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LORRAIN TOWNSHIP, SOUTHERN PART
CONCESSIONS I TO VI

DISTRICT OF TIMISKAMING

by

H.L. Lovell and J.W. de Grijs

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TABLE OF CONTENTS

Page

PHOTOGRAPHS

TABLES

CHART A

(back pocket)

Lorrain Township, Southern Part,
Concessions I to VI. Scale, 1:15,840 or 1 inch to ¼ mile.

ABSTRACT

Lorrain Township is noted as the original type-area of the Lorrain Formation and the Lorrain granite. The Lorrain Formation, composed principally of arkoses and quartzites, in particular is described in some detail. Keewatin-type metavolcanics, Gowganda Formation sedimentary rocks, and Nipissing Diabase in the southwestern part of Lorrain Township have mineral exploration potential for silver, and the Mission Point is formed of a large deposit of sand and gravel.

The shoreline area of Lake Timiskaming has outcrops rising high above the present lake level, providing many sites for a clear overview across the lake. The outcrops have been wave-washed clean by the waters of Pleistocene glacial Lake Barlow-Ojibway, and between the outcrops much of the soil has been formed into beach terraces. Large pines are growing on the thin soil occupying fractures and joint systems in the bedrock, and the Pleistocene lake beaches are covered mostly by Great Lakes-St. Lawrence hardwood forest that is relatively free of underbrush. This shoreline area constitutes natural parkland.

LORRAIN TOWNSHIP, SOUTHERN PART

CONCESSIONS I to VI

DISTRICT OF TIMISKAMING

by

H. L. Lovell[1] and J. W. de Grijs[2]

INTRODUCTION

The map-area comprises concessions I to VI of Lorrain Township, located 16 km (10 miles) southeast of the town of Cobalt between Lake Timiskaming and the Montreal River.

Means of Access

Access to the eastern part of the map-area is provided by Highway 567 from North Cobalt through the Lorrain Valley, a farming area, with side roads to Lake Timiskaming. The southwestern part is accessible by The Ontario Hydro-Electric Power Commission Road along the Montreal River. The southwestern part is accessible along the abandoned railroad from Cobalt to Silver Centre and is drivable to 1.6 km (1 mile) south of Silver Lake. Several auxiliary bush roads, trails, Hydro "right of ways", and cut concession lines provide further access; some of these are drivable if all-terrain vehicles are used. Water access is provided by Lake Timiskaming and the Montreal River.

Base Map and Present Geological Survey

Geological mapping was conducted during the summers of 1973 and 1974 using air photographs at the scale 1:15,840 or 1 inch to ¼ mile. Pace-and-compass traverses were run at approximately 0.8 km (½ mile) intervals. In areas with abundant outcrop or near geological contacts the distance between traverses was decreased where considered necessary. The geology was plotted on acetate sheets over air photographs obtained from the Silviculture Section of the Ontario Division of Forests. The geology was then transferred to a base map compiled by the Cartographic Unit of the Ontario Division of Lands from Forest Resources Inventory maps. Some corrections and updating were done to the base map, in accordance with information obtained in the field.

Topography

The northwestern part of the map-area tends to be flat-lying and swampy. The rest of the map-area is rugged; the highest point being the Monks Mountain area, approximately 434.3 m (1,425 feet) in elevation, some 240 m (800 feet) higher than Lake Timiskaming. In the area where Early Precambrian (Archean) rocks outcrop the hills are generally rounded, north-trending whalebacks. In the areas where Middle Precambrian rocks outcrop, steep sharp ridges occur. Many of the ridges appear to be the result of faulting with a steep gradient on one side and gently dipping slopes down the other side. The hills commonly consist of either diabase or Huronian sedimentary rocks, with contacts between them and other rocks in the valleys.

Natural Resources

Small logging operations are confined to the Lorrain Valley. The trees being harvested consist of pine, cedar, poplar, aspen, and birch. Farming is carried out in the Lorrain Valley.

Previous Geological Work

Sir William Logan (1847, p.51), founder

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and the first Director of the Geological Survey of Canada, in 1845 examined the shores of Lake Timiskaming. A.E. Barlow (1897) mapped an area of which Lorrain Township forms part and which is east and west of Lake Timiskaming, in 1887-1888 and from 1892-1895. W.G. Miller (1913) through 1905 to 1913 and 1923 comments on the geology of Lorrain Township. M.E. Wilson (1918) in describing the geology of Temiscamingue County in Quebec gives a great deal of information applicable to Lorrain Township.

GENERAL GEOLOGY

The map-area forms part of the Cobalt Plain (Gill 1949; Stockwell 1964) near the boundary between the Superior and Southern Provinces of the Canadian Precambrian Shield.

The Early Precambrian rocks include andesitic and basaltic lavas, diabase intrusions, and intrusions of granite hornblende syenite, and associated lamprophyre and syenite dikes and quartz monzonite.

Middle Precambrian rocks are represented by sedimentary rocks of the Huronian Supergroup, Cobalt Group, Gowganda and Lorrain Formations, and by Nipissing Diabase. The Gowganda Formation consists of greywackes, siltstones, and lenses of conglomerate. The Lorrain Formation is represented by medium- to coarse-grained arkose which occurs as massive and weakly bedded units and crossbedded units with a few pebbly bands. The Nipissing Diabase, intrusive into all the older rocks, is a massive, relatively unaltered rock.

The Pleistocene and Recent deposits consist of sand, gravel, varved clay, and till.

Early Precambrian (Archean)

METAVOLCANICS AND METASEDIMENTS (KEEWATIN TYPE AND TIMISKAMING)

Metavolcanics of Early Precambrian age occur in the southwestern part of the map-area. These rocks consist of metamorphosed massive andesites and basalts, porphyritic andesite (pale green plagioclase phenocrysts up to 1cm in length), pillow lavas and pyroclastic rocks, and some diabase. The rocks are fine grained, dark green to black in colour, and in many places contain no visible structure. Fine-grained (less than 1mm), disseminated pyrite (characteristically less than 0.5 percent) with minor chalcopyrite occurs in the metavolcanics.

The metavolcanics are foliated near their contact with the granitic and syenitic intrusive rocks, the foliation being approximately parallel to the contact. A few inclusions of metavolcanics occur in the syenitic and granitic intrusives. The inclusions are subrounded, up to 50cm in size, appear to be massive, and no preferred orientation could be discerned.

A block of metavolcanics appears to have been thrust up by the underlying Nipissing Diabase sill south of Bouck Lake so that it now is exposed as an inlier.

The diabase occurs as irregular masses in the metavolcanics.

On the island in Lake Timiskaming, in concession II, mafic tuff with distinct bands and lenses of greyish black and grey colours contains white feldspar fragments in places, and is interbedded with more massive greyish white hard felsic tuff, some of the latter cut by numerous quartz stringers containing small amounts of pyrite.

In the northwestern part of the island is a cliff-forming outcrop of Timiskaming conglomerate containing pebbles, cobbles, and boulders of a great range of roundness and sphericity. The largest boulder is 1.2 m (4 feet) long. Beds are not well defined. Rock types represented in the clasts are mainly metavolcanic.

FELSIC TO INTERMEDIATE INTRUSIVE ROCKS (ALGOMAN TYPE)

Lorrain Granite

The "Lorrain granite" (Thomson 1960, p.17-18) is present in the northwest part (north of Bouck Lake), the central and north-central part, and east of Highway 567 (north of the Mission Road to Lake Timiskaming). The Lorrain granite is overlain by Cobalt Group sedimentary rocks and intruded by Nipissing Diabase. The granite is massive, uniformly coarse to medium grained, with a distinctive flesh-red colour, although variations in colour do occur. East of Highway 567 the granite is weakly foliated, strikes north, and contains a few aplite veins and dikes having an average width of 5cm.

TABLE 1 TABLE OF LITHOLOGIC UNITS FOR LORRAIN TOWNSHIP, SOUTHERN PART

PHANEROZOIC
CENOZOIC
QUATERNARY
Pleistocene and Recent
Varved clays, sand, gravel, and till

GREAT UNCONFORMITY

PRECAMBRIAN
MIDDLE PRECAMBRIAN (PROTEROZOIC)
MAFIC INTRUSIVE ROCKS
Quartz diabase (Nipissing)

INTRUSIVE CONTACT

HURONIAN SUPERGROUP
COBALT GROUP
Lorrain Formation
Arkoses, crossbedded arkose with pebble bands, arkose "spotted alteration", crossbedded arkose, massive arkose, laminated arkosic sandstone and orthoquartzite and basal conglomerate

Gowganda Formation
Firstbrook Member
Arkose and interbedded argillite

Coleman Member
Greywacke, arkose, argillite and interbedded arkose, argillite with quartzite and conglomerate zones, siltstone, conglomerate with intercalated arkose and quartzite and basal conglomerate

UNCONFORMITY

EARLY PRECAMBRIAN (ARCHEAN)
FELSIC TO INTERMEDIATE INTRUSIVE ROCKS (ALGOMAN-TYPE)
Granite, syenite, biotite lamprophyre, aplite veins and dikes, and quartz monzonite

METAVOLCANICS AND METASEDIMENTS
METASEDIMENTS (TIMISKAMING)
Conglomerate and greywacke

MAFIC METAVOLCANICS (KEEWATIN-TYPE)
Massive basalts and andesites, pyroclastic rocks, porphyritic andesite, pillow lavas, diabase, and felsic and mafic tuffs

No important variation in mineral composition was observed during mapping. In hand specimens the plagioclases and biotite tend to be subhedral to euhedral, the orthoclase subhedral, and the quartz occurs in rounded grains. The composition is estimated visually in hand specimen to be as follows: quartz 30 to 40 percent, plagioclase 15 percent, microcline and orthoclase 20 to 30 percent, and biotite 5 percent. The biotite is considerably chloritized.

A Nipissing Diabase sill cuts the Lorrain granite 2.4 km (1.5 miles) east of Bouck Lake. The contact trends 120 degrees and dips 10 degrees north. The Lorrain granite shows no visible change at the contact although the Nipissing Diabase has a chill zone 5 to 10cm (2 to 4 inches) thick.

Syenite

The syenite is massive, medium to coarse grained, dark pink to red, with subhedral to euhedral crystals of feldspar. The composition estimated from hand specimen examination is: plagioclase 20 to 25 percent, potassic feldspar 40 to 50 percent, and the remaining 10 to 30 percent is made up of hornblende, minor biotite, and considerable chlorite and quartz.

This hornblende syenite is regarded as a closely related satellite body of the Lorrain granite (Thomson 1972). The contact between hornblende syenite and Lorrain granite was not observed, but appears to lie in a valley near the line between concessions II and III. The hornblende syenite outcrops in the general area between and around Lakes Anderson, Caswell, and Latour.

A wedge of hornblende syenite, 0.4 to 0.8km (¼ to ½ mile) northwest of Caswell Lake, appears to have been separated from the main mass of syenite below and to the north by a Nipissing Diabase sill. The Nipissing Diabase has a chill zone at the contact with the hornblende syenite. South of Paul's shaft (see section on Mineral Exploration) on the north shore of Anderson Lake a 10 by 25m (30 to 80 feet) inclusion of hornblende syenite occurs in the Nipissing Diabase.

Quartz Monzonite

The quartz monzonite outcrops in the southeast part of the map-area along the shores of Lake Timiskaming to 1.2km (3/4 mile) inland. The quartz monzonite is massive, medium to coarse grained and dark pink in colour.

Biotite Lamprophyre (Haileyburian?)

This is dark medium-grained rock with 20 percent coarse-grained biotite, having a preferred orientation parallel to the strike of the dikes. The biotite lamprophyre occurs as dikes in metavolcanics, generally less than 7m (23 feet) wide, striking northeast and dipping vertically. The dikes are difficult to trace owing to the scattered nature of the outcrops. The exposures seen are nearly collinear and may be one or more dikes. The dikes occur along a bush road north of Anderson Lake.

Aplite Veins and Dikes

Aplite veins and dikes are uncommon; they occur in the metavolcanics. The veins and dikes are related to the Lorrain granite and the hornblende syenite. Within the Lorrain granite and the hornblende syenite the aplite veins and dikes are very rare.

Middle Precambrian (Proterozoic)

HURONIAN SUPERGROUP

Cobalt Group

The Cobalt Group was originally defined by W. H. Collins (1917) and consisted of the Lorrain and Gowganda Formations. This was subsequently modified by R. Thomson (1957) (see Table 2), who subdivided the Gowganda Formation into the Firstbrook and Coleman Formations. In 1969 the Federal-Provincial Committee on Huronian Stratigraphy (Robertson *et al.* 1969, p.17) recommended that the Firstbrook and Coleman units be designated as Members of the Gowganda Formation.

TABLE 2 | COBALT GROUP?

Collins (1917, p.23)	Thomson (1957, p.40)	Federal-Provincial Committee on Huronian Stratigraphy (Robertson *et al.* 1969, p.17)	
Lorrain Formation	Lorrain Formation	Lorrain Formation	
Gowganda Formation	Firstbrook Formation	Gowganda	Firstbrook Member
	Coleman Formation	Formation	Coleman Member

GOWGANDA FORMATION

Coleman Member

The Coleman Member outcrops in the southwestern part of the township between the Montreal River and Caswell Lake and also west of Pointe a la Barke on Lake Timiskaming. The Coleman Member, on the basis of field mapping, was subdivided into stratigraphic units which from top to bottom are:

(4a) Basal conglomerate.
(4b) Siltstone and conglomerate with intercalated arkose and quartzite.
(4c) Argillite with quartzite and conglomerate zones.

The Coleman Member unconformably overlies the Early Precambrian (Archean) metavolcanics and intrusive rocks and was deposited upon a gently undulating basement topography. The Coleman Member strikes east-southeast to south-southwest, with dips 5 to 15 degrees south, and has a maximum thickness of 60 to 75m (200 to 250 feet).

(a) *Basal conglomerate* overlies the hornblende syenite and consists of closely packed angular to subangular fragments of hornblende syenite. The size and number of fragments decrease away from the hornblende syenite, and at 5m (15 feet) distance the fragments disappear and what is present is a silstone-conglomerate horizon.

(b) *Siltstone-conglomerate horizon* with intercalated arkose and quartzite. The conglomerate consists of 15 to 25 percent subangular to rounded pebbles, cobbles, and boulders of granitic rock and angular fragments of mafic metavolcanics with minor Early Precambrian metasediments being present. The distribution of pebbles, cobbles, and boulders appears to be random. The granitic pebbles and cobbles are pink and grey in colour. The matrix of the conglomerate consists of brownish grey very fine to fine-grained siltstone. Thin beds (maximum thickness about 20cm; 8 inches) of very finely laminated siltstone with minor interlaminated arkose and quartzite form discontinuous units. The siltstone-conglomerate horizon contains dropstones and appears to be glaciofluvial in origin.

(c) *Argillite with quartzite and conglomerate zones*: This unit comprises massive argillite beds 1 to 10cm (0.04 to 4 inches) thick, and laminated argillite (laminae 1 to 5mm, thick) ranging in colour from grey to brown to red. Lenses, about 50m (160 feet) long and 0.5m (1.5 feet) thick (maximum) of fine- to medium-grained quartzite, associated with conglomerate zones, is interbedded with the argillite. The conglomerate forms proportionately less of (c) than of (b) and is more feldspathic; bedding is less clearly defined and cobbles are mostly pink in colour. The conglomerate contains 15 to 30 percent rounded to subrounded granitic pebbles and cobbles with minor fragments of greenstone.

Firstbrook Member

Argillite and interbedded arkose: This unit represents a transition between the argillitic Coleman Member, Unit 4c, and the arkosic Lorrain Formation. No clear contacts were observed. The upper part of the Coleman Member shows a gradation into a laminated, very fine grained argillite (possibly the Firstbrook Member), red to reddish brown in colour though reversals occur, and medium-grained arkose beds (possibly lower Lorrain Formation) of variable thickness are present in places. This arkose in general contains a greater percentage of mafic fragments than observed in the Lorrain Formation proper.

At the eastern end of Caswell Lake, a coarse-grained argillite or fine-grained arkose occurs. This is a well laminated, pale reddish to buff coloured sequence of unknown thickness. It is thought to represent either the upper part of the Firstbrook Member or the Lower Lorrain Formation.

LORRAIN FORMATION

The Lorrain Formation forms the steep-sided hills fronting Lake Timiskaming and both sides of Lorrain Valley. It is also present in the southern parts of the map-area, and in a limited area north of Bouck Lake where the topography is less rugged. The thickness as determined from field observations may be as much as 240m (800 feet), although this has not been confirmed by drilling or by other means. The Lorrain Formation occurs in exposures varying from 3km (2 miles) in length to small scattered outcrops. It is in conformable contact with the Gowganda Formation and unconformably overlies the Early Precambrian basement rocks.

Thomson (1960, p.16) states that the Lorrain Formation near Cobalt "...is almost exclusively arkose notwithstanding the common reference to it as Lorrain quartzite...". D.G. Hadley (1968) and J. Wood (1971) also state that the Lorrain Formation is arkose. In the map-area the Lorrain Formation is entirely made up of arkose except at the lower contact with the Gowganda Formation where minor interbeds of argillite occur.

Logan (1863), Barlow (1897), Collins (1917), and J.F. Henderson (1936) describe the Lorrain Formation as coarse green quartzite. W.H. McIlwaine (1970, p.16) describes the main rock types as grey feldspathic quartzite, green quartzite, and pink arkose.

Hadley's (1968) examination of thin sections of the Lorrain Formation is summarized as follows:

(i) Quartz averages from 50 to 70 percent, increasing up the sequence.
(ii) Feldspar averages from 35 to 25 percent, decreasing up the sequence.
(iii) Rock fragments average from 8 percent to trace, decreasing up the sequence.
(iv) Upwards in the sequence the grains are more rounded and the degree of sorting is higher.

The compositions found by Hadley agree with the definitions of arkoses given by H. Williams, F.J. Turner, and C.M. Gilbert (1954, p.293) and R.L. Folk (1968, p.124).

Basal conglomerate and the relationship of the Lorrain Formation to the underlying formations: In seeking an explanation of the relationship of the Lorrain Formation with the underlying formations it appears necessary to consider the topography before the deposition of the Coleman Member. Considerable relief existed, and the Gowganda Formation was deposited in the valleys. By the beginning of the deposition of the Lorrain Formation the relief had been reduced (Thomson 1960, p.17-18). Contacts between the Lorrain granite and the Lorrain Formation form a transitional relationship from granite through decomposed granite to arkose (Collins 1917, p.22). The Gowganda Formation passes gradationally into the Lorrain Formation.

The transition from Lorrain granite and the hornblende syenite to Lorrain Formation does not show any clear-cut contact. At the base of the transitional basal conglomerate are large, up to 2m (6.5 feet) in size well rounded granitic boulders generally of low sphericity. The matrix is coarse grained, angular, and arkosic in composition. Up the section the matrix increases from 5 to 70 percent; the boulders decrease in size, remain well rounded, and show moderate to high sphericity. The matrix becomes less coarse grained and less angular. The composition of the boulders remains granitic although a few greenstone and other erratic boulders are present.

Within the basal conglomerate both laterally and up the section are what appear to be channels (?) in which are found very angular to subangular pebbles and boulders (5 to 30cm; 2 to 12 inches), composed of granitic rocks with a medium-grained arkosic matrix.

Lorrain Arkoses: The relationship between the basal conglomerate and the Lorrain arkoses appears to be either (a) transitional or (b) sharp conformable contact dependent on pre-existing topography.

In the valleys (or lower lying areas) the basal conglomerate contains decreasing amounts of pebbles and boulders which also decrease in size until the rock is typical Lorrain arkose.

The topographic highs result in a "sharp contact" between the basal conglomerate

Photo 1 - Large well rounded granite boulders near base of basal conglomerate of the Lorrain Formation.

(possibly regolith) and the arkoses. This may be seen best in the north half of concession IV 370m (1,200 feet) west of Latour Creek. The base of the arkose consists of the following:

(a) Lenses (2 to 3m, 6½ to 10 feet, in length and up to 10cm, 4 inches, thick) of medium-grained orthoquartzite filling small depressions.
(b) Thinly laminated pale green to white argillite, occurring in irregular patches of unknown extent and thickness, (though generally believed to be small) which are highly contorted due to soft sediment deformation.
(c) Thin (1 to 2cm, 0.3 to 0.7 inches) layers of coarse-grained arkose filling small depressions on the surface of the basal conglomerate.

The contact between the Lorrain arkoses and the underlying Gowganda Formation is transitional.

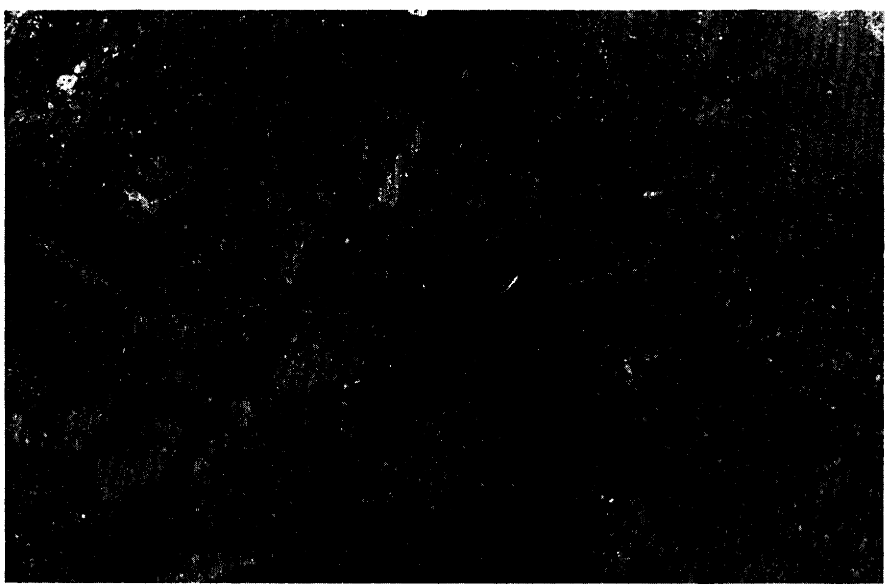

Photo 2 - Angular granitic fragments in basal conglomerate of the Lorrain Formation.

Photo 3 - Lens of orthoquartzite underlain by basal conglomerate of the Lorrain Formation.

During the field mapping the only contacts between the Lorrain Formation and the Lorrain granite seen were, a transition zone of Lorrain basal conglomerate the main components of which are boulders and smaller clasts of Lorrain granite.

The Lorrain arkoses, as stated previously, were seen in hand specimen examination to contain more quartz and less feldspar up section. The Lorrain arkose shows the following basic structures:

(a) Well bedded (2 to 3cm or 0.7 to 1 inch thick), fine- to medium-grained arkose with small (less than 2cm or 1 inch) fragments of granitic material.

(b) Apparently massive (up to 10m or 32 feet thick) arkose with occasional small fragments (less than 2cm or 1 inch) of granitic material.

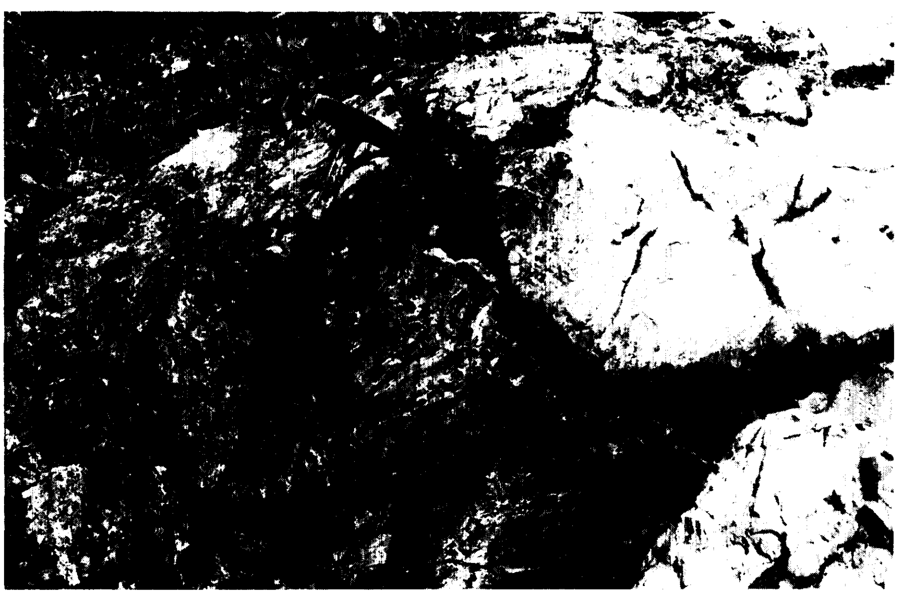

Photo 4 - Thinly laminated Lorrain argillite showing soft sediment deformation.

(c) Crossbedding in both tabular and trough form is present in about equal amounts. The range in size of crossbedding is: thickness 30 to 70cm (12 to 28 inches) and length 1 to 3m (3 to 10 feet), with inclination 15 to 20 degrees.
(d) Crossbedded arkose with pebble bands occurs only near the summit of what is locally known as Monk's Mountain in the southeastern part of the map-area. The pebbles are rounded, 2 to 5cm (0.7 to 2 inches) in size, and are composed of granitic and sedimentary rocks. The pebble bands lie at the base of graded beds occurring at the base of the crossbedding and foresets.

The following structures make up a very small part of the arkoses:

(e) Layers of "cherty" material, 5 to 10cm (2 to 4 inches) thick, forming distinct bands mappable for up to 100m (300 feet). The bands contain breaks which appear to have resulted from being plucked apart (boudinage?). These bands are restricted to the lower 50m (150 feet) of the Lorrain arkoses, as in a locality 600m (2,000 feet) north of the eastern arm of Latour Lake.
(f) Minor disconformities are present and consist of ripples ranging in length from 2 to 20cm (0.7 to 8 inches) between crests and are overlain by fine-grained argillite filling the troughs of the ripples. The argillite in-filling is overlain in turn by massive or crossbedded arkose.
(g) During the field mapping only one recognizable stream channel was observed. It is in concession IV, 700m (2,500 feet) west of Latour Creek. The stream channel is about 1m (3 feet) wide and 0.5m (1.5 feet) in depth, and is filled with fragments which are coarser than those in the surrounding rocks.

Deposition of the Lorrain Formation: The lower part of the Lorrain Formation according to Hadley (1968) was deposited in a shallow marine environment, probably marginal to a large delta based on the conformable transition from lacustrine argillites of the Gowganda Formation. The basal Lorrain Formation was succeeded by coarse delta-fringe sediments. This conclusion is based on the coarse-grained nature of the sediments, lack of silt and clay, a lack of upwards-fining cycles, and scour-and-fill channels.

According to McIlwaine (1970, p.16) the Lorrain Formation is a shallow water deposit derived from a granitic terrain. Hadley (1968) states that the source is dominantly an igneous-metamorphic terrain similar to the presently exposed Canadian Shield. During the early Lorrain possibly a granite or granite-gneiss yielded feldspar and quartz detritus. Palaeocurrents appear to have from north to south trends; however, owing to the nature of the exposures, very few determinations could be made.

Wood (1971, p.75), using feldspars as indicators of climatic conditions, states that there would appear to have been an amelioration of climate during deposition of the Lorrain Formation. Diaspore and kaolinite are present and are thought to be "in situ" feldspar alteration under "tropical" climatic conditions. The underlying Gowganda Formation is thought to be glacial in origin (Lindsey 1969).

MAFIC INTRUSIVE ROCKS

Quartz Diabase (Nipissing)

The quartz diabase is massive, dark grey, fine to coarse grained, and appears to be relatively unaltered. Examination of hand specimens shows plagioclase laths, pyroxene, hornblende (some altered from pyroxene), quartz, and minor disseminated pyrite and rare chalcopyrite. Joint surfaces show hematite and limonite staining and sparse serpentine. Minor quartz-calcite veins and epidote veins occur in the quartz diabase.

The quartz diabase near the apparent top of sill-like parts of the diabase grades into a transition rock having a variety of textures. The plagioclase, pyroxene, and hornblende are coarse grained and form needle-like chains. Within the transition rock, layered sequences occur. These are up to 20 to 30cm (8 to 12 inches) thick and show features resulting from turbidity currents by the slumping of crystals during cooling of the diabase sill.

No granophyre was observed although pink feldspar in the diabase is present in one isolated area about 300m (1,000 feet) east of Caswell Lake.

STRUCTURE OF THE QUARTZ DIABASE

The quartz diabase is the dominant phase of the Nipissing Diabase in the Cobalt area.

The quartz diabase was observed cutting all rock types in the map-area except the quartz monzonite in the southeastern part of the map-area. The Nipissing Diabase appears to comprise geometrically simple sills in the west-central and central part of the map-area and comprises part of a complex sill in the southwestern part of the township.

(a) A large simple sill exposed northeast of Bouck Lake is about 300m (1,000 feet) wide. Few actual contacts were observed but one contact with Lorrain granite at the southwestern end of the Nipissing Diabase intrusion strikes at about N60W and dips northwards at about 10 degrees. Thus the sill's true thickness is considerably less than 300m (1,000 feet). In plan view the sill forms a semicircle having a diameter of about 2.4km (1.5 miles). Scattered exposures of diabase occur between the western end of this sill and the township boundary and it is not clear whether these are linked with the sill.

(b) The complex sill in the southwestern part of the township probably represents part of a large basin complex occupying part of Gillies Limit and South Lorrain Townships. The thickness of this sill complex is unknown. Large areas of diabase up to 1,500m (5,000 feet) wide are exposed owing in part, to its flat-lying nature and in part to faulting, but regionally the dips vary considerably. Two vertical quartz diabase dikes 150 to 300m (500 to 1,000 feet) wide extend from the northern rim of the complex sill. The western dike lies near the Ontario Hydro road along the Montreal River. This dike is not exposed through to South Lorrain Township. The eastern dike extends all the way to the apparent south rim of the basin in South Lorrain Township.

The complex sill has apparently rafted up metavolcanics, hornblende syenite, and Cobalt Group sedimentary rocks. The rafts tend to be elongate, with lengths of three times their width and widths of 150 to 240m (500 to 800 feet) maximum.

CHLORITIC ALTERATION

A gradual increase in chloritic alteration, indicated by spotting in rocks, is thought to occur near cobalt-silver veins, (MacVeigh 1970) although this is not always the case. In the southwestern part of the map-area chlorite alteration occurs in all the Coleman Member rock types, increasing in intensity towards the quartz diabase.

Phanerozoic

CENOZOIC

Quaternary

PLEISTOCENE AND RECENT

Bedrock that was wave washed presumably by proglacial Lake Barlow (Thomson 1960, p.35) is exposed for the most part in the areas of higher elevation. The highest wave washed surface is located 295m (970 feet) above mean sea level on top of the hill 0.8km (½ mile) southwest of Mission Point (Thomson 1960, p.37). The hilltop is basal till that has not been reworked by lake waters, so the beach may represent the highest elevation attained by glacial Lake Barlow-Ojibway in Lorrain Township, a difference in relative postglacial rebound of 85m (250 feet) in only 110km (70 miles) to Pontiac Township to the north (Jensen 1975, p.22).

The overburden is generally thin except in the Lorrain Valley, the Montreal River valley, and along Latour Creek where glaciolacustrine varved clays were deposited. These clays are overlain by gravels in places.

The Montreal River has cut into sandbanks that are in part crossbedded. Along the shores of Lake Timiskaming are numerous deposits of sand, gravel, and boulder till. On the south side of many of the outcrops sand, gravel, and boulder till occur, although they are limited in thickness and in lateral extent.

The most prominent deposit of sand and gravel in the map-area is at Mission Point. At this location an esker-delta has formed where the narrows in Lake Timiskaming are framed by rock bastions near both shores.

STRUCTURAL GEOLOGY

Schistosity

The Early Precambrian (Archean) metavolcanics show the most prominent schistosity near contacts with the felsic to intermediate intrusive rocks. This schistosity is parallel to the contact. All other rocks in the map-area tend to show localized schistosity near faults.

Joints

The joint pattern was not studied in detail. The quartz diabase shows the most prominent jointing, resulting in places in steep cliffs with a maximum height of 15m (50 feet). The (roughly) horizontal joints are parallel or subparallel to the contact of the sill. Cylindroidal joints are present in the quartz diabase, e.g. near the Bigelow Farm, on the east side of a dried-up lake west of Highway 567, but are not common.

The felsic and intermediate intrusive rocks show only a weak joint pattern.

Faults

The faults in the map-area are generally marked by linear topographic depressions. Evidence from outside the map-area led Thomson (1960, p.25-26) to postulate that late movement, post-Silurian in age, had occurred on the Lake Timiskaming and Cross Lake Faults. Earliest movements may have occurred prior to intrusion of the Nipissing Diabase (Lovell and Caine 1970, p.8). The most prominent faults strike northwest. Their dips are unknown. Included in the northwest-striking faults are the Montreal River, Lake Timiskaming, and Cross Lake Faults. A possible north-striking fault (interpreted from air photographs) is followed by Latour Creek. Other faults of possible later age are the northeast-striking faults.

MINERAL EXPLORATION

Early work consisted mainly of pitting and trenching in the Nipissing Diabase and Keewatin metavolcanics. About 1911 Lang-Caswell Cobalt Mines Limited did exploration work about 300m (1,000 feet) southeast of Latour Lake. The work consisted of pits, trenches, and two shafts. The No.1 shaft was sunk to a depth of 47.2m (155 feet) with 3.9m (13 feet) of crosscutting on the 38.1m (125 foot) level. Little information is available on the No.2 shaft. No reports on mineralization are available and no ore was shipped (Gibson 1911, p.54).

In 1916 the Giroux shaft, 760m (2,500 feet) northeast of Anderson Lake was sunk on a silver-cobalt vein to a depth of 15m (50 feet), with 7.3m (24 feet) of crosscutting on the 15m (50 foot) level. During the 1920s a number of prospect shafts were sunk. In 1923 Paul's shaft, 150m (500 feet) north of Anderson Lake, was sunk to a depth of 15m (50 feet) on a shallow, rich silver vein that was 0.6m (2 feet) wide but did not persist to any depth (Northern Miner 1923). In the same year, a short distance west of Paul's shaft, the McKinley-Darragh-Savage Mines of Cobalt Limited drilled three holes, but the whereabouts or existence of core logs is not known.

Between the years 1925-1927 Manasseh Silver-Cobalt Mines Limited (formerly Pine Lake-Lorrain Mines Limited) sank a shaft, 400m (1,300 feet) south of Bouck Lake, to 68.6m (225 feet) and did 60m (200 feet) of lateral work.

In 1951 Siscoe Metals of Ontario Limited rehabilitated the Lang-Caswell No.1 shaft and carried out a program of surface drilling. Mineralization in the drill core consisted of pyrite, pyrrhotite with minor chalcopyrite, and cobalt arsenides (Pearson 1951).

During 1963 (J. Price), 1966 (G.J. Quinlan), and 1970 (Chukuni) minor footages were diamond drilled (see Description of Properties 8, 7, 2). In 1972-1973 Aggressive Mining Limited carried out a program of geological mapping, geochemical surveys, and drilling; and Thomson (1972) carried out a geological mapping program in the southern part of the township.

No production of metals is on record for concessions I to VI of Lorrain Township. Numerous sand and gravel pits (quarries) exist in the map-area but owing to the shallow nature of the overburden, their size is limited, with the exception of the esker deltaic deposit that forms Mission Point on the shore of Lake Timiskaming.

Description of Properties and Mineral Deposits

AGGRESSIVE MINING LIMITED (1)

Geology

The property consists of a block of unpatented claims in concession I, lots 3 to 6. Gowganda Formation sedimentary rocks and limited outcrops of Lorrain Formation in the southeastern part of the property are intruded by quartz diabase (Nipissing). Dip measurements on the diabase indicate that it forms a basin under the property (MacVeigh 1970). An irregular wedge of hornblende syenite is exposed in the northern end of the property. Drilling indicates that hornblende syenite underlies much of the property (MacVeigh 1970).

Economic Features

Minor pyrite and chalcopyrite mineralization occurs in the Coleman sedimentary rocks. Several varieties of spotted alteration are prominent in parts of the property. The intensity of the spotted alteration is related to the distance from the quartz diabase and the composition and texture of the host rock.

History

Numerous trenches in both overburden and bedrock are located on the property; they are believed to have been dug in the mid-1920s. In 1972 to 1973 geological, geochemical, and electromagnetic surveys were carried out and eight diamond drill holes were drilled to a depth of 971.1m (3,186 feet) by Aggressive Mining Limited (Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake).

CHUKUNI GOLD MINES LIMITED (2)

A shaft was sunk in metamorphosed andesite and basalt about 180m (600 feet) north of the contact between hornblende syenite and metavolcanic rocks in concession II, lot 5, N½, SW¼, patented claim T10682½. The depth and the age of the shaft are not known. Syenite, syenite porphyry, and lamprophyre were intersected in three diamond drill holes with a total footage of 234m (766 feet) from the same setup during a 1970 drill program by Chukuni Gold Mines Limited (Exploration Files, Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake). Mineralization consists of minor pyrite and chalcopyrite disseminated in feldspar porphyry and lamprophyre, and along slips in chlorite schists. Drill core assayed trace amounts of silver (Thomson 1970a).

DUREX MINES LIMITED [1947] (3)

Work was done on four claims; two in Lorrain Township, (concession II, lot I, N½, NW¼ and SW¼) and two in Gillies Limit (block 62, Claims 27089 and 27090). The area is underlain by Nipissing quartz diabase. Mineralization was not reported (Benner 1947). The ground was open for staking at time of writing in 1975.

GIROUX SILVER-COBALT DEPOSIT (4)

In 1916 Fred Giroux sank a 15m (50 foot) shaft on formerly patented claim T10722, concession II, lot 5, N½, NE¼. On the 15m (50 foot) level 7.3m (24 feet) of crosscutting was done. Three holes (footage unknown) were drilled in 1949. (Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake).

Exposures are limited; sparsely distributed outcrops consist of mafic to intermediate metavolcanics. A high-grade silver and cobalt vein 3m (9 feet) long and 25cm (10 inches) wide was found in the vicinity of the shaft (Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake). In a pit about 270m (900 feet) northeast of the shaft niccolite is reported to have been found.

LEPALADAN CORPORATION LIMITED (5) (LANG-CASWELL SILVER-COBALT DEPOSIT)

Geology

The property lies southeast of Latour Lake, concession I and II, lot 8. Shafts were sunk on quartz diabase containing a number of "veins". On surface the Lorrain Formation occurs some 180m (600 feet) south of the shafts.

Economic Features

Core from a drilling program carried out in 1951 by Siscoe Metals of Ontario Limited contained pyrite, pyrrhotite and minor chalcopyrite. One drill hole is reported to have intersected cobalt arsenides (Pearson 1951).

History

In 1910 Lang-Caswell Cobalt Mines Limited sank No.1 shaft to a depth of 47.2m (155 feet), with 39.9m (131 feet) of crosscutting on the 38.1m (125 foot) level, and also sank No.2 shaft to 10m (32 feet). Extensive trenching and pitting were carried out (dates uncertain). In 1951 Siscoe Metals of Ontario Limited drilled six holes (659.3m, 2,163 feet) and dewatered the shaft (Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake). Lepaladan Corporation Limited is the current owner of the group.

R.D. NEGUS (6)
(GOODWIN LAKE SILVER-COBALT DEPOSIT)

Geology

The property consists of 12 leased claims south of Goodwin Lake in concessions VI and VII, lots 4 and 5 and in 1973 belonged to R.D. Negus. A shaft was sunk in 1910 by Crown Reserve Mining Company Limited to a depth of 15m (50 feet), collared on one of two sets of quartz-carbonate veins in quartz diabase. The veins are mineralized with native silver, an unspecified cobalt mineral, chalcopyrite, and pyrite (Thomson 1960, p.81). The Cross Lake Fault passes through the claim group.

Economic Features

At the shaft the quartz-carbonate vein carried silver to a depth of 8m (26 feet); several bags of high-grade ore were picked (Thomson 1960, p.81-82).

History

In 1910 Crown Reserve Mining Company Limited did surface trenching and sank the above mentioned 15m (50 foot) prospect shaft on what is now claim T45965. From 1910 to 1950 little or no work appears to have been done on the property. Surface work was done in 1950 by M. Halstead. In 1955, 12 drill holes with a total footage of 549.3m (1,802 feet) and from 1959 to 1963, 14 drill holes with a total footage of 482m (1,580 feet) were drilled by E. de Camps (Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake). The property is owned as of January 1972 by R.D. Negus.

A.G. PAOLETTI AND D. COLEMAN (7)
(MANASSEH SILVER-COBALT DEPOSIT)

Geology

This property consists of an irregular block of 10 patented claims, covering part of Bouck Lake (formerly Pine Lake) and the land to the south (concessions II and III, lots 1 and 2). On claim T19794 a shaft was sunk on a silver-cobalt vein near the contact between mafic metavolcanics and Nipissing quartz diabase.

Economic Features

At 51.2m (168 feet) depth down a shaft sunk on silver-cobalt veins there was "plenty of cobalt though silver values were not high" (Anon. 1930). Drilling in 1966 revealed the presence of a quartz zone 3.4m (11 feet) wide containing "heavy mafic minerals" and chloritic contacts (Willars 1966).

History

In 1925 surface trenching was begun by Pine Lake-Lorrain Mines Limited and a shaft was sunk to 12m (40 feet) by hand. Work resumed in 1926 and the shaft was deepened to 67m (220 feet) with 60m (200 feet) of drifting and crosscutting on the 60m (200 feet) level. Work ceased in 1927.

In 1951 the name of Pine Lake-Lorrain Mines Limited was changed to Manasseh Silver-Cobalt Mines Limited. During 1966, five holes (154m, 505 feet) were drilled by J.J. Quinlan (Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake).

PRICE SILVER-COBALT DEPOSIT (8)

Geology

The property lies at the west end of Anderson Lake (concession II, lot 4). The rocks are fine-grained Nipissing Diabase. About 150m (500 feet) south of the main showing quartz diabase forms a prominent ridge.

Economic Features

Cobalt bloom was reported from a pit near the southwestern part of Anderson Lake (Thomson 1951).

History

In 1951 pits and trenches were dug by Mrs. James and P. Campbell (Thomson 1951). Two holes (64.6m, 212 feet) were drilled in 1963 by J. Price (Resident Geologist's Files, Ontario Ministry of Natural Resources, Kirkland Lake). The holes intersected granite and metavolcanics. Pyrite, hematite and quartz stringers were found in the metavolcanics. At time of writing in 1975 the area was open for staking.

R. THOMSON (9)

Geology

This property consists of a block of unpatented claims in concession II, lots 3, 4, and 5. Early Precambrian metamorphosed pillowed, amygdaloidal, and porphyritic andesite and basalt lavas are present. The absence of interflow sedimentary bands made tracing of individual flows impracticable. Hornblende syenite, feldspar porphyry, and feldspathic dikes cut the metavolcanics. The dikes are narrow, having a maximum width of 3 to 5cm (1.2 to 2 inches). The metavolcanics have been intruded by diabasic rocks some of which may be of Early Precambrian age. Biotite lamprophyre dikes also cut the metavolcanics, but could not be followed continuously, although all the occurrences appear to be part of the same dike. The sedimentary rocks of the Coleman Member overlie the metavolcanics. All the above rocks have been intruded by Nipissing quartz diabase.

Economic Features

A rich silver occurrence was found at Paul's shaft by Richardson. The Northern Miner (1923) reported: "The surface silver showing in a vein two feet wide was blasted out with the first round, and while from time to time in the shaft sinking silver was found the quantities were small". The best assay from drill core was 0.04 oz. Ag/ton over 0.1m (0.4 feet) (Thomson 1970b).

History

In the 1920s the surface was prospected and numerous trenches and pits excavated, particularly in the area of Paul's shaft, which was sunk to a depth of 15m (50 feet). (Thomson 1972).

In 1923 three holes were drilled by the McKinley-Darragh-Savage Mines of Cobalt Limited. No records of these holes are known to exist. In 1950 Vanadium Exploration Syndicate drilled a 49.4m (162 feet) hole which encountered nothing of economic significance (Thomson 1972). In 1970 three holes (87.2m, 286 feet) were drilled by R. Thomson in the vicinity of Paul's shaft and chalcopyrite and low silver assays reported (Thomson 1972). During 1971 to 1973 geological and limited geochemical surveys and trenching were done by R. Thomson. In 1975, of the original group, only claim L401343 was still held by R. Thomson.

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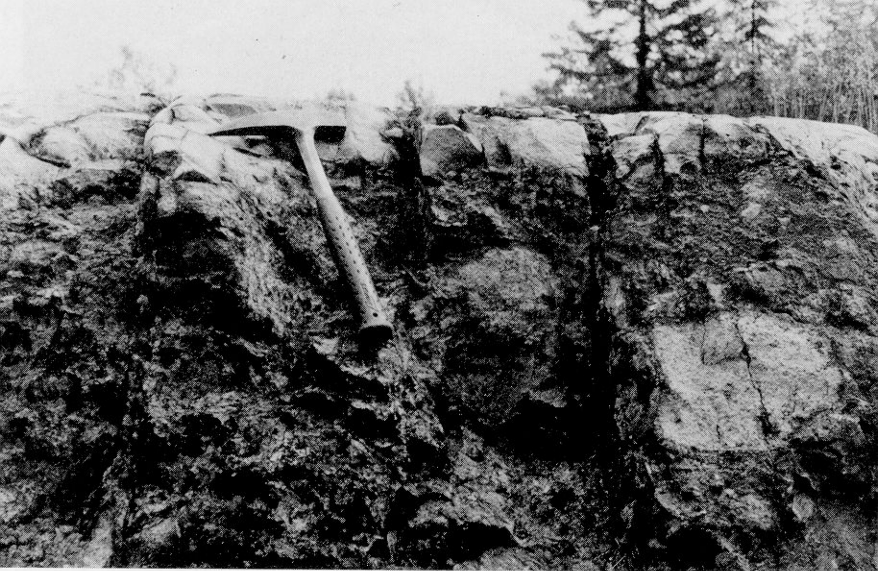

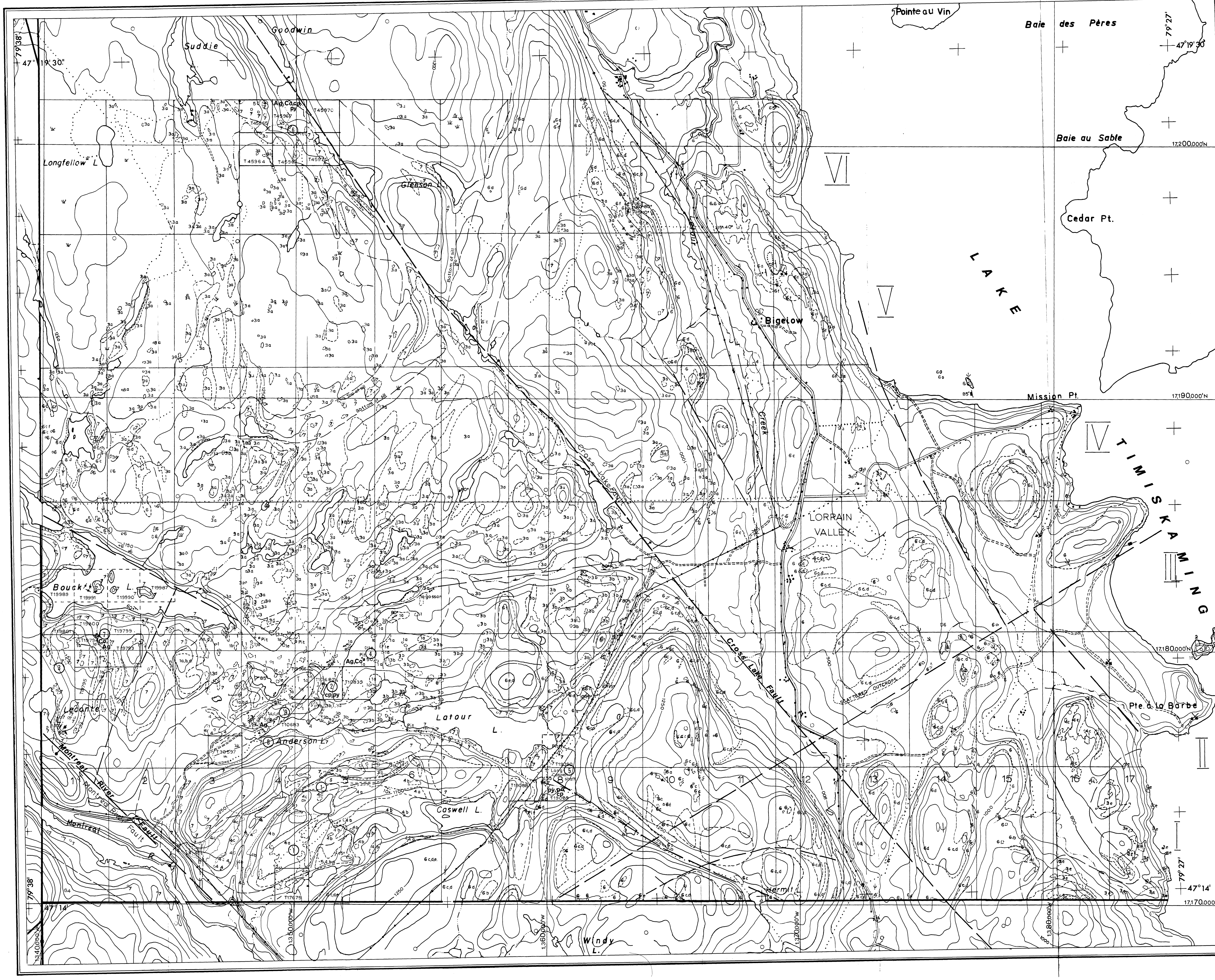

Ontario
Division of Mines

HONOURABLE LEO BERNIER, *Minister of Natural Resources*
DR. J. K. REYNOLDS, *Deputy Minister of Natural Resources*
G. A. Jewett, Executive Director, Division of Mines *E. G. Pye, Director, Geological Branch*

CHART A
LORRAIN TOWNSHIP
SOUTHERN PART
CONCESSION I TO VI

DISTRICT OF TIMISKAMING

Scale: 1:15,840 or 1 inch to ¼ mile

NTS Reference: 31M/3W, 4E, 5E, 6W
ODM-GSC Aeromagnetic Map: 1481G, 1482G, 1491G, 1492G
ODM Geological Compilation Series Map: 2205

LEGEND

PHANEROZOIC
CENOZOIC
QUATERNARY
PLEISTOCENE AND RECENT
Varved clays, sand, gravel, and till

GREAT UNCONFORMITY

PRECAMBRIAN
MIDDLE PRECAMBRIAN (PROTEROZOIC)
MAFIC INTRUSIVE ROCKS

7	7	Quartz diabase (Nipissing)

INTRUSIVE CONTACT

HURONIAN SUPERGROUP
COBALT GROUP
Lorrain Formation

6	6	Unsubdivided
	6a	Crossbedded arkose with pebble bands
	6b	Arkose "spotted alteration"
	6c	Crossbedded arkose
	6d	Massive arkose
	6e	Laminated arkosic sandstone and orthoquartzite
	6f	Basal conglomerate

Gowganda Formation
Firstbrook Member

5	5	Arkose and interbedded argillite

Coleman Member

4	4	Unsubdivided greywacke and arkose
	4a	Basal conglomerate
	4b	Siltstone, conglomerate with intercalated arkose and quartzite
	4c	Argillite with quartzite and conglomerate zones

UNCONFORMITY

EARLY PRECAMBRIAN (ARCHEAN)
FELSIC TO INTERMEDIATE INTRUSIVE ROCKS (ALGOMAN-TYPE)

3	3a	Granite
	3b	Syenite
	3c	Biotite lamprophyre
	3d	Aplite veins and dikes
	3e	Quartz monzonite

METAVOLCANICS AND METASEDIMENTS
METASEDIMENTS (TIMISKAMING)

2	2	Conglomerate and greywacke

METAVOLCANICS
Mafic Metavolcanics (Keewatin-Type)

1	1	Unsubdivided basalts and andesites
	1a	Massive basalts and andesites
	1b	Pyroclastic andesite
	1c	Porphyritic andesite
	1d	Pillow lava
	1e	Diabase
	1f	Felsic and mafic tuffs

GEOLOGICAL AND MINING SYMBOLS

Glacial striae.
Area of bedrock outcrop.
Bedding, top unknown; (inclined, vertical).
Schistosity; (horizontal, inclined, vertical).
Geological boundary, position interpreted.
Fault; (observed, assumed). Spot indicates down throw side.
Lineament or fault.
Jointing; (horizontal, inclined, vertical).
Shaft; depth in feet.
Gravel pit.
Bedrock contour.

METAL AND MINERAL REFERENCES

Ag .... Silver
Co .... Cobalt
cp. .... Chalcopyrite
po .... Pyrrhotite
py .... Pyrite
qcv .... Quartz-calcite vein

LIST OF PROPERTIES AND MINERAL DEPOSITS

1. Aggressive Mining Limited
2. Chukuni Gold Mines Limited
3. Durex Mines Limited [1947] *
4. Giroux Silver-Cobalt Deposit
5. Lepaladan Corporation Limited (Lang-Casell Silver-Cobalt Deposit)
6. Negus, R.D. (Goodwin Lake Silver-Cobalt Deposit)
7. Paoletti, A.G. and Coleman, D. (Manasseh Silver-Cobalt Deposit)
8. Price Silver-Cobalt Deposit
9. Thomson, R.

*Note: Date in square brackets indicates last year of exploration activity on land now open for staking.

SOURCES OF INFORMATION

Geology by H.L. Lovell and J.W. de Grijs, 1973, 1974.

Base-map derived from maps of the Forest Resources Inventory, Ontario Division of Lands.

Air photographs from Air Photo Library, Ontario Ministry of Natural Resources.

Geology is not tied to surveyed lines.

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