



GEOLOGICAL  
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DEPARTMENT OF MINES  
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PAPER 65-21

CONTWOYTO LAKE MAP-AREA  
DISTRICT OF MACKENZIE

76<sup>E</sup>/<sub>11</sub> and 76<sup>E</sup>/<sub>14</sub>. (part of)

(Report and Map 12-1965)

L. P. Tremblay



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OF CANADA**

**PAPER 65-21**

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DISTRICT OF MACKENZIE**

**L. P. Tremblay**

**DEPARTMENT OF MINES AND TECHNICAL SURVEYS**

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ROGER DUHAMEL, F.R.S.C.  
Queen's Printer and Controller of Stationery  
Ottawa, Canada

1966

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## ABSTRACT

Contwoyto Lake map-area is underlain almost entirely by metamorphosed sedimentary rocks. In the northeast quarter these are black to grey argillite, slates, and siltstone of the Yellowknife Group type and include a few narrow beds and lenses of garnet-cummingtonite-quartz-sulphide gneiss. These are the top unit of the stratigraphic succession. This unit grades to the south and west with increasing metamorphism into nodular (cordierite mainly) schists, some augen gneiss, and biotite-andalusite schists.

The nodular schists are underlain by a fine-grained granular, well layered, quartz-feldspar-biotite gneiss, which, with facies changes and higher metamorphism, is probably represented in the southwest corner by a layered mixture of anthophyllite-garnet-cordierite gneiss and granitoid gneiss. In the southeast corner related rocks are carbonate-bearing and were probably calcareous.

The lowest stratigraphic unit covers the southwest quarter of the map-area and is a fine-grained granular quartz-feldspar gneiss, low in biotite, which grades locally into red granite.

A white, extensively pegmatitic granite locally carrying black tourmaline covers a large area in the northwest quarter of the map-area. It is surrounded by a narrow aureole of nodular schists, and encloses many remnants of these schists.

Northwesterly to, rarely, easterly trending gabbro dykes cut all other rocks.

Gold has been reported from many showings, the Canadian Nickel prospect on Contwoyto Lake being the most important to date. Gold is found in the garnet-cummingtonite-quartz-sulphide gneiss, closely associated with pyrite or pyrrhotite and arsenopyrite.



## CONTWOYTO LAKE MAP-AREA

### DISTRICT OF MACKENZIE

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#### INTRODUCTION

Contwoyto Lake map-area is 250 miles northeast of Yellowknife and is reached by chartered aircraft. It is just south of the northwest end of Contwoyto Lake. In 1964, on July 7 very few lakes could be used by float-equipped aircraft, but by July 10 all but Contwoyto Lake were free of ice. Contwoyto Lake still had some ice on August 8.

Relief is generally less than 200 feet but near Contwoyto Lake it is slightly more than 300 feet. Granite, amphibolite, and gneiss areas are more rugged than those of less altered sediments and schists. Most of the area is covered with overburden and most outcrops are accumulations of frost-heaved blocks. The best outcrops are in areas of granite, amphibolite, and gneiss.

#### GENERAL GEOLOGY

All the rocks are of Precambrian age. Except for the granite in the northwest corner, some of the amphibolite masses in the southern half of the area, and the gabbro dykes, all are metamorphosed sediments. Stratigraphically, the oldest rocks are in the southwest corner and the youngest near the Inco camp on Contwoyto Lake. This succession seems to coincide with zones of increasing metamorphism, the more intensely metamorphosed rocks occurring at the base of the succession, the least metamorphosed near the top.

The lowest unit (1) is a fine-grained granular quartz-feldspar gneiss. This gneiss is buff to orange, massive to faintly gneissic in outcrop and of fairly uniform composition. It is all crudely gneissic in hand specimens. Unit 1 is composed of about 50 per cent oligoclase, 15 per cent microcline, 30 per cent quartz, and 5 per cent biotite. It grades into a coarse-grained red granite, passing through a transition stage of somewhat coarser grained granular quartz-feldspar gneiss. It is traversed by pegmatite and grades locally into what appear to be remnants of the original sedimentary rocks.

Overlying unit 1 is another band of fine-grained granular quartz-feldspar-biotite gneiss (2). This gneiss is well layered, in general has more biotite than unit 1, and some beds are garnetiferous. It locally resembles a quartzite. This band envelops the lowest unit (1) on the east, north, and northeast and in most places is less than one mile thick. The



rock is made up mainly of tiny (0.2 mm) quartz grains enclosed in various amounts of sericitic material. In some layers the sericitic material is the main constituent and these alternate with layers containing considerable quartz grains. Some of the sericitic material is possibly altered feldspar. Also present is some dirty green biotite and a few poikiloblastic garnet grains with abundant quartz inclusions.

The interlayered mixture of anthophyllite-garnet-cordierite-quartz gneiss and granitoid gneiss (3) outcrops in two basin-like areas in the southwest corner of the map-area. It is probably equivalent to unit 2 but is composed of more highly metamorphosed rocks and also possibly represents a facies change toward the south and southwest. Unit 3 consists of much anthophyllite and garnet in a base of abundant cordierite with fine-grained interstitial quartz.

The dome-like area (3b) in the southeast corner probably belongs to the same unit (3) but there the rocks are less metamorphosed and are in part carbonate-bearing, suggesting that they may have been calcareous originally.

The nodular schist (4) is a dark grey and dark brown to black weathering rock. It is a metamorphic rock derived by regional metamorphism from rocks similar to those of unit 6 but lower in the succession. Rocks of unit 4 are massive to faintly schistose and are locally well layered or bedded. They are made up of abundant black to dark grey nodules in a granular mass of fine- to medium-grained quartz-biotite schist or gneiss. The nodules are generally less than 1 inch in size. They are oval to irregular in shape, and are more common in the argillaceous parts than in the sandy parts of beds, where bedding is thin and obvious. The massive nodular schist is generally sandy and monotonously uniform. The nodules represent large poikiloblastic crystals of cordierite with much included biotite and quartz. The nodular schist is interbedded with a few layers of biotite-andalusite schist (4a) in which the biotite occurs as large flakes in abundant books and andalusite as large elongated poikiloblastic grains with abundant quartz inclusions.

The nodular schist (4) occupies a belt extending north and east of the area underlain by rocks of unit 2. It occurs also as an aureole about the mass of granite (8) in the northwest corner of the map-area. This aureole appears to be the direct result of metamorphism by the granite and the rocks may be younger than those in the main part of the belt to the south. This main part of the belt, directly overlying unit 2, is very wide in the southeast corner of the map-area but much narrower south of Norma Lake or to the north. This distribution suggests that the dip is more gentle in the southeast quarter and steepens to the north, although this is not confirmed by actual measurements in the field.

The augen gneiss (5) is rusty white and coarse grained. It is granitoid and consists of large, white, round feldspar grains and abundant coarse biotite flakes in a fine-grained base of quartz, feldspar, and biotite. It occurs mainly as large lenticular masses, but it is also found locally as small beds and lenses interbedded with the nodular schist (4) and the coarse biotite-andalusite schist (4a).

The argillite, slate, and siltstone (6) are the relatively unmetamorphosed equivalents of the nodular schists (4), and cover most of the northeast quarter of the map-area. They are generally fine grained and grey to black, and are made up of tiny grains of quartz and feldspar in a matrix of biotite or chlorite. The matrix is more abundant in the argillite and slate than in the siltstone. These rocks are fairly well bedded but, due to poor exposures, to great similarities of composition, and to only minor differences in grain size, bedding is not always apparent. Where visible, beds are thin with different rock types closely alternating. The siltstone is generally lighter grey and more massive than the argillite. It is also slightly coarser grained, occurs in thicker beds, and appears to be more abundant than the argillite. Locally it is rusty buff where carbonates have weathered, or greenish and dioritic where hornblende is abundant. Blebs of pyrite probably representing concretions are present locally. The slate occurs as narrow beds or zones in fairly massive siltstone and is more common in the apex of folds or where these sediments show much deformation and are closely folded. The argillite is generally faintly schistose but its schistosity is not always distinct enough to measure.

The garnet-cummingtonite-quartz-sulphide rock (6c) is black to reddish black and dark green. It is generally medium- to coarse-grained and massive and its weathered surfaces are invariably rusty. It is made up of abundant red garnet and amphiboles of the cummingtonite group and of various amounts of sulphides, quartz, and other minerals. Some of the amphiboles are deep blue in thin-sections and are probably soda-bearing varieties. The garnet is approximately 80 per cent almandine and 20 per cent spessartite (Baragar and Hornbrook, 1963, p. 14). Most of the sulphides are pyrite or pyrrhotite and arsenopyrite. There is also some chalcopyrite, and loellingite (Schiller and Hornbrook, 1964, p. 11) has been identified. Some of this rock has no garnet and consists mainly of a fibrous amphibole. This variety is mainly light to dark green, better foliated, and much finer-grained than the garnet-bearing rock, and outcrops are rarely rusty. Parts of it carry abundant white feldspar and resemble diorite. All these rocks occur as beds interbedded with argillite, slate, and siltstone and as lenses distributed along certain horizons. The beds are thin, generally less than one foot wide, and occur in groups forming zones. These zones may reach 60 feet wide, as on the Inco showing, and locally were traced intermittently for more than 5,000 feet, as on the east shore of Contwoyto Lake, on ground optioned to Falconbridge. The lenses are short and narrow and generally occur along several closely spaced horizons. Gold has been reported from rocks of this unit (6c) and this was the reason for

the work done in this area. Most occurrences of unit 6c are too small and too narrow to be shown separately, but their locations are shown on the map by the symbol 6c. In general they follow the trend of the enclosing sediments, but only in rare instances were outcrops sufficiently continuous to permit the narrow individual beds to be traced far.

Dark green to black amphibolite (7) occurs as layers or lenses and as irregular bodies. Amphibolite in the irregular bodies is massive, coarse-grained, and of variable composition. It may consist mainly of hornblende and be a typical amphibolite, or it may carry much plagioclase (at least as basic as a calcic andesine) and possibly pyroxene, and be a gabbro or a diorite. In part it may also be porphyritic having large, up to 2-inch, hornblende crystals in a coarse-grained matrix of hornblende and plagioclase or in a fine-grained matrix of epidote, carbonate, and feldspar. Garnet is absent.

The layers and lenses of amphibolite are interbedded with the nodular schist (4). They consist of a fine-grained, well foliated, and garnetiferous rock, made up of fine hornblende needles, abundant tiny black biotite flakes, and granular quartz and feldspar. These layered rocks are included with the amphibolites but are really hornblende schist or gneiss. Both the massive and lens-like types are slightly mineralized with pyrite or pyrrhotite but no gold has been reported.

The biotite-muscovite granite (8) is intrusive into the nodular schist (4) and encloses blocks or remnants of schist of all sizes. Locally the remnants are abundant, elsewhere they are rare or absent. The granite is a massive coarse-grained rock with sharp contacts. It is extensively pegmatitic, fine-grained phases are rare and occur mainly near the east and south boundaries of the granite mass. The pegmatite bodies are either dykes with sharp contacts or large irregular masses in coarse-grained or somewhat finer-grained granite. The granite is made up of about 30 per cent quartz, 25 per cent microcline, 40 per cent calcic oligoclase, 4 per cent muscovite, and 1 per cent greenish brown biotite, with traces of apatite and iron oxides. Locally the biotite content is much higher (8b). Muscovite is the principal mica in the pegmatites and in places much black tourmaline in long prismatic crystals is also present. The granite of the small masses (8a) within the nodular schist in the southeast quarter of the area is massive, fine-grained, white to buff, and biotite-bearing. The small mass (8e) in unit 2a is a large, very coarse-grained, muscovite-bearing pegmatite. The syenite body (8f) is coarse grained, massive, and comprises only pink feldspar and hornblende altered in part to chlorite.

Gabbro and basalt (9) occur mainly as dykes. They appear to be more abundant in the northern half of the area than in the south but this may be due to better exposures in the north. There are also a few sills. Most of the dykes and sills trend between north and northwest but a few trend northeasterly and easterly. Most were traced for more than a mile and one extends for 15 miles. They appear to dip steeply about 70 degrees. The

constituent rock is fresh, generally black to dark green, and massive. It is fine grained at the contacts and somewhat coarser near the centres, the coarseness of the rock at the centres varying with the thickness of the body. The width of all the known dykes and sills is less than 400 feet, and is very uniform for any single dyke except where the latter pinches out. Both gabbro and basalt are made up of about 39 per cent labradorite, 50 per cent pyroxene and its alteration products (amphibole and some chlorite and biotite), 7 per cent magnetite and about 4 per cent interstitial quartz and feldspar. A few dykes are light green and seem to carry more feldspar and less black or dark green minerals.

### STRUCTURAL GEOLOGY

The large area of granular gneiss (1) in the southwest corner of the map-area is probably a dome and the granite (8) area in the northwest corner may be regarded also as a dome-like structure. Analogous structures probably exist to the northeast outside the map-area. The area of relatively fresh sediments in the northeast part of the map-area appears to have been compressed between these domes with the development of two major synclines and several smaller anticlines and synclines. The traces of some of these folds are shown on the map. The two large synclines probably unite at about the large island east of the Canadian Nickel base camp where the apex of the single extension is believed to have been recognized. These large folds are probably drag-folds on a much larger fold. All folds probably plunge steeply northerly.

In the area of these folds, and particularly in the argillite of the relatively fresh sediments (6), two cleavages were recognized and measured. The older one is a schistosity, in many places parallel with bedding or almost so; the younger is a fracture cleavage and generally cuts the older cleavage at a pronounced angle. It was not seen everywhere, although in some places it seems to be the only cleavage present, having obscured or obliterated the older one. The older cleavage in places is too faint or weak to measure.

### ECONOMIC GEOLOGY<sup>1</sup>

Gold was discovered late in the summer of 1960 near the shore of Contwoyto Lake, on grounds now owned by Canadian Nickel. During the summer of 1961 news of the discovery became known and as a result about 1,500 claims were staked by several other companies on ground adjoining and surrounding the property of the Canadian Nickel. The companies

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<sup>1</sup> Some of the assay results in this section were obtained from the files of the Resident Geologist in Yellowknife.

involved in this staking were: Conwest Exploration Company Limited, the Big Four Syndicate (Consolidated Discovery Yellowknife Mines, Consolidated Northland Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited), the Eskimo Syndicate, the Earl Jackson Syndicate, New Athona Mines Limited, Roberts Mining Company, North Goldcrest Mines Limited, and a few individuals. Other companies such as Falconbridge Nickel Mines Limited and Giant Yellowknife Mines Limited also became interested in the area and took options on some of the groups of claims. All these companies were at one time very active in the area, particularly during the summers of 1962 and 1963 when most of the prospecting, stripping, trenching, geological mapping, diamond drilling, and geophysical exploration was done. At the end of 1963 about 27,000 feet of diamond drilling had been done on the best known showings in the area and more than one hundred and fifty rock trenches and pits had been excavated. In 1964 almost all exploration had stopped, Canadian Nickel and Falconbridge Nickel Mines Limited were the only companies remaining in the area and still doing a certain amount of prospecting and exploration. Nevertheless at the end of the summer of 1964, most of the claims were still in good standing suggesting that there was still interest in the area.

Everywhere in the area the gold is found in the garnet-cummingtonite-sulphide gneiss where there is a fair concentration of sulphides, where arsenopyrite seems to be abundant, and where quartz veins or seams are common. In general the gold values appear to be low and erratic. Descriptions of the properties follow.

#### Canadian Nickel

Canadian Nickel Company Limited owns in the map-area the Mop group of 294 claims, the Congo group of 9 claims, and 3 claims of the Pat group, altogether 306 claims. These claims form a large irregular block about 10 miles long from west to east about latitude  $65^{\circ}45'$  and 5 miles wide from north to south about longitude  $111^{\circ}15'$ . The centre part of this block, about longitude  $111^{\circ}15'$ , covers an area 5 miles by 5 miles.

The base camp is in a small bay on the west shore of Contwoyto Lake. It consists of plywood frame buildings and includes a diesel-powered electrical system. Swamp tractors and Otter aircraft were used for local transportation.

The showing was discovered in late 1960 as a result of helicopter reconnaissance followed by ground investigations of some of the rusty outcrops in the area. Amongst the samples collected for study, a few were from the garnet-cummingtonite-quartz-sulphide gneiss (unit 6c) and were found to carry appreciable gold. Consequently, during July and August of 1961, some sampling, trenching, and geophysical work and about 1,500 feet

of diamond drilling were done on some of these gold occurrences. This was followed in 1962 and 1963, during the period June to September of each summer, by extensive geological and geophysical investigations and more diamond drilling. In 1964, very little work was done on the property. Altogether about 25,000 feet of diamond drilling was done on this property and about 18,000 feet on the Main Showing alone.

The property is underlain almost entirely by greywacke, argillite, and nodular schist (4 and 6). The western boundary of the property follows approximately the contact between the granite (8) and the nodular schist, but overlaps the granite somewhat near the western edge of the property. The contact of the nodular schist with greywacke and argillite crosses the property in a northeasterly direction from its southwestern corner to about the location of the base camp at Contwoyto Lake. Several narrow zones of garnet-cummingtonite-quartz-sulphide gneiss (6c) and a few late gabbro dykes are also covered by the property. The garnet-cummingtonite gneiss locally carries gold and the Main Showing is in this type of rock.

Most of the property is on the northwestern limb of the northern main syncline and the apex zone where the two synclines join, is south of the large island east of the base camp. The Main Showing is just north of this apex zone at a place where the rocks are complexly and tightly folded.

The Main Showing outcrops about 4,000 feet S 45°W from the base camp. It is an interbedded mixture of mainly garnet-cummingtonite-quartz-sulphide gneiss and some greywacke and argillite. The weathered surface of this showing is typically rusty, due to abundant fine-grained pyrrhotite, and where it was stripped and trenched, the showing is about 60 feet wide and is locally widened to 100 feet by repetition or folding. It seems to narrow along strike away from the main stripped area. It was traced over a distance slightly less than 3,000 feet and probably extends much farther in both directions. The folds affecting the showing are probably secondary or drag-folds on the limb of the main syncline and, as suggested by lineation, probably plunge 70°NE in a N 20°E direction. Arsenopyrite is fairly abundant locally and occurs in places in large characteristic crystals up to 1/2 inch across. Some pyrite and a few grains of chalcopyrite were also noted. Black glassy quartz and milky white granular quartz occur as veins along late cleavage planes across the zone and also as seams, pockets, and lenses parallel with bedding in the nose areas of the folds. All these quartz masses are only a few inches wide and generally less than 10 feet long.

Gold is found in the garnet-cummingtonite-quartz-sulphide gneiss and not in the greywacke or the argillite. Furthermore it occurs mainly where the garnet-cummingtonite gneiss is mineralized and arsenopyrite may be an important gold associate. The quartz veins may be gold-bearing at their extremities or where they are mineralized. Chip samples

taken by Baragar and Hornbrook (1963, p. 16) from several of the trenches dug across the mineralized parts of this zone have assayed "from 0.07 oz to 0.65 oz a ton gold and from 0.04 to 0.24 oz a ton silver".

Many other rusty zones of similar types of rocks and also mineralized to various degrees are present on the property, but generally seem to lack arsenopyrite. Most of them could not be traced far due to poor exposures. It is not known if they carry gold but there is no doubt that they represent either the extension of the Main Showing or other related zones at different levels in the rock succession.

### Falconbridge

In July, 1961 Falconbridge Nickel Mines Limited optioned from Conwest Exploration Company Limited the Fox group of 186 claims, the Box group of 97 claims, the Sox group of 54 claims, the Dale group of 51 claims, and the Snow group of 25 claims, altogether 413 claims. Other groups of claims were also optioned then, but are outside the map-area.

The Dale group of 51 claims occurs in two blocks. These two blocks and the Snow group adjoin the Canadian Nickel property to the north-west. They are underlain almost entirely by granite (8) enclosing a few remnants of nodular schist. The option of these blocks was dropped following geological mapping.

The Sox group is near the western boundary of the map-area and extends from Concession Lake in the south, north almost to Contwoyto Lake. It is about a mile west of the western boundary of the Canadian Nickel property. The northwestern half of this group of claims is underlain almost entirely by granite (8), the southeastern half by nodular schist and minor garnet-cummingtonite-quartz-sulphide gneiss. The mineralization here occurs as blebs of pyrite or pyrrhotite in the argillaceous parts of the nodular schists and as fine disseminations of pyrite and pyrrhotite, with traces of chalcopyrite in the garnet-cummingtonite gneiss. The nodular schist part of this property was surveyed in 1963 with a ground magnetometer. About 475 feet of diamond drilling was apparently done on these claims. All samples submitted for assays gave low gold values.

The Fox and Box groups of claims are contiguous and form a large block about 8 miles long from Norma Lake on the west to Contwoyto Lake on the east and 3 miles wide from north to south. They adjoin on the south the Canadian Nickel property. They are underlain almost entirely by greywacke and argillite (6) and are crossed by several gabbro dykes. Narrow layers and lenses of garnet-cummingtonite-quartz-sulphide gneiss occur at many places throughout the property but were seen to outcrop in some abundance in two areas only. One, on the Fox group of claims, is between Norma and Fox Lakes; the other, on the Box group, is near

Contwoyto Lake. Some of the garnet-cummingtonite gneiss of these two areas was found to carry gold, and, in the summers of 1961, 1962, 1963, and 1964, were sampled, some trenched, and a few tested by diamond drilling. Altogether at least twelve rock trenches were excavated and about 3,400 feet of diamond drilling was done. In addition a great deal of geological mapping and geophysical exploration were carried on at various times during these four summers.

In the area between Norma and Fox Lakes, what appear to be at least three or four parallel zones of garnet-cummingtonite gneiss are exposed. Although the outcrops are discontinuous the zones appear to be at least 100 feet apart, to be generally less than 70 feet wide, to be mixtures of mainly greywacke and argillite and of garnet-cummingtonite gneiss in lenses, and to trend parallel with the bedding, or about east and west. The mineralization in the gneiss, is faint, and occurs as fine pyrite and pyrrhotite. A little arsenopyrite has been reported but was not recognized on the outcrops. Gold assays from these zones were apparently all low.

In the area near Contwoyto Lake the garnet-cummingtonite-sulphide gneiss occurs as narrow layers and small lenses within a zone about 500 feet wide. This zone trends about parallel with the bedding, or about north and south, and probably extends from Contwoyto Lake in the north to a large bay on Contwoyto Lake in the south, a distance of about 3 miles. In this zone the garnet-cummingtonite layers, lenses, and pockets are in an en échelon pattern, the steps being to the west and north, and vary in number and size. This zone is generally recognized by the rusty outcrops of the gneiss and although these are very irregularly distributed, they suggest sporadic mineralization over a reasonably continuous zone. Some fairly encouraging gold assays were obtained from this zone but values mostly appear to be erratic. Pyrite and arsenopyrite are the main sulphides present; pyrrhotite appears to be rare. Arsenopyrite is fine to coarse, in places is coarse grained mainly near quartz veins or veinlets. Magnetite is locally fairly high and was recognized in the outcrops. A chip sample from a heavily mineralized zone in one of the rock trenches yielded 0.325 oz Au per ton and 0.09 oz Ag per ton (Baragar and Hornbrook, 1963, p. 17).

#### Roberts Mining Company

Roberts Mining Company owns the Dud group of 18 claims, the Mor group of 15 claims, the Har group of 36 claims, and 30 claims of the Fry group, altogether 99 claims. This block of claims is near the east boundary of the map-area about 4 miles south of the large bay on Contwoyto Lake southeast of Finger Lake.

Most of the work on this property was done during the summer of 1963 and was concentrated in the area of Gossan Lake, or near the



east boundary of the claims. The work consisted of geological mapping, geophysical exploration, trenching, and sampling. Twenty-seven trenches were seen on the property, most of them at the west end of Gossan Lake in an area about 1,500 feet long in an east and west direction by about 600 feet wide. In this area the trenches lie along and normal to a line trending approximately N 70°W and are all in garnet-cummingtonite-sulphide gneiss.

This property is underlain almost entirely by nodular schists (4) that locally display well formed crystals of andalusite and possibly staurolite. At the west end of Gossan Lake the nodular schists include several narrow layers of garnet-cummingtonite-sulphide gneiss. They are lenticular and locally strongly contorted. They seem to be less than 2,000 feet long and in general less than 50 feet wide. Their trend is about parallel with the foliation of the nodular schist or N 70°W. All are sparingly mineralized with pyrite and pyrrhotite. Arsenopyrite and chalcopyrite are apparently also present. Several quartz veins and stringers up to 4 inches thick were noted locally. About one hundred samples from all over this property, but mainly from the trenched areas, were assayed for gold. Almost all of them returned less than 0.1 oz. Au per ton.

#### Big Four Syndicate

The Big Four Syndicate owns the Bar group of 90 claims and the SP group of 36 claims. These two groups are contiguous and form a large block that extends from east and south of Bar Lake north to the southwestern boundary of the Canadian Nickel property. The eastern boundary of the northern half of the block is at about the western shore of Norma Lake.

The property was geologically mapped and prospected in the summers of 1962 and 1963 and at the same time the best mineralized areas were trenched, sampled, and locally diamond drilled. Altogether about a dozen rock trenches or pits were excavated and about 2,000 feet of diamond drilling was done on three showings.

The claims are underlain by nodular schist in the southwest half and by greywacke and argillite in the northeast half. The contact between these two groups of rocks is Z-shaped as a result of an offset of about 1 1/2 miles to the northeast along a major fault that crosses the centre of the property from west to east. This contact extends from the west boundary of the property near Sep Lake, to the fault south of Norma Lake. Then, after displacement, from the fault near the western boundary of the property to the east boundary south of Bar Lake. Garnet-cummingtonite-sulphide gneiss occurs in both rock groups but is more common in the argillite and greywacke where it is in small lenses or thin layers and beds parallel with the bedding. It is the gneiss in these lenses and layers that was sampled, trenched, and drilled.

One of the showings is about 2,500 feet due east of the north end of Bar Lake. It occupies an area, about 300 feet long northwesterly by 150 feet wide, that encloses several small outcrops of the rusty garnet-cummingtonite gneiss. These outcrops seem to be the parts of highly contorted and tightly folded beds and layers but may represent a single continuous bed of gneiss. This showing was described by Baragar and Hornbrook (1963) as follows: "the amphibolite (garnet-cummingtonite-sulphides) bed forms a double fold with axial planes that strike slightly north of east and dip steeply north. Three limbs of the fold are readily recognizable in outcrops. The southern limb strikes N 75°W and dips steeply north. It is some 10 to 20 feet thick. The middle limb is about 190 feet long, 35 feet wide, and strikes N 75°E and dips 75°N. The northern limb strikes N 55°W, dips 85°N, and is about 60 feet wide. It extends from its apex with the middle limb to a point about 200 feet to the northwest and there is succeeded along strike by outcrops of slate. Presumably the amphibolite swings to the northeast again in another fold. At the apex of the middle and northern limbs a smooth curved surface at the margin of the outcrop, presumably a bedding plane, indicates a plunge of about 60°WSW. A large diabase dyke with a southeasterly strike cuts the sedimentary rocks just north of the middle fold crest.

"The amphibolite is composed largely of a coarse-grained dark amphibole. Garnet is in minor amounts. Most of the amphibolite is poorly mineralized but lenses, patches, and zones, marked on the surface by rusty stains, contain up to 20 or 30 per cent by volume of sulphide minerals. These seem to have an erratic distribution. The sulphide minerals in order of abundance are pyrrhotite, pyrite, and arsenopyrite. As observed elsewhere in this region, pyrrhotite is finer grained and more widely distributed than either pyrite or arsenopyrite. The latter seems to be present mainly where the content of sulphide minerals is high and occurs characteristically as coarse crystals ranging up to 1 cm across. Quartz patches or veins are commonly associated with the sulphide-rich lenses. Magnetite is abundant in places and gives rise to marked magnetic anomalies. Layers 1 inch to 2 inches thick that are rich in magnetite are interbedded with the amphibolite and appear to be quite independent of concentrations of sulphide minerals. Surface samples from parts of the mineralized amphibolite are said to have yielded good values in gold."

Two of the holes drilled on this property, totalling 262 feet, were on this showing, and the results seem to confirm the complexity of folding and the difficulty of tracing the garnet-cummingtonite-sulphide gneiss layer or lenses.

The second showing is less than 1/4 mile north of the north shore of Sep Lake. It comprises two lenticular bodies of garnet-cummingtonite-sulphide gneiss within and interbedded with argillite and greywacke. They trend northwest about parallel with the bedding, and pinch or finger out into the argillite and greywacke along strike. These bodies are up to 300 feet

wide and enclose much interbedded sedimentary material. They are fine or more commonly coarse grained, and are made up of abundant amphibole and red garnet. They are sparingly to abundantly mineralized with pyrite, pyrrhotite, and arsenopyrite. Numerous seams and veinlets of grey quartz were noted trending parallel with the lenses, but as they are narrow they represent only a small part of the rock. Five trenches were excavated near the east end of the northern lens and about 1,500 feet of diamond drill-hole was drilled, in various parts of this showing, to intersect at depth the mineralized parts of the garnet-cummingtonite-sulphide lenses. Good gold values were reported from this showing. Schiller and Hornbrook (1964, p. 12) report a drill-hole intersection that "assayed 2.29 ounces of gold per ton over 9.5 feet".

In the area within a quarter of a mile east and southeast of the east end of Sep Lake, are several small outcrops of the rusty garnet-cummingtonite gneiss. These rusty zones are all small, lenticular, and very irregularly distributed. As the outcrops are small and widespread it is almost impossible to determine whether or not all these outcrops represent one or several highly folded beds. Some of these rusty zones were tested by rock pits or trenches and locally they were diamond drilled. A well mineralized grab sample taken from one of the pits "assayed 0.36 oz of gold per ton and 0.32 oz of silver per ton" (Schiller and Hornbrook, 1964, p. 13).

Another group of claims, the RY group of 18 claims, was staked by this syndicate in this area, but, as it is underlain almost entirely by granite (8), very little exploration work was done on it.

#### Giant Yellowknife Mines Limited

During the summer of 1962, Giant Yellowknife Mines Limited optioned, from the Eskimo Syndicate, the White group of 40 claims, the Sun group of 40 claims, and the Eskimo group of 10 claims, altogether 90 claims. These three groups are contiguous and form a large block elongated east and west that adjoins on the west the property of the Canadian Nickel Company. The east boundary of this block of claims is about 2 1/2 miles west of the Canadian Nickel base camp.

In 1962 and possibly 1963, these claims were mapped and prospected, and about 30 rock pits or trenches were excavated, mainly at two places, one a few hundred feet north of White Lake and the other along a north and south line north of Sun Bay near the west boundary of the map-area. About 100 samples were assayed and all gave values of less than 0.05 oz Au/ton.

This block of claims is underlain almost entirely by granite (8). A few gabbro dykes cross it and there are many small and large remnants

of nodular schist and rusty garnet-cummingtonite gneiss. It is these rusty remnants that were trenched and sampled.

In the area a few hundred feet north of the west half of White Lake at least 6 rock trenches were excavated across small pods or lenses of garnet-cummingtonite-sulphide gneiss in granite. All these pods are fine to medium grained and have abundant garnet and pyrite. Pyrrhotite and magnetite are in minor quantity. Chlorite is probably also common. No arsenopyrite was seen in the trenches or on the outcrops.

Another group of trenches is near the west boundary of this block of claims in a large remnant of nodular schist. These trenches are distributed along a line trending approximately north and south and less than 3,000 feet from the northeast shore of Sun Bay. Five trenches were examined. All trend across the foliation of the rock and all are very slightly mineralized with pyrrhotite. A few have narrow quartz stringers or veinlets. Small lenses of garnet-cummingtonite gneiss were recognized in two trenches.

All other workings are either isolated stripped areas or small pits and are remote from the main workings.

#### Earl Jacks Syndicate

The Earl Jacks Syndicate owns the Bay group of 54 claims, the JE group of 36 claims, and several other seemingly less interesting smaller groups. None of the groups is contiguous. The Bay group is in the area between Finger Lake and Shallow Bay in the northeast quarter of the map-area and the JE group is east of Sun Bay near the western boundary of the map-area.

The Bay group was optioned in 1962 to Gunnex Limited, Amalgamated Larder Mines Limited, Rayrock Mines Limited and Faraday Uranium Mines Limited who prospected it, mapped it geologically, and did about 1,050 feet of diamond drilling on the main showing. The Bay group is underlain almost entirely by greywacke and argillite (6) and is traversed by a few gabbro dykes. Locally there are also a few narrow layers and lenses of garnet-cummingtonite-sulphide gneiss. These layers and lenses are locally mineralized and gold has been reported from the two occurrences described here. The main showing is near the southwest shore of a small lake (Esker Lake) south of the southwest end of Finger Lake. The trace of the rusty gneiss as seen on outcrops suggests complex and intricate folding. This showing was described by Baragar and Hornbrook (1963, p. 21) as follows: a layer of "amphibolite (garnet-cummingtonite gneiss) can be traced in outcrops for a strike length of only a few hundred feet but within this distance it passes through a succession of four tight folds (or a double pair). The axial planes are parallel and strike approximately N 60°W. They are separated by distances of 30 to 50 feet. The fold axes plunge either

vertically or at about 85°N. The limbs dip vertically or steeply. The northeast limb of the double pair of folds lies along the shore of the lake and strikes N 55°W and dips 75°NE. At this point the amphibolite is a minimum of 25 feet thick. Northward it disappears beneath overburden. The southwest limb of the fold complex thins to a maximum width of about 5 feet or less and disappears beneath overburden a few feet southeast of the adjoining fold crest. An outcrop of heavily mineralized amphibolite is found on the northeast limb of the fold complex adjacent to the shore of the lake. The outcrop is about 45 feet long and a maximum of 6 feet wide. It comprises well-layered garnet-amphibole rock rich in coarse arsenopyrite and finely disseminated pyrrhotite, with minor chalcopyrite and pyrite. Quartz is present in irregular veins, stringer zones, and masses. Samples from this outcrop are reported to assay 1 oz of gold per ton. The spectroscopy detected minor amounts of silver, nickel, and copper."

The other occurrence is on the southeast shore of the same lake and the distribution of the layer of gneiss suggests the same type of complex and intricate folding. Other occurrences are known on this group of claims but all are small, narrow, and discontinuous and weakly mineralized.

The JE group was prospected, geologically mapped, and in part geophysically explored in 1962. It is underlain almost entirely by nodular schist except in its southeast corner where a small area of greywacke and argillite was outlined. Some garnet-cummingtonite gneiss occurs locally as small zones. Five of these zones near the east boundary of the group of claims were stripped or trenched. As the mineralization is weak and erratic or spotty, exploration was not carried further. All the zones trend parallel with the foliation or bedding of the nodular schist, dip mainly south at 75 degrees or more, and are up to 70 feet wide. They can be traced for long distances along strike. Pyrite and pyrrhotite are the main minerals recognized and the zones are all garnet-bearing.

#### New Athona Mines Limited

New Athona Mines Limited owns the Nat group of 72 claims that adjoins the Bar group and part of the Sox group on the south. It extends from the west end of Shallow Bay in the east almost to Fly Lake in the west and from Post Lake southwest of Finger Lake in the north to about 4,000 feet south of Bar Lake in the south.

The contact between greywacke and argillite (6) and nodular schists (4) crosses the Nat claims in an almost north and south direction from a point slightly west of the south end of Bar Lake to the southern boundary of the group. Exploratory work was conducted on the property in 1962 and consisted of prospecting, geological mapping, rock trenching, and some diamond drilling. Most of the work was concentrated on three occurrences of garnet-cummingtonite-sulphide gneiss.

Number 1 occurrence or showing is a few hundred feet south and east of the south end of Post Lake, a small lake southwest of Finger Lake. Baragar and Hornbrook (1963, p. 19) described this occurrence as follows: "Four holes aggregating 818 feet were drilled to test the showing following the return of encouraging assays from a surface trench: Very little outcrop occurs in the vicinity of the area drilled and presumably the original discovery was aided by the presence of frost-heaved mineralized slabs.

"The trench is roughly north-south and is about 45 feet long. It exposes three narrow mineralized amphibolite members interlayered with unmineralized meta-greywacke and slate. The amphibolite layers are situated at the north end of the trench, and 20 feet and 35 feet from the north end. They are 1 1/2 feet, a minimum of 1 foot (not fully exposed), and 2 feet wide respectively. The 2-foot layer can be correlated with a similar amphibolite layer exposed in an outcrop about 30 feet east of the trench. It strikes N 85°E and dips 85°N. Metallic minerals comprise from 1 to 30 per cent by volume of the amphibolite members and include pyrrhotite, arsenopyrite, pyrite, and chalcopyrite. Pyrrhotite is finely disseminated and widespread whereas arsenopyrite occurs as coarse crystals, and in company with chalcopyrite appears to be most abundant where amphibolite is richly dissected with small quartz masses and stringers."

Number 2 occurrence or showing is about 600 feet due south of the south end of Bar Lake. It is in an area of small scattered outcrops, about 300 feet long parallel with the foliation by 150 feet wide. Baragar and Hornbrook (1963, p. 19) described this showing as follows: "Approximately 120 feet of the 150-foot width is underlain by garnet amphibolites; the remainder by meta-greywackes, slates, and dark, fine-grained rocks rich in ferromagnesian minerals (volcanic rocks?). The amphibolites range from massive to well-bedded and from fine-grained rocks with or without sheaves or rosettes of acicular amphibole porphyroblasts to coarse-grained, even-textured, hornfelses. Garnets are commonly concentrated in well-marked layers that evidently reflect the original bedding. The bedding strikes approximately S 60°E and dips steeply north to vertical. Quartz stringers and lenses from one inch to several inches wide penetrate the amphibolite at many places. Ore minerals, marked at the surface by rusty patches, appear to have a spotty distribution throughout the amphibolite members. Generally the rusty zones do not exceed 2 to 3 feet in width, but at least one mineralized zone 10 feet wide, was intersected in a drill-hole. Most of the amphibolite is very sparsely mineralized or is unmineralized. Sulphide minerals observed, in order of abundance, are pyrrhotite, pyrite and arsenopyrite. Chalcopyrite is said to be a rare constituent. Pyrrhotite tends to be finely disseminated whereas both pyrite and arsenopyrite tend to occur in coarse crystals or aggregates commonly 2 to 5 mm across. Magnetite is locally abundant in the amphibolite and gives rise to marked magnetic anomalies but it does not necessarily seem to be closely associated

with sulphide minerals. Six drill-holes with an aggregate length of 1,060 feet were drilled under the showing. All but one were frozen in and had to be abandoned before completion."

Number 3 occurrence is about 6,500 feet south-southeast of the south end of Bar Lake. It occupies an area of small, scattered outcrops of greywacke and argillite interbedded with much garnet-cummingtonite-sulphide gneiss. It lies a few hundred feet east of the contact of the nodular schist with greywacke and argillite and a few hundred feet northwest of the hornblende syenite contact. Twenty-one rock trenches were excavated in this outcrop area on garnet-cummingtonite rock. These trenches are distributed over an area about 1,000 feet long by 150 feet wide elongated to the northwest or about parallel with the trend of the rock. The trenches are at right angles to this direction. In this area, the garnet gneiss is in narrow layers or beds, its garnet content is high, and some of the layers are rich in pyrite or pyrrhotite. The greywacke and argillite are generally more schistose here than elsewhere in the map-area.

#### North Goldcrest Mines Limited

North Goldcrest Mines Limited owns the Gun group of 54 claims and the Nor group of 54 claims, altogether 108 claims. These two groups are contiguous and form a large block that adjoins the Sox group on the south and that extends from Concession Lake in the northwest corner to Fly Lake in the southeast corner.

The block of claims is underlain almost entirely by nodular schist except in the southwest corner where there is a little granitoid gneiss. A large fault trending northeasterly was traced across the southeast corner of the property. Gold has been reported from the area southeast of the fault where some stripping, prospecting, sampling, and geophysical work were done. Most of this work was concentrated at the east and northeast end of Nor Lake.

Several occurrences of garnet-cummingtonite-sulphide gneiss were noted on this block of claims, particularly in the area south of the fault. In general these occurrences of garnet gneiss are small, lenticular, and discontinuous and are so poorly exposed that it is difficult to trace them or even to determine their width. In general they are slightly mineralized with pyrite and pyrrhotite. No assay returns are available.

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