NEW BRUNSWICK

MINES DIVISION

DEPARTMENT OF NATURAL RESOURCES

NICKEL CONTENT OF STREAM AND SPRING SEDIMENTS

- Sample location
- 32 Concentration, 25 to 44 parts per million
- 125 Concentration, 45 parts or greater per million

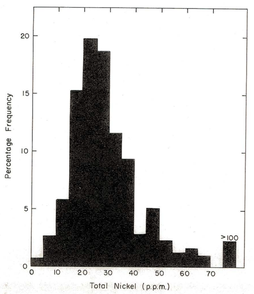


Figure 1. Histogram of nickel concentrations in 549 samples of stream sediment.

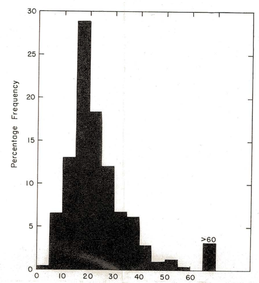


Figure 2. Histogram of lead concentrations in 507 samples of stream sediment.

DESCRIPTIVE NOTES

Geological

Almost all of the map-area is underlain by Palaeozoic rocks that range in age from Early Ordovician to Late Devonian. Volcanic rocks in the extreme southeastern part of the map-area are tentatively correlated with Coldbrook Group rocks of probable Proterozoic age. The northwestern third of the map-area is underlain by a widespread sequence of undifferentiated Lower Palaeozoic light to dark slates, argillites and impure quartzites of the Charlotte Group.

In the Oak Bay region, the base of the Silurian is marked by a belt of conglomerate that grades upward into an assemblage of greywacke, quartzite, siltstone and argillite. Andesite, rhyolite, dacite and basalt flows, breccias and tuffs predominate in the upper part of the Silurian section between Bocabec Bay and Lake Utopia. Volcanic and sedimentary units on the Mascarene-Letite Peninsula are highly deformed and intensely sheared, in contrast to generally less deformed unmetamorphosed rocks of similar lithology in the area northwest of the Magaguadavic River.

Eastport-type sedimentary rocks of possible Lower Devonian age are intruded by rhyolite and andesite volcanic necks near Chamcook Lake. The Upper Devonian Perry Formation consists of extensive terrestrial deposits of red conglomerate and sandstone, and minor intercalated basalt flows. Conglomerates containing granitic boulders and clasts of Silurian and pre-Silurian rocks are in most cases undeformed and rest unconformably on older rocks or in fault contact with them.

Lower Palaeozoic volcanic and sedimentary units are intruded by Ordovician gabbro-norite bodies, and Middle Devonian granitic batholiths and stocks. The large St. George batholith underlies the northeastern part of the map-area and is composed mainly of granite, quartz monzonite and adamellite. Three smaller stocks of similar composition intrude the Lower Palaeozoic sedimentary rocks of the Charlotte Group. Granitic rocks immediately east of Oak Bay are intimately associated with gabbro, diorite and diabase that are similar to, but may significantly post-date the gabbro intrusives at St. Stephen. Silurian and Lower Devonian sedimentary and volcanic rocks are locally intruded by gabbro and diabase dykes, sills and stocks.

The region has been heavily glaciated. Eskers, glacial striae, and stoss and lee slopes indicate a general southeasterly direction of ice movement. Double sets of striae in the area south of St. George reflect at least two ice advances. An older set bearing 145 degrees is combined with a younger set that averages 110 degrees. Thick deposits of glacial till and fluvioglacial sands and gravels cover most of the area and have markedly altered the pre-Pleistocene drainage pattern on the lower parts of the Magaguadavic River.

The principal mineral deposits in the district are massive, vein and disseminated copper-nickel deposits associated with the gabbroic intrusions, and copper-lead-zinc disseminated and vein-type deposits in the Silurian volcanic rocks. Molybdenum, tin and gold occurrences appear to be associated with some of the granitic bodies.

Map 1 should be consulted for further details on the geology and economic geology of the district.

Geochemical

The data recorded on this map are based on the analysis of 1,056 samples of fine-grained sediment collected from the channels of rivers and streams, and from rivulets flowing from springs and seeps. Where possible the active channels were sampled, but in a few cases bank material or residual sediment of dried up streams was used. Nickel has been determined in 549 samples from the northwest half of the map-area. Lead has been determined in 507 samples collected from the southeast part of the map-area (including Deer and Campobello Islands). Sediment samples from poorly drained areas of muskeg and beaver workings contained abundant decomposed organic matter. All samples were collected during the 1966 field season. An attempt was made to maintain a uniform sample density, but this was frequently not achieved because of irregularities in the drainage network and the absence of an actively deposited silt-sized fraction in streams draining areas underlain by coarse glacial till. All streams were traversed on foot, and samples were collected, where possible, at intervals of 1,000 to 1,500 feet.

Sediment samples were air dried prior to shipment to Bondar-Clegg & Company Limited, Ottawa, Ontario for laboratory analysis. Nickel and lead were determined by atomic absorption analysis after extraction from the -80 mesh sieve fraction by hot HNO_3 - HCl digestion. Values shown on this map are expressed in parts per million. The subdivisions used on the map are arbitrary, and the lowest subdivisions approximate the regional background values for nickel and lead.

The nickel content of the stream sediments ranges from 4 ppm to 300 ppm. The average background value is about 30 ppm, but this is variable, being as low as 20 ppm in some areas and as high as 50 ppm in the vicinity of the St. Stephen gabbro-norite body. The frequency distribution of nickel values shows 55.8 per cent of the analyses exceeding 25 ppm, and 13.1 per cent exceeding 45 ppm.

Copper-nickel deposits associated with the St. Stephen gabbro-norite intrusion are marked by higher than normal amounts of total Ni in nearby streams. These anomalies are broadly correlative with copper and cobalt anomalies over the gabbro-norite. Exploration and development of the St. Stephen copper-nickel deposits has been largely concentrated in the northern half of the basic intrusion. Sediments from streams draining the southwestern and eastern margins of the intrusion have produced higher than average nickel values and the geochemical data combined with aeromagnetic information[1], suggests that other gabbroic rocks occur southwest of Milltown in areas previously mapped as granite.

The lead content of the stream sediments ranges from 5 ppm to 330 ppm. The frequency distribution of lead data shows that 51.5 per cent of all analyses exceed the normal background value of 20 ppm, and 14.5 per cent of the analyses exceed 35 ppm. The presence of large concentrations of manganese hydroxides and oxides (Map 5) may be a factor in the localization of lead in some of the anomalous streams. A few higher than average values may reflect contamination from nearby settlements or roads. Sediments from streams draining the coastal region between the Digdeguash and Magaguadavic Rivers have produced anomalous lead values (40 ppm to 330 ppm) that are unrelated to high manganese contents, known deposits, or contaminating agencies. These streams drain an area that is underlain by andesite, rhyolite and basalt flows and intercalated red shales and siltstones of Silurian age.

The nickel and lead contents of stream and spring sediments shown on this map should be interpreted with respect to the geological environment (Map 1) and compared with the contents of individual elements in stream sediments on Maps 2 to 8 inclusive.

(1) Geol. Surv. Canada: Geophysics Paper 595, St. Stephen, New Brunswick, 1957.

Metal and Mineral Symbols

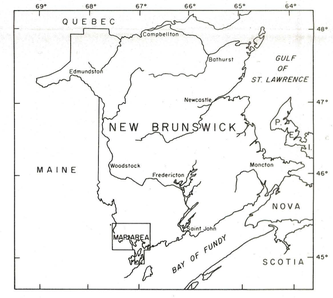
Arsenic ..... As	Silver ..... Ag	Hematite ..... hem	
Bismuth ..... Bi	Zinc ..... Zn	Malachite ..... mal	
Copper ..... Cu		Pentlandite ..... pn	
Gold ..... Au	Arsenopyrite ..... asp	Pyrite ..... py	
Lead ..... Pb	Chalcopyrite ..... cp	Pyrrhotite ..... po	
Molybdenum ..... Mo	Fluorite ..... fl	Quartz ..... qtz	
Nickel ..... Ni	Galena ..... gn	Sphalerite ..... sp	

INDEX TO MINING PROPERTIES AND PROSPECTS

1. Atlantic Nickel (Rodgers Farm): cp, po, pn.
2. Clark Farm ('A' Zone): cp, po.
3. Hall Carroll: po, cp.
4. Dennis Stream ('N' Zone): cp, po.
5. Grant Farm: cp, po.
6. 'C' Zone: cp, po.
7. Union Bridge - St. Croix River: cp, po.
8. Moores Mills - qtz, asp, gn, sp.
9. Rollingdam Molybdenite: Mo, fl.
10. Mt. Blair: cp, fl, mal, hem.
11. Oliver - Cameron: qtz, cp, Bi, Au, Ag, mal.
12. T. Dick: qtz, py, cp, po, gn.
13. Letite: qtz, cp, gn.
14. Simpson: sp, gn, py.
15. Daniel Hatt Farm: qtz, cp, po, gn.

Field work by W.J. Wolfe, M. Mason, G.J. Maserolle, J.M. Robbins, R.G. Garnett and D.K.J. MacKinnon

Analyses by Bondar-Clegg & Company, Limited, Ottawa, Ontario



Published, 1967

Copies of this map may be obtained from the Mines Division, Department of Natural Resources, Fredericton, New Brunswick

MAP 6

REPORT OF INVESTIGATIONS NO. 4

LEAD CONTENT OF STREAM AND SPRING SEDIMENTS

SOUTHWESTERN CHARLOTTE COUNTY, NEW BRUNSWICK

- Sample location
- 25 Concentration, 20 to 34 parts per million
- 95 Concentration, 35 parts or greater per million

SCALE 1:100,000

1.25 inches to 2 miles approximately

Miles / Kilometers

× Cu,Ni Location of known mineral occurrences (Symbols indicate principal metals)

Ⓢ Mining properties and prospects (see index)