dénys area the Silurian rocks are intruded by a granitic stock that has an associated metamorphic aureole in which the rocks are mainly hornfels and skarn. Another granitic stock intrudes Silurian volcanic rocks along South Benjamin River.

East of Nepisiguit River the area is underlain by the Pennsylvanian Bathurst Formation. These rocks are mainly siltstones, sandstones, grits, and conglomerates that dip gently eastward.

Flat-lying conglomerates and sandstones (Bonaventure Formation), possibly of Triassic age, underlie Heron Island and fringe the coast in the Jacquet River area.

Glacial till, sand, and gravel mantle the whole district, and recent post-glacial sands and clays cover much of the area around Bathurst Harbour and occur in the shore section at Jacquet River.

The principal mineral deposits in the area are massive, vein, and disseminated deposits containing essentially iron, zinc, lead, and copper sulphides. Molybdenite occurrences are associated with the Bathurst, Nicholas Dénys, and Antinouri Lake granitic bodies.

The text of the paper accompanying this map should be consulted for further details on the geology and economic geology of the district.

### Geochemical

The analyses recorded on this map were done on samples of sediment collected from the channels of rivers and streams and from rivulets flowing from springs. Where possible the active channels were sampled, but in a few cases the residual sediment of dried-up streams was used. In muskeg areas and in streams where many beaver workings are present, the sediment contained abundant organic matter.

The wet sediment was analyzed at the sample site for cold citrate-extractable heavy metals using the method described by Smith (1964)<sup>1</sup>. Values are expressed as total heavy metals in parts per million. Samples were not titrated above 20 ppm. The subdivisions used on the map are arbitrary and based on experience in the district. The lowest subdivision can be taken to represent the background.

All streams and rivers were traversed on foot, and the stream sediments were tested, where possible at intervals of 1,500 feet.

Most of the known sulphide deposits in the district are marked by higher than normal contents of heavy metals in the neighbouring stream sediments. Examples are the higher than average contents of heavy metals in Nepisiguit River (Key Anacon deposit, south of the map-area), Armstrong Brook (Armstrong Brook deposit), Orvan Brook (Orvan Brook deposit), and Elmtree River (Keymet mine). The dispersion trains from these and other known deposits vary from 1/4 mile to 4 miles in length.

Numerous examples of streams with sediment containing higher than average amounts of heavy metals occur in virgin areas and are unrelated to known deposits or contaminating agencies. A few of the more important of these that should receive further investigation are Eddy Brook, Cherry Brook, some of the tributaries of Armstrong Brook, a number of the tributaries of the Rocky Brook - Millstream system, Wild Cat Brook, a number of the tributaries of the Fortymile Brook system, a number of the tributaries draining south into the South Tetagouche River, North Nigadoo River, Eel Brook, Ellis Brook, Guitar Brook, Lake Brook, the north tributary of Fournier Brook, South Nash Creek and its tributary, and a number of the streams draining southeast into Jacquet River. The last group of anomalies appears to be related to the northeast trending faults west of Jacquet River.

The stream sediment anomalies outlined by the cold extractable technique are generally coincident with anomalies in the water. In South Little River, however, the metal content of the sediments is low whereas the content of heavy metal in the water is high. This is obviously due to the low pH (3.5) of the water in this stream. There is a general correlation of heavy metal anomalies outlined by the cold extractable technique with those obtained by more rigorous methods for zinc, copper, lead, arsenic, antimony, and molybdenum in most streams.

The distribution of heavy metal values in the stream sediments is not as uniform as those in water.

The presence of abundant manganese hydroxides and oxides (Map 44-1965) may be a factor in the localization of the heavy metals in some of the anomalous streams. Manganese hydroxides (and hydrated oxides) strongly adsorb many of the heavy metals and hence may give false anomalies. This feature should be carefully considered when evaluating all anomalies on this map. The coincidence of heavy metal water anomalies with many of the stream sediment anomalies seems to suggest, however, that many of the latter are valid anomalies and are only enhanced by the presence of manganese.

The heavy metal content of the stream and spring sediments shown on this map should be compared with the heavy metal content of stream and spring waters shown on Map 32-1965 and with the contents of specific elements in stream sediments recorded on Maps 34-1965 to 44-1965 inclusive.

<sup>1</sup>Smith, A. Y. : Field and laboratory methods used by the Geological Survey of Canada in geochemical surveys; No. 5, Cold extractable "heavy metal" in soil and alluvium; Geol. Surv. Can., Paper 63-49 (1964).