



GEOLOGICAL
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CANADA

DEPARTMENT OF MINES
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MINERAL INDUSTRY OF
DISTRICT OF MACKENZIE, 1963

E. A. Schiller and E. H. Hornbrook



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ABSTRACT

This report reviews mining and exploration in the District of Mackenzie for 1963. The district's three gold mines - Giant Yellowknife Mines Limited, Con-Rycon Mines, and Consolidated Discovery Gold Mines Limited - produced just over 400,000 ounces of gold bullion with a total value of about 15 million dollars. Two developing mines - Tundra Gold Mines Limited and Pine Point Mines Limited - are scheduled to commence production in 1964 and 1966 respectively. Pending further studies, a silver-copper property, 1 mile east of Port Radium may commence mining in 1964.

Exploration in the district by major companies was concentrated in a 160-mile long belt between Itchen Lake and the upper part of Back River. Canadian Nickel Company, Falconbridge Nickel Mines Limited, Big Four Syndicate, and the Consolidated Mining and Smelting Company Limited did surface and drilling programs on gold properties found in 1961 and 1962. Giant Yellowknife Mines Limited and Roberts Mining Company completed surface programs on a number of claim groups.

In 1963, there were 2,952 claims recorded in the district. Staking of new discoveries took place in the following localities: a gold prospect at Point Lake, 82 claims; a number of gold showings in the Regan Lake area, 136 claims; a gold prospect in the Coronation Gulf area, over 900 claims; and a nickel showing at Itchen Lake, 112 claims.

A number of gold properties near Yellowknife were examined in detail. Drilling programs were done on the following properties - Rodstrom Yellowknife Gold Mines Ltd., Akaitcho Yellowknife Mines Limited, W. T. group, and the MON group.

MINERAL INDUSTRY OF DISTRICT OF MACKENZIE, 1963

INTRODUCTION

This is the fourth in the series of annual reports on the mineral industry of the District of Mackenzie. The properties described include active mines and prospects in which work was done or interest was shown during the year. The writers wish to acknowledge the cooperation extended them by the mining companies and individuals concerned.

PRODUCING MINES

The metal mining industry in Mackenzie district comprises three producing gold mines: Giant Yellowknife Mines Limited and the Con-Rycon Mine of Consolidated Mining and Smelting Company of Canada Limited at Yellowknife, and Consolidated Discovery Gold Mines Limited 52 miles north of Yellowknife. A fourth mine - Tundra Gold Mines Limited - 150 miles northeast of Yellowknife is scheduled to commence production in March, 1964. Pending further metallurgical work, the Echo-Bay silver-copper property 1 mile east of Port Radium may, it is reported, commence mining in 1964.

In 1963 the mines produced just over 400,000 ounces of gold bullion with a total value of about 15 million dollars.

TRANSPORTATION

Mining and exploration in the district is primarily serviced out of Yellowknife. Except for periods of break-up (May-June) and freeze-up (November-December) in which traffic is suspended across the Mackenzie River, Yellowknife can be reached by an all-weather road from southerly points.

Truck transport, barge, bus, and aircraft provide freight and express services into Yellowknife. Shipping rates and schedules are as follows:

Trucking (Edmonton to Yellowknife)

Class	1	2	3	4	5
Cost (dollars/100 lb.) ..	6.03	5.11	4.24	3.55	3.00

Bus (Express, Edmonton to Yellowknife three times weekly)

Pounds	0-5	5-10	10-20	20-30	30-40	
Rate.....	\$ 1.35	1.50	2.40	2.70	3.45	
Pounds	40-50	50-60	60-70	70-80	80-90	90-100
Rate.....	4.20	4.80	5.75	6.80	7.85	9.00

Air Cargo (daily scheduled service except Sunday)

Pounds	Edmonton to Yellowknife	Yellowknife to Edmonton
Less than 100	\$.20/lb.	\$.10/lb.
100 to 1,800.....	15.75/100 lb.	8.00/100 lb.
1,800 to 3,000.....	13.75/100 lb.	7.00/100 lb.
More than 3,000....	12.00/100 lb.	6.00/100 lb.

Barge (Waterways to Yellowknife, June-October)

Class 5 (general cargo)..... \$1.75 per 100 lbs.

Aircraft based at Yellowknife and capable of carrying pay loads of 500 to 12,000 pounds, may be chartered at a cost of \$.30 to \$1.75 a mile.

Freighting by trucks on winter roads to points as far distant as Tundra Mines continued with good success. During the summer a Yellowknife-based trucking firm surveyed a winter route to Contwoyto Lake (via Tundra Mines) in anticipation that trucking services to this area may be required in the near future. A Yellowknife charter airline company was granted a lease to construct a landing strip at Contwoyto Lake in order to provide large freighter aircraft service year round to this area.

GENERAL PROSPECTING

In 1963, 10 major companies or groups in addition to private prospectors, representing a labour force of about 250 field personnel, were active in exploration in Mackenzie District¹. From January 1 to December 31, 1963, 2,952 claims were recorded in the Mackenzie Mining District.

¹This is exclusive of work done in western Mackenzie District (i.e. Mackenzie Mountains). For description of Redstone Mines Limited, Crest Exploration, and Canada Tungsten see Green, L.H., and Godwin, C.I. (in press).

The major activity this year was centered around Canadian Nickel's property at Contwoyto Lake, where gold was discovered in 1961. In 1962, gold-bearing rocks were discovered both west and east of Contwoyto Lake, at Itchen Lake, and in the region around the upper part of Back River. In 1963, 5 exploration companies involving about 200 men were active in this 160-mile long belt between Itchen Lake and the upper part of Back River. In this area, significant discoveries were made by the following: Giant Yellowknife Mines Limited recorded 82 claims to cover gold-bearing amphibolites south of Itchen Lake near Point Lake; Roberts Mining Company recorded 112 claims to cover a nickel-bearing sulphide deposit that occurs in gabbroic rocks at Itchen Lake; Falconbridge Nickel Mines Limited recorded 42, 58, and 36 claims respectively to cover three areas underlain by gold-bearing rocks in the vicinity of the upper part of Back River. Other companies active in this belt were Canadian Nickel, Big Four Syndicate¹, and Consolidated Mining and Smelting Company of Canada Limited. Earl-Jack Syndicate, North Goldcrest, New Athona, and private interests held ground but performed no work in 1963.

A gold discovery 2 miles south of Coronation Gulf on the Arctic Ocean at lat. 63°43', long. 111°25' (N.T.S. map-sheets 76-M-11 and 12)² was reported late in September. Over 900 claims were staked to cover an area containing a lengthy gold-bearing quartz vein in syenite. The vein is to be drilled in May 1964.

Near Yellowknife, work was done on the following gold properties: W. T. group near Dome Lake (N. T. S. map-sheet 85-I-14), where Consolidated Discovery Yellowknife Mines Limited completed 3,000 feet of drilling; MON group at Discovery Lake (N. T. S. map-sheet 85-J-16), where Consolidated Mining and Smelting drilled 9 holes; W. J. group at Sophia Lake (N. T. S. map-sheet 85-J-16), where Earl-Jack Syndicate did detailed geological, geophysical, and geochemical mapping; H. M. group at Hidden Lake (N. T. S. map-sheet 85-I-12), where J. Herriman and C. McChesney continued underground work; Garskie Gold Mines (N. T. S. map-sheet 85-I-12), where L. Garskie continued mining his high grade gold property. Camlaren Mines Limited at Gordon Lake (N. T. S. map-sheet 85-I-16) completed repair of their buildings. The mine will probably commence shaft-sinking in 1964 and pending transactions with Consolidated Discovery Yellowknife Mines Limited, proposed operators of the

¹Consolidated Discovery Yellowknife Mines, Consolidated Northland Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited.

²National Topographic Series mineral claim sheets, available from the Mining Recorders Office, Department of Northern Affairs and National Resources, Yellowknife.

mine, and with the Federal government officials on cost-aid provisions, production is anticipated sometime in 1965. Rodstrom Yellowknife Gold Mines Limited did detailed geological mapping, sampling, and drilling on their property in the hitherto considered barren granodiorites 4 miles northwest of Yellowknife. This prospect has aroused considerable interest and the results may lead to a reappraisal of the prospecting needs in the extensive granite areas near Yellowknife. Akaitcho Yellowknife Mines Limited undertook a drilling program on their property that lies immediately north of Giant Yellowknife Mines Limited.

Pine Point Mines Limited continued systematic drilling of their large lead-zinc property south of Great Slave Lake. Production is scheduled to commence in the spring of 1966. Some interest was shown in lead-zinc deposits within Precambrian rocks east of Pine Point Mines. Staking of galena-sphalerite vein deposits in this area comprise the PS group of 36 claims near Hay Creek (N. T. S. map-sheet 85-H-7) and the Dice group of 6 claims near O'Connor Lake (N. T. S. map-sheet 75-E-5). A number of claims were staked at Galena Point on Bathurst Inlet (N. T. S. map-sheet 76-N-13). The claims cover an area that includes a property described by Lord (1951, p. 154).

Information derived from Geological Survey of Canada aeromagnetic maps 3003G and 3004G (1962a and 1962b) led to the staking of 463 claims along the Beaulieu River at lat. $62^{\circ}78'$, long. $112^{\circ}30'$ (N. T. S. map-sheets 85-I-16 and 15). The claims staked by F. Avery and associates were optioned and subsequently dropped by United States Smelting Refining and Mining Company. The company completed a detailed aeromagnetic survey over the main anomaly. The area underlying the anomaly consists of rocks of the Yellowknife Group that contain thick beds of magnetite iron-formation. Copper, lead, and zinc sulphides are reported to occur on the property. Data obtained from aeromagnetic map 1285G (1962c) were responsible for delineating a sedimentary magnetite iron-formation that contains up to 40 per cent iron south of the east arm of Great Slave Lake near French Lake (N. T. S. map-sheet 75-K-10).

Northwest Explorers Limited drilled the silver-copper Echo Bay property 1 mile east of Port Radium (N. T. S. map-sheet 86-K-4). Pending metallurgical work it is reported that the property could commence mining as early as the summer of 1964.

Selco Exploration (Selection Trust Limited) had prospecting parties working in the vicinity of Beechey Lake and the east arm of Great Slave Lake. In the latter locality they were supported by an airborne E.M. and magnetometer survey flown by

the company's own Canso aircraft. In the Beechey Lake area, in addition to prospecting for gold in Yellowknife Group rocks they examined Proterozoic clastic sedimentary rocks of the Goulburn Group. The search for fossil placer gold in Proterozoic sedimentary rocks may well become an important exploration target in the Mackenzie and Keewatin Districts.

A number of small gold and sulphide occurrences were staked in an area centered around Yellowknife and bound by Russell Lake and Beaulieu River. In the same area several claim groups were staked to cover anomalies as shown on recently published G.S.C. aeromagnetic maps. A few claims were staked in the Indin and Arseno Lakes region. Consolidated Beta Gamma Mines Limited staked 72 claims on a copper showing near Dismal Lakes. In December, two groups of claims comprising 100 claims were staked for J.A. Harquail and associates near Point Lake. Forty claims tie onto a claim block between Point and Itchen Lakes owned by Giant Yellowknife Mines Limited (N.T.S. map-sheet 86-H-7). Sixty claims were staked south of Point Lake at lat. $65^{\circ}13'$ and long. $113^{\circ}12'$ (N.T.S. map-sheet 86-H-3).

Winter prospecting in the barren lands resumed in the fall. Over the 1962-63 winter Mr. G. Turner and an Eskimo, N. Avadluk, worked in the Contwoyto and Itchen Lakes area. The two prospectors will spend the 1963-64 winter prospecting in the Bathurst Inlet area. It appears sufficient outcrop is exposed to warrant prospecting at this time. In December, it was reported that the two prospectors were staking a nickel showing west of Bathurst Inlet.

The Department of Northern Affairs and National Resources prospector assistance program sponsored six 2-man parties in 1963. The program provides remuneration to private and company prospecting parties who spend more than 60 days in the field in the Territories.

DESCRIPTION OF PROPERTIES

AKAITCHO YELLOWKNIFE GOLD MINES, LIMITED

The company owns the A.E.S. group of 24 claims 4 miles north of Yellowknife. They were staked in February, 1936 and after incorporation in January, 1945 have since come under the control of Falconbridge Nickel Mines, Limited. The property is bound on the north and south by the PA and GIANT groups of Giant Yellowknife Mines, Limited, on the east by the Goodwin claims of Atlas Yellowknife Mines, Limited, and on the west by a number of claim groups (N.T.S. map-sheet 85-J-9).

A comprehensive review of the property is given in Lord (pp. 64-68, 1951). In brief the claims are underlain by volcanic rocks of the Yellowknife Group and contain gold-bearing shear zones that can be correlated with similar structures to the south on the contiguous Giant Yellowknife Mines property.

The company commenced a diamond drilling program in August, 1963, supervised by personnel from Giant Yellowknife Mines. At the time of writing (November 25th, 1963) five holes were completed and three more were planned. The program was directed to enlarge known gold-bearing zones and to search for new zones. Previous drilling programs were done in 1950 and 1959. Prior to this year, four gold-bearing zones had been defined, one of which was reported to contain 260,000 tons averaging 0.48 ounces per ton, cut grade.

CON AND RYCON MINES

The Con and Rycon gold mines of Consolidated Mining and Smelting Company of Canada Limited, at Yellowknife, continued production throughout the year at a rate of about 525 tons of ore a day. Production during 1962 totalled 196,000 tons of ore¹. The mill heads averaged 0.56 ounce of gold per ton during 1962². Major production comes from the 103 and 102 zones in the Campbell shear system in a ratio of approximately 1:1. About 8 per cent of production comes from the 101 zones, an increase of 7 per cent over last year, and less than 1 per cent production comes from the Con shear system.

Description and references of the mine geology have been given in preceding papers of this series; a summary of the geology by Baragar and Hornbrook (1963) is as follows:

Country rock in the vicinity of the mine is mainly Yellowknife Group massive and pillowed volcanic rocks with minor thin tuffaceous interlayers. The volcanic assemblage strikes approximately N 60° E, dips steeply southeast, and faces southeast. A swarm of northerly striking, westerly dipping, gabbroic dykes cut the volcanic rocks and are in turn cut by mineralized shear zones. A set of related transverse faults offsets all previous rock types.

¹Northern Miner, November 7, 1963.

²K.J. Christie: Mining in the North, 1962; Resources Division, Northern Administration Branch, Department of Northern Affairs and National Resources, 1963.

The Con and Campbell shear systems are mainly quartz-chlorite-sericite schist zones containing mineralized gold-bearing lenses as well as masses of unshaped country rock. They strike northerly, dip moderately to steeply west, and are approximately 3,000 feet apart. The Campbell shear system abuts the West Bay fault at a depth of about 2,300 feet. Accordingly it is not exposed on surface.

Access to the Campbell shear system from the C-1 shaft in the original mine workings of the Con shear system is provided by a crosscut several thousand feet long on the 2,300-foot level. The B-3 winze services 9 levels that are developed to date in the Campbell shear system. The 103, 102, and 101 zones are the major working areas in the mine and are located as follows: the 103 zone begins about 200 feet north of the B-3 winze and extends northward in the Campbell shear system; the 102 zone is in the foot-wall side of the system about 1,400 feet south of the winze and extends southward; the 101 zone is opposite the 102 zone and lies in the hanging-wall of the Campbell shear system.

Major extensions to underground workings in the last year are as follows: the B-3 winze was deepened to the 3,900-foot level and new levels established at 3,700 and 3,900 feet. A crosscut has been driven 1,200 feet west on the 3,700-foot level and drifting south in the Campbell shear system has commenced. A few hundred feet of crosscutting west on the 3,900-foot level has been completed.

Development work completed this year in the 101, 102, and 103 zones respectively is: 1,200 feet of drifting on the 3,300- and 3,500-foot levels, 900 feet of drifting on the 3,100- and 3,500-foot levels, and 500 feet of crosscutting and 100 feet of drifting on the 3,500-foot level. Exploration in 1963 has been concentrated south of the 102 zone and in the 101 zone and testing of a new ore lens northwest of the previously developed 103 zone.

CONSOLIDATED DISCOVERY YELLOWKNIFE MINES LIMITED

The Discovery gold mine on the west shore of Giauque Lake about 52 miles north-northeast of Yellowknife continued production at a rate of about 150 tons of ore a day throughout 1962. The writer visited the property October 31, 1963. For the year ending December 31, 1962, 43,011 ounces of gold, with a value of

\$1,617,543, were produced from 53,858 tons of ore. The average mill head grade was 0.81 ounces of gold per ton¹.

A brief summary of the geology and major workings of the mine are as follows²:

Gold-bearing quartz veins occur within folded meta-greywacke and slate north of, and enclosed in the east side of, a northerly striking, westerly dipping lens of basic volcanic rock.

Major working areas in the mine are designated as veins No. 1, 4, 16, and the West Zone.

No. 1 vein has a fold-like configuration opening south. The fold plunges steeply northward and its axial plane dips steeply west. The amplitude of the fold decreases from about 200 feet on the surface to less than 100 feet on the lower levels. The vein is about 450 feet long averaging 3 feet wide, and progressively pinches out to a short barren quartz vein a few inches wide on the 27th level. Presently, ore is mined from the No. 1 vein on the 20th to 24th levels.

No. 4 vein consists of a series of roughly parallel quartz stringers striking northeasterly, dipping steeply west, and raking southwest. On the 7th level No. 4 vein is northeast of the nose of No. 1 vein and on the 12th level it is southwest of the east limb of No. 1 vein. What is thought to be an extension of No. 4 vein is mined between the 20th and 23rd levels.

No. 16 vein about 700 feet south of No. 1 vein strikes north-northeasterly and dips steeply northwest. The south end of the vein has been intensely drag-folded. The characteristics of the plunge of the drag-folds are similar to No. 1 vein. The No. 16 vein is generally 2 feet wide and 150 to 200 feet long. The vein is mined on the 9th to 14th levels at present.

The West Zone, about 500 feet southwest of the nose of No. 1 vein, lies entirely within the lens of basic volcanic rock. The Zone consists of northerly striking, westerly dipping quartz stringers that frequently coalesce to form irregular-shaped bodies. The zone is presently being mined on the 3rd and 4th levels.

¹Annual Report, Consolidated Discovery Yellowknife Mines Limited for the year ending December 31, 1962.

²References: Baragar (1961, pp. 10, 11; 1962, pp. 17-19); Baragar and Hornbrook (1963, pp. 11-13); Lord (1951, pp. 124-131); J.A. Millen (personal communication); Tremblay (1952, pp. 43-53).

The quartz veins contain about 1 per cent metallic minerals, which are predominantly pyrite and pyrrhotite. The mottled grey quartz is frequently banded with alternating layers of silicified biotitic rock.

The mine has 27 levels to 3,950 feet, separated by 150-foot level-spacings except for the 1st, 2nd, and 4th levels. Access is provided to all levels by a 3-compartment vertical shaft. All major working areas are generally connected to the No. 1 vein by drifts and crosscuts.

During 1962, No. 1 vein, No. 16 vein, and the West Zone contributed the following percentages of ore: 50, 23, and 7 per cent respectively. The remainder was obtained from small ore shoots about No. 1 vein and from development work¹. Reduction of grade and ore reserve tonnage indicate the approaching date of closure of the mine. Remaining high grade ore reserves in No. 1 and No. 4 veins are apparently sufficient to compensate for the lower grade ore obtained from No. 16 vein and the West Zone to maintain production on the present basis to the end of 1964².

From June 1, 1963 to August 20, 1963, 12,174 tons of ore that had been trucked from Camlaren Mines Limited at Gordon Lake during the previous winter were milled at Discovery Mine. The mill head assays of Camlaren ore averaged 1.14 ounces of gold per ton and 0.32 ounces of silver per ton, with an overall gold recovery of 99 per cent.

During the period that Camlaren ore was milled exploration was concentrated on delimitation of the West Zone ore shoots by a combined drifting and drilling program. Present exploration is concerned with establishing vertical and longitudinal continuity of ore shoots about the periphery of No. 1 vein.

¹Annual Report, Consolidated Discovery Yellowknife Mines Limited for the year ending December 31, 1962.

²Subsequent to the time of writing, a new high grade ore shoot was discovered in the No. 4 zone on the 20th level and it will probably provide sufficient ore to prolong the life of the mine beyond 1965.

CONTWOYTO LAKE

Since the original staking in this area by Canadian Nickel Limited late in 1961 and subsequent staking by other companies and prospectors up until the summer of 1962, relatively few claims have been added to existing properties. The companies actively working in the area comprise Canadian Nickel Limited, Falconbridge Nickel Mines Limited, Big Four Syndicate¹, and Roberts Mining Company. To date the work done by companies includes detailed and reconnaissance geological mapping, ground E.M. and magnetometer surveys, airborne magnetometer surveys, trenching, and diamond drilling.

The geology of the area has been mapped by Fraser (1964). Exploration 'targets' are the mineralized amphibolites that are found interbedded in Yellowknife Group type metasedimentary rocks. The claims on which much of the work has been done cover an east-striking belt of metasedimentary rocks that extend from the middle third of Contwoyto Lake west about 15 miles to longitude 111° 30'. On the north the metasedimentary rocks are in relatively sharp contact with massive granitic rocks whereas on the south they grade into mixed gneisses and schists and granite. Within the belt, alternating amphibolite and metasedimentary beds occur in fairly well defined stratigraphic zones up to 3,000 feet thick. Two and possibly three such zones can be traced from west to east across the belt. Mapping of the amphibolites across the belt is complicated by a major fault that strikes N60°E through the central part of the belt. Except for a single amphibolite zone that occurs on a peninsula on the northeast side of Contwoyto Lake no amphibolites are reported from the metasedimentary rocks that extend northeast from the lake.

The amphibolites form conformable bands and lenses within the steeply dipping metasedimentary sequence and exhibit considerable thickening and thinning along noses and limbs of folds. Although a tuffaceous origin cannot be ruled out for some of the amphibolites, the intimate nature of well to poorly sorted clastic quartz both interbedded and interspersed with amphibole suggests a sedimentary origin for most of these rocks. They probably represent metamorphosed iron-rich detrital sediments².

¹Consolidated Discovery Yellowknife Mines, Consolidated Northland Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited.

²Cumingtonite schists containing gold-bearing sulphide deposits, similar to those in the Contwoyto Lake area, are found at the Homestake Mine at Lead, South Dakota. At Homestake the cumingtonite schists were derived from sideroplesite-rich $[(Fe, Mg)CO_3]$ sedimentary rocks (see Noble, J.A., and Harder, J.O., 1948).

The amphibolites are commonly dark grey to black; brown or dark green varieties are due to chlorite alteration of the amphibole. Grain size ranges from fine to coarse but generally is fine to medium grained. Prismatic amphibole crystals show little or no preferred orientation, hence the rocks tend to be massive.

Preliminary thin-section study indicates two amphibole minerals are common to the amphibolites - a colourless to neutral grunerite and green to blue and yellow green hornblende¹. They occur separately or together and where together the reaction grunerite to hornblende is very common. Both amphiboles display minor chlorite alteration. Detrital and/or vein quartz are present in all thin sections examined. Almandine garnet is found in some amphibolites.

The rocks of the Yellowknife Group consist of slate and related rocks and subordinate amounts of meta-greywacke. Folding during two or more periods and ending with the intrusion of granite is related to the development of complex regional and contact-metamorphic effects that extend up to and include the almandine amphibole and hornblende hornfels facies. Regionally metamorphosed rocks are primarily slates, phyllites, and schists containing variable amounts of chlorite, muscovite, biotite, and quartz. Garnet- and staurolite-bearing rocks are tentatively assigned to the higher almandine amphibolite facies. Contact metamorphosed rocks of the hornblende hornfels facies consist of cordierite, andalusite, biotite, quartz, and staurolite(?). The metamorphic origin of the amphibolites is uncertain. The roles played by regional and contact metamorphism are incompletely known. The presence of amphibolites within metasedimentary rocks as low as the greenschist facies indicates that regional metamorphism is a contributive factor, but the proximity of amphibolites to granites may also be important.

The sulphide minerals are almost solely contained within the amphibolites. Nearly massive and disseminated arsenopyrite and pyrrhotite are found together and separately in bands up to a few hundred feet long and generally up to a foot wide. Other sulphides include pyrite and minor amounts of chalcopyrite and lollingite. Magnetite appears to be a common constituent. The gold is almost entirely associated with arsenopyrite, pyrrhotite, and pyrite; free gold is rare.

The major enigma in this area is the ubiquitous occurrence of sulphide that is generally gold-bearing. Values about 0.1 ounces per ton are not uncommon from any of the many gossans in the area.

¹R. N. Delabio, X-Ray Diffraction Laboratory, Geological Survey of Canada.

In the area, only two showings have received detailed attention by their owners. Canadian Nickel have completed about 30,000 feet of drilling on their main showing in the past two years in addition to detailed geological and geophysical studies. Results of their work have not been reported and future plans of the property are not known. The Big Four Syndicate reported encouraging results from their drilling on their SP-11 showing during the summer.

Big Four Syndicate¹

The Big Four Syndicate owns the BAR group of 90 claims and the SP group of 36 claims south of Canadian Nickel's property at Contwoyto Lake. The contiguous SP and BAR groups adjoin the west boundary and part of the south boundary of the FOX claims held under option by Falconbridge Nickel Mines Limited. The writers visited the property August 29, 1963 and briefly examined the SP-11 and BAR-42 showings. The company operated from a base camp on the northwest shore of a lake near the west boundary of the FOX group at longitude 111°17', latitude 65°43'.

The property is underlain by a folded slate and meta-greywacke sequence of rocks of Yellowknife Group type. Amphibolite beds are interbedded with the sequence and commonly contain pyrite, pyrrhotite, arsenopyrite, minor magnetite, and rarely chalcopyrite. Locally the amphibolite contains gold.

On the SP-11 and BAR-42 showings 8 and 5 holes respectively were drilled into the amphibolite. Ground magnetometer surveys and detailed geological mapping were completed over both showings. The SP-11 and BAR-42 showings are on claims SP-11 and 14 and BAR-42 and 43 respectively.

The amphibolite bed at the SP-11 showing has a fold-like configuration opening to the southeast and is well exposed in several trenches on the northeast limb. The axial plane of the vertically plunging fold strikes N55°W. The fold has an amplitude of approximately 2,500 feet. The amphibolite observed in the trenches is generally coarse grained and garnetiferous and in places may exhibit well developed banding. Numerous clear to milky white quartz veins were observed ranging in width from 1/2 inch to 8 inches and averaging 2 inches. The veins are generally roughly parallel with the banding and commonly enclose heavily mineralized fragments of amphibolite. A drill hole intersection on the northeast limb of the fold assayed 2.29 ounces of gold per ton over 9.5 feet.

¹Consolidated Discovery Yellowknife Mines, Consolidated Northland Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited.

The amphibolite bed at the BAR-42 showing has a fold-like configuration opening southeast. The fold has an amplitude of about 2,200 feet and its axial plane strikes N55°W. A well mineralized grab sample taken from one of the three shallow pits on the northeast limb of the fold assayed 0.36 ounce of gold per ton and 0.32 ounce of silver per ton.

Canadian Nickel Limited

Canadian Nickel Company Limited owns a block of 306 claims on the northwest corner of Contwoyto Lake (N.T.S. mapsheets 76-E-11 and 14). This is an addition of a block of 10 claims to their original staking in 1961. The new claims recorded in the summer of 1963 — MOP 300-309 — lie 2 miles northeast of their base camp at Contwoyto Lake and constitute submerged claims. The company also holds the POM group of 18 claims at approximately 65°39'N and 111°45'W and permit areas in parts of 76-E-10, 12, and 15.

A well equipped base camp consisting of plywood frame buildings and serviced by a diesel-powered electrical system is located on the northwest corner of Contwoyto Lake at approximately 65°46 1/2'N and 111°12'W. In addition the company had a well equipped assay office operating all summer.

Work during the summer consisted of diamond drilling, geological mapping, geophysical surveying (mainly magnetometer) on staked ground, and prospecting their permit areas. The company drilled 17,000 feet, of which 9,000 feet was done on the main showing. Geological mapping consisted of covering much of their staked ground at a scale of 1/2-inch to 1 mile, and in other selected areas mapping at scales of 1-inch to 20 feet and 50 feet. On the main showing, overburden was removed over an area about 400 by 200 feet and mapped at a scale of 1-inch to 10 feet.

The main showing, which led to the exploration rush into north-central Mackenzie District, is located 4,000 feet S45°W of the base camp at Contwoyto Lake. Steeply dipping, sulphide-bearing amphibolite and interbedded argillite, siltstone, and fine-grained greywacke of the Yellowknife Group have been strongly deformed into a complex, synclinal fold structure that plunges 70 to 90 degrees north and whose axial plane varies from north to N15°W. The main fold has an amplitude of 500 feet and an average width up to 100 feet. Smaller folds tens of feet and less in amplitude are common along the limbs.

The mineralized amphibolite band is about 50 feet wide and lithologically consists of two types. A gold-bearing fine- to medium-grained variety (referred to as the siliceous member) contains quartz, hornblende, and grunerite. The amphibole minerals and intergrown quartz occur in separate bands interbedded with detrital quartz beds. A barren medium- to coarse-grained variety (referred to as the non-siliceous member) contains hornblende and detrital quartz. In both types the sulphide and magnetite replace and cut the amphiboles. The significance of the amphibole minerals is not known. A study of amphibolites from the Contwoyto Lake area indicates that where grunerite and hornblende occur in the same rock the latter is derived from the former. It cannot be discerned whether this is a retrogressive or progressive mineralogical transformation. Continued work on this subject is being done by the Geological Survey of Canada.

Gold is commonly associated with arsenopyrite, pyrrhotite, and pyrite. Chalcopyrite occurs in trace amounts. Lollingite (FeAs_2) has been identified, but its distribution is not known. Scattered specks of gold were noted in core drilled from the main showing. Disseminated sulphides and, less commonly, nearly massive sulphides form bands up to 1 foot wide, but average about 5 inches, and parallel the bedding. Amphibolite bands up to a few feet wide, containing little or no sulphides, separate the mineralized bands. Sparsely mineralized, resinous quartz lenses of probable metamorphic origin, inches long, generally parallel the bedding. A few quartz stringers containing trace amounts of sulphide minerals were seen cutting the bedding. The banded nature of the sulphides resembles a bedded deposit and to some geologists in the area indicate that the sulphides are syngenetic. More data are needed to determine the origin of these deposits.

Falconbridge Nickel Mines Limited

The company has under option from Conwest Exploration Company Limited 4 claim groups comprising 391 claims as shown on N.T.S. map-sheets 76-E-11 and 14. The base camp is located at the lake (locally known as Norma Lake) at lat. $65^{\circ}43'$ and long. $111^{\circ}17'$. The contiguous FOX and BOX groups adjoin Canadian Nickel's property. The SOX group is about 4 miles west of the FOX group and the ROX group covers a northwest projection of a peninsula on the northeast shore of Contwoyto Lake. The writers visited the property August 30, 1963 and briefly examined the FOX and BOX groups.

Detailed geological mapping, ground magnetometer surveys, and surface sampling were conducted on the FOX and BOX groups during the summer. On the former about 2,700 feet and on the latter 658 feet of diamond drilling were completed. A ground magnetometer survey was conducted over the SOX group, except for the northern part, which is largely underlain by granite. Diamond drilling on the SOX and ROX groups this summer amounted to 473 feet and 637 feet respectively.

The FOX and BOX claims are underlain by a steeply dipping slate and a meta-greywacke sequence of rocks of Yellowknife Group type. Interbedded in the sequence are the important sulphide-bearing amphibolites that are found in the northwest corner of the FOX group and eastern part of the BOX group.

The amphibolites and sedimentary rocks in the north-western part of the FOX group have been strongly deformed into tight folds with amplitudes up to hundreds of feet in which considerable thickening and thinning along noses and limbs respectively have occurred. On the BOX claims the north-striking amphibolites have been less intensely deformed, as indicated by only minor drag-folds. The amphibolites average 40 to 50 feet thick and on the noses of folds may reach up to 100 feet thick. An amphibolite bed on the BOX claims was traced along its strike for 4,000 feet.

A major prospect on claim 26, on the east edge of the BOX group, trenched and drilled in 1962, was not worked during the summer of 1963 (Baragar and Hornbrook, 1963, pp. 16-18). In 1963 the company remapped this area at a scale of 1 inch to 200 feet in addition to trenching a number of gossans.

The sulphides on the BOX claims are predominantly pyrite, arsenopyrite, and lollingite, and minor pyrrhotite and chalcopyrite. Gold is sporadically distributed in bands and lenses of sulphide and in quartz.

Roberts Mining Company

Roberts Mining Company owns 4 claim groups (DUD, HAR, FRY, and MOR) comprising 61 claims, and have controlling interest in the VAY and NUT groups of 1 claim and 26 claims respectively. The VAY and NUT groups were originally staked for Prospectors Airways and later acquired by Roberts. The company had under option 4 claim groups (FUZZ, GOS, AN, and LEM) comprising 96 claims, but have since dropped the option. The claim groups are shown on N. T. S. map-sheets 76-E-6 and 11. The writers visited the property August 30, 1963 and examined two showings on the DUD group.

A brief description of the geology on the property follows. A contact, between granitic rocks to the south and a belt of highly metamorphosed Yellowknife Group sedimentary rocks to the north, trends northwest through the southwest part of the property. Proceeding northeast from the contact and extending across the property the rocks decrease in metamorphic grade and change from mixed granite gneiss through schist to phyllite. In places on the property small granite stocks have intruded the metasedimentary rocks. Andalusite and staurolite have been found in knotted schists in the vicinity of the showings. Amphibolite beds are interbedded with the metasedimentary rocks and commonly contain pyrrhotite, pyrite, arsenopyrite, minor magnetite, and rarely chalcopyrite.

The main showing is about 600 feet northwest of a small lake at longitude $111^{\circ}0'54''$, latitude $65^{\circ}36'$. It consists of several mineralized amphibolite beds 10 to 25 feet thick, exposed here and there over a strike length of 1,000 to 1,500 feet. The amphibolite beds strike $N70^{\circ}W$ and dip vertically and are well exposed in four large trenches and numerous shallow pits along strike. In places the amphibolite exhibits alternating brown and black banding parallel with the bedding. Numerous glassy quartz stringers ranging in thickness from $1/4$ inch to 4 inches parallel the banding and may constitute up to 20 per cent of the rock. The sulphide minerals are irregularly distributed, but commonly occur in lenses or layers parallel with the bedding.

A second showing about 1,000 feet southeast of the small lake mentioned previously, consists of a small outcrop of amphibolite heavily mineralized with pyrrhotite and minor amounts of pyrite. A grab sample containing about 30 per cent pyrrhotite assayed 0.03 ounces of gold per ton and 1.60 ounces of silver per ton.

Geological mapping, prospecting, and surface sampling were completed on parts of the property this summer. On the HAR group detailed geological mapping and ground magnetometer surveys were completed over an area that includes the main showing.

ECHO BAY GROUP

The ECHO BAY group of 10 claims is about 1 mile northeast of Port Radium (N.T.S. map-sheet 86-K-4). The claims were staked for the Consolidated Mining and Smelting Company of Canada Limited in 1930. In 1963 the claims were optioned from the company by Northwest Explorers Limited of Edmonton. The latter company completed a diamond drilling and sampling program in 1963. During the fall, the company announced that tentative

arrangements were being made to commence mining the property in the summer of 1964.

Previous work to date includes an extensive underground exploration program involving two levels of drifting from two parallel adits. Both adits were driven S50°E into a northeast-striking ridge on the western part of the property. The upper adit is 50 feet northeast of the lower adit. The lower portal is 50 feet south and 15 feet above the road that passes across the property and the upper portal about 600 feet southeast and 233 feet above the lower. A description of the underground workings is as follows:

	<u>Length of adit</u>	<u>Location of drift southeast of portal</u>	<u>Length of drift</u>
Lower level	1,040 feet	No. 1 - 280 feet	960 feet southwest
Upper level	440 feet	No. 1 - 110 feet	160 feet southwest
		No. 2 - 250 feet	530 feet southwest -100 feet northeast
		No. 3 - 440 feet	100 feet southwest -110 feet northeast

A limited amount of crosscutting has been done from both drifts. On the upper level 50 feet southwest of the adit a winze and raise has been extended an unknown distance. The winze-raise lies directly over the lower adit. South of the adits, several trenches were dug on top of the ridge. Heavy manganese stain occurs throughout the trenches; some chalcopyrite and bornite were noted.

A description of the geology of the claims prior to the underground work is reported by Kidd and Lord (1951, pp. 140-141).

The rocks are tuff, dacite, feldspar porphyry, and fine-grained banded sediments, all of the Echo Bay Group. All are altered and contain pyrite, chlorite, magnetite, biotite, actinolite, and tourmaline. Six steeply dipping shear fracture zones, five of which trend northeast, occur in an area 2,000 feet long and 600 feet wide that extends northeasterly across the crest of a prominent hill. The exposed length of the zones ranges from 50 to 800 feet, but their widths are not known. The zones are belts of intense fracturing that in places near the middle contain up to 1 foot of gouge-like material. The fracturing dies out away from the central zone of shearing. In most places the fractures are coated with supergene manganese minerals and in many places the rock adjacent to them

contains disseminated chalcopyrite or galena. Metallic minerals in the zones are in part disseminated throughout the fractured rock and in part occur in veins or stock-works of manganiferous carbonate or quartz. Those seen are pyrite, magnetite, arsenopyrite, pitchblende, chalcopyrite, sphalerite, marcasite, galena, bornite, rammelsbergite, unidentified minerals containing cobalt or nickel or both metals, niccolite, stromeyerite, argentite (?), native silver, covellite, and surface alteration products of manganese, copper, iron, and cobalt minerals. Neither the proportion of vein filling to rock in the zones nor the proportion of metallic to non-metallic minerals in the vein filling is known. One quartz vein is 2 feet wide in one place. Silver-bearing minerals occur in places in most of the zones and a little pitchblende occurs in one zone.

A description of the N40°E-striking veins as exposed on the surface going from NW to SE, is as follows:

<u>Vein</u>	<u>Length</u>	<u>Location</u>
No. 1	320 feet	
No. 4	discontinuous for 1,360 feet	western end of vein #4 lies 220 feet south of vein #1
No. 2	1,080 feet	90 to 200 feet south of vein #4
No. 3	500 feet	0 to 90 feet south of western end of vein #2
No. 5	240 feet	180 feet south of east end of vein #2

Vein No. 4 was intersected in drift No. 1, upper level. Vein 2 was intersected in drift No. 1 and No. 2 of lower and upper levels respectively. Vein No. 5 was intersected in drift No. 3, upper level.

The underground workings were examined briefly. The No. 2 vein in the lower adit was not completely traced, but parts of the veins showed only sparse sulphide minerals, with pyrite predominant.

Veins Nos. 2 and 5 in the upper levels are continuously exposed in drifts Nos. 2 and 3 respectively. The veins are up to 1 1/2 feet wide and consist of pyrite, chalcopyrite, galena in calcite or quartz gangue filling pre-mineralization shear zones. Some cobalt stain was noted. Native silver and stromeyerite (Cu, Ag)₂S are reported to occur in the veins. The vein system is mainly vertical, but parts of the vein probably dip steeply north or south.

Assays of two grab samples taken from the No. 2 vein in drift No. 2 of the upper level are as follows:

1. 22.53 ounces Ag per ton; 0.005 ounces Au per ton.
2. 118.05 ounces Ag per ton; trace Au per ton; 0.36 ounces Co per ton.

During the summer the company drilled 11 holes totalling 1,500 feet. They sampled much of the underground workings and sent 500 lb. of mineralized rock to the Mines Branch in Ottawa for milling metallurgical study. Preliminary results indicate a favourable Ag concentrate can be obtained from this material. Further work is being done, results of which will determine if production will commence in 1964.

At the time of the writers' visit (Sept. 19) electricians were installing facilities to bring power to the lower adit from the source at Port Radium. When mining commences, the ore will be trucked to the mill of Eldorado Mining and Refining at Port Radium. Concentrates will be barged initially to Waterways; in 1966 they will be barged to Hay River and railed south via the Great Slave Railway. Reserves, tenor of the deposit, and production figures have not been reported by the company.

GARSKIE GOLD MINES

Garskie Gold Mines Limited is a producing mine on the south shore of Little Sproule Lake, 33 miles northeast of Yellowknife (N. T. S. map-sheet 85-I-12). A few tons of ore were mined and milled by the owner L. Garskie during the months May-September.

The mine is covered by the Old Parr group of 14 claims staked by the owner in 1947. The gold is mined from open pits where it occurs free, in spectacular amounts, in quartz veins within steeply dipping, tightly drag-folded metasedimentary rocks of the Yellowknife Group. Considerable geological work and diamond drilling were done in the past and reported elsewhere (Lord, 1951, pp. 225-227; Baragar, 1961, pp. 19-23).

Mining during the summer of 1963 was directed to slashing on the hanging wall in the Million Dollar vein, where minor amounts of galena were found associated with the gold. About 150 ounces of gold were produced during the year and sent unrefined to the mint.

GIANT YELLOWKNIFE MINES LIMITED

Giant Yellowknife Mines Limited operates the largest gold mine in the Northwest Territories, 3 miles north of Yellowknife. This report will review major work completed on the property to December 31, 1963.

During the period January 1 to September 30, 1963 a total of 281,783 tons of ore was milled, with an average milling rate of 1,032 tons. Gold and silver recovery was 192,951 and 19,908 ounces respectively. Average mill heads were 0.720 ounces per ton, giving an unofficial total recovery of 87.2 per cent¹.

In 1962 the company produced 253,189 ounces of gold and 25,504 ounces of silver with a value of \$9,512,024. Ore reserves as of December 31, 1962 are as follows:

	<u>Tons</u>	<u>Grade ozs./ton</u>
Active stopes	920,000	0.79
Pillars	120,000	0.80
Other developed ore	<u>1,525,000</u>	<u>0.79</u>
	2,565,000	0.79

Operating costs during 1962 were \$12.62 per ton milled compared with \$12.97 per ton milled in 1961².

The gold deposits are contained in shear zones that intersect a sequence of mafic volcanic rocks of the Yellowknife Group. The rocks strike N 30°E and dip steeply southeast to northwest with tops to the southeast. The shear zones have a fold-like configuration and strike N 30°E. Two major 'folds' or arches (the Western and Eastern arch) and a central trough, can be traced the length of the property. The shear zones consist of various combinations of sericite, chlorite, quartz, and calcite. Gold is associated with a complex sulphide - antimony sulphosalt mineral assemblage. For a

¹Quarterly Report, September 30, 1963, Giant Yellowknife Mines Limited.

²Annual Report for year ended December 31, 1962, Giant Yellowknife Mines Limited.

detail review of the geology of the mine see Baragar (1960, 1961).

Principal exploration and development work during 1963 involved the driving of drifts northward 1,500 and 1,800 feet on the 175- and 750-foot levels respectively, north of the North Giant arch (Western arch) where diamond drilling has indicated a new ore zone of possible substantial size. In the same area, northward drifting commenced on the 425- and 575-foot levels and is expected to be completed in 1964. The four levels are situated in the foot-wall of ASD zone. On the 575-foot level, south of C-shaft, exploration in the western limb of the eastern arch GB zone outlined small erratic lenses of sub-ore grade minerals. An extensive exploration program started in 1960 from the 2,000-foot level was completed in 1963; no new orebodies were found.

A surface drilling program was undertaken during the period April-December. Ninety holes were drilled on the property; most of the drilling was directed at the Western arch in the A-shaft area. Purpose of drilling was to re-examine known low-grade mineralized areas.

GOO AND TRE GROUPS

The Burnt Island property of C. McDonald and J. Woolgar of Yellowknife comprising claims GOO Nos. 1-9 and contiguous TRE claim No. 1 (TRE claim is on Treasure Island, 1/4 mile east of Burnt Island) was visited on October 11, 1963. The islands are situated 12 miles north of the south end of Gordon Lake, about 50 miles northeast of Yellowknife (N.T.S. map-sheet 85-P-3).

The work to 1939 was described by Henderson (in Lord, 1951, p. 76) under the ARDOGO group. In the 1940's the claims were restaked as the GOOD HOPE group and restaked in 1959 as the GOO group by the present owners. The work to date on the property includes the sinking of an 8- by 8-foot inclined prospect shaft 43 feet deep and considerable trenching on the many quartz veins on Burnt Island. The shaft was sunk in 1945 on a number of closely spaced quartz veins in a zone up to 6 feet wide. South of the shaft, trenchings through overburden extended the zone to more than 100 feet in length, where it is found to narrow to less than 2 feet in width. The structure in the shaft area consists of a northeast-plunging anticlinal fold about 10 to 20 feet wide and with an amplitude of a few tens of feet. Drag folds indicate the plunge to be about 60-70°. Considerable quartz containing visible gold was removed at the time of shaft sinking. The owners report that much more spectacular gold was stock piled and subsequently removed by unauthorized people. The writers found visible gold in much of the quartz.

The islands are underlain by a monotonous sequence of slate, siltstone, and subgreywacke of the Yellowknife Group. Repeated graded beds of subgreywacke-shale indicate rhythmically controlled sedimentation. The rocks have been deformed into a N30°E-striking fold belt in which individual folds plunge 60° to 70° northeast, or in a few instances vertically, and rarely steeply to the southwest. A vertical, regional, axial-plane cleavage parallels the northeast-striking fold belt.

Quartz veins that individually do not generally exceed 1 foot in width occur separately and in zones made up of many veins. Individual veins are as much as a few tens of feet long and in zones seldom more than 100 feet long. The veins are mostly parallel with the regional cleavage, but they also parallel the bedding and less commonly cut the bedding as feather fracture-fillings. Of significance the quartz veins are found consistently on the crests of the plunging folds. Gold characteristically occurs as thin flakes in chlorite-sericite seams in quartz and does not preferentially occur with the sulphides. Pyrite, chalcopyrite, galena, and sphalerite occur in minor amounts.

HM GROUP — HIDDEN LAKE

The HM group of three claims covers a gold prospect on the northeast side of Hidden Lake (62°33.3'N; 113°31'W) in the Beaulieu River area 28 miles east-northeast of Yellowknife. The claims were staked in June 1959 by J. Herriman of Yellowknife. The work to date (by Herriman and C. McChesney) consists of a small drilling program and sinking of an 8- by 8-foot steeply inclined shaft to a depth of 69 feet. The shaft is located approximately 700 feet east-northeast of the base of a conspicuous narrow peninsula on the northeast shore of Hidden Lake. The following is a description of the geology and workings in the vicinity of the shaft, as described by Baragar (1962, pp. 28-29).

Thin-bedded greywackes and slates of the Yellowknife Group form the country rock. The bedding ranges in strike from N15°W to N5°W and dips 25 to 35°E.

The gold-bearing quartz vein encountered in drill-holes and in the shaft is not presently exposed at the surface, but a series of three caved pits aligned parallel with the bedding and lying about 40 feet west of the shaft were presumably excavated on its surface exposures. The pits range over a strike distance of about 150 feet, with the northern pit directly west of the shaft. The

central pit is about 60 feet long parallel with the bedding and is reported to have been the site of an inclined shaft lying in the vein. A series of seven holes drilled along a line about 50 or 60 feet east of and parallel with the row of pits, are reported to have cut a quartz vein over a strike length of at least 110 feet.

Work on the property has been confined to drifting underground and comprises the following. Commencing at the bottom of the shaft in the foot-wall of the quartz vein sequence a main drift has been driven 65 feet on a bearing of 113 degrees through the quartz-vein sequence to a point in the hanging-wall side. From this point two sub-drifts have been driven, roughly parallel with the hanging-wall contact on bearings of 335 degrees and 183 degrees, 35 feet and 45 feet respectively. Drifting on the south sub-drift is expected to intersect high-grade gold that is a down-dip extension of the high-grade material present in the central pit. In the north sub-drift on the west face the hanging-wall contact exhibits a small roll or open fold plunging 25° to 40°NE. A similar roll or open fold is exhibited by the hanging-wall contact where it is exposed in the shaft.

A section perpendicular to the gold-bearing quartz-vein sequence from top to bottom would have the following characteristics. The upper contact is represented by 2 or 3 closely spaced chlorite-bearing zones. Immediately below for 1 foot to 4 feet the quartz takes the form of roughly parallel boudinage bands conformable with the country rock. Spectacular amounts of visible gold occur in individual boudins concentrated along the altered contact with the country rock. Underlying the boudined quartz is country rock with little quartz up to 5 feet thick, which in turn is underlain by approximately 10 feet of quartz vein. The major amount of the 1 per cent metallic minerals present is composed of pyrite and minor pyrrhotite. Galena occurs where gold values are high.

The owners plan to continue development drifting this winter.

ITCHEN LAKE

A staking rush precipitated by Canadian Nickel's gold discovery at Fuz Lake in the fall of 1962 led to the acquisition of considerable ground in this area up until the fall of 1963. Canadian Nickel Limited, Giant Yellowknife Mines Limited, Big Four Syndicate, Roberts Mining Company, New Athona Mines, and private prospectors staked 1,250 claims to cover sulphide deposits in amphibolite. One of the first occurrences of nickel-bearing sulphides

in gabbroic rocks in north-central Mackenzie District was staked in the Itchen Lake area in August, 1963 by the Roberts Mining Company.

Most of the staking is east and south of Fuz Lake in an area bound by lat. $65^{\circ}45'N$ and $65^{\circ}38'N$ and long. $112^{\circ}07'W$ and $112^{\circ}36'W$ (N.T.S. map-sheets 86-H-9 and 10). Other staked areas include the northwest corner and the central peninsula of Itchen Lake (N.T.S. map-sheet 86-H-10), and two blocks of claims, one 8 miles east and the other 12 miles south of Itchen Lake.

The geology of the Itchen Lake area is much the same as that described for the Contwoyto Lake region. The Yellowknife Group consists of metasedimentary rocks and subordinate amounts of volcanic rocks. The metasedimentary rocks are predominantly quartz-rich mica schists, hence appear to have been originally an arenaceous facies in contrast to the more shaly facies of the Yellowknife rocks in the Contwoyto Lake area. The volcanic rocks are primarily greenstones, in part pillowed and occur in a north-striking belt that lies west of Itchen Lake. The important sulphide-bearing amphibolites are interbedded in the metasedimentary rocks and are in all respects identical to those previously described.

BAT AND WO GROUPS

The BAT and WO groups of 36 and 38 claims respectively were staked by R.G. Beck and D. Stuebing in February, 1963. The former lies about 2 miles east of the southeast side of Fuz Lake at lat. $65^{\circ}42'$, long. $112^{\circ}18'$ (N.T.S. map-sheet 86-H-9). They tie onto the FUZ, PIT, CAT, TEG, and GET claims on the south, east, northeast, north, and west respectively. The WO group is located on the west side of Lily Lake at lat. $65^{\circ}43'$ and long. $112^{\circ}10'$ (N.T.S. map-sheet 86-H-9). Both BAT and WO claims were optioned by Giant Yellowknife Mines Limited, but have since been dropped. The company geologically mapped both groups and completed ground E.M. and magnetometer surveys over the BAT group.

A number of small gossans on claim BAT 5 on the west edge of Jack Lake were examined on August 23. A few fine-grained amphibolite beds less than 4 feet thick are found within grey, sugary-textured, biotite-quartz-feldspar schists that strike generally east and dip $70^{\circ}S$. The gossans are found in amphibolite containing sparsely disseminated arsenopyrite. About six individual gossans are present, none of which is greater than 100 square feet. These gossans are typical of many of the gossans in the Itchen Lake area in which conspicuous limonite is developed in sparsely to heavily mineralized amphibolites.

Big Four Syndicate

The company owns the JEM group of 144 claims that border on the east side of Jane Lake at latitude $65^{\circ}38'$ and longitude $112^{\circ}50'$ (N.T.S. map-sheet 86-H-10). Reconnaissance geological mapping and prospecting were done on the claims. A number of gossans are known to occur on the claims, but only few of them were examined.

Canadian Nickel Company

The FUZ group of 424 claims was visited briefly on August 23, 1963 (claim sheet 86-H-9 and 10). They were staked by Canadian Nickel in September, 1962 and subsequently led to the peripheral staking about these claims and in the general Itchen Lake area by Big Four Interests, Giant Yellowknife Mines, Roberts Mining, and private prospectors. The claims are bound on the west at long. $112^{\circ}35'$ between the northwest corner of Fuz Lake and the west part of the northeast arm of Itchen Lake, and taper eastward to long. $112^{\circ}18'$. Much of the north boundary of the group lies on lat. $65^{\circ}42'$.

The claim group is underlain, from west to east, by a northwest to east-striking, steeply dipping belt of metasedimentary rocks of the Yellowknife Group. In the western part of the claim group a few concordant bodies of granite, in part mildly foliated, hundreds of feet long and tens of feet wide are found within the metasedimentary rocks.

The metasedimentary rocks are primarily quartz feldspar biotite schists and less commonly quartz-feldspar-muscovite schist. Sulphide minerals are primarily contained within amphibolitic rocks. A number of small gossans, seldom over a few tens of feet in size, occur along the contact between granite and metasedimentary rocks. One such gossan, 20 by 10 feet, is located on claim 32. No recognizable sulphide mineral could be identified.

The main showing comprises a number of individual gossans on claims 25 and 26 on the west central side of Fuz Lake. The company drilled and trenched two main gossans. Some trenching was undertaken on other gossans. The original discovery was on a heavily mineralized arsenopyrite-bearing amphibolite found on the eastern part of claim 26. A pyroxene-rich rock of unknown dimension lies in close proximity to the mineralized zone. The significance of this rock unit is not known.

A showing in the central part of claim 25, situated on a prominent hill exposes gossaned rocks over a 60- by 50-foot area. The rocks are fine- to medium-grained amphibolites, with bands 1 inch or 2 inches thick, interbedded with sugary-textured quartz-feldspar-biotite schists. They strike northwesterly and appear to be tightly folded into steeply plunging structures with amplitudes less than 10 feet in size. Axial planes of folds strike about N60°W and plunge 70°SE. An almost continuous trench 60 feet long extends across the strike of the rocks. A small gossan 200 feet northwest of the showing bears minor disseminated sulphides.

The sulphide minerals on the showing probably form less than one per cent by volume of the amphibolitic rocks and in some gossans in sedimentary rocks no sulphide can be seen. Disseminated arsenopyrite predominates, a little pyrite occurs in vuggy masses, and pyrrhotite is sparsely disseminated in a few discontinuous bands. Light grey quartz forms continuous lenses up to 1-inch thick parallel to the bedding and carries some sulphide minerals.

Six holes totalling 1,496 feet were drilled on the two showings. The drilling was completed in August 1963, after which no further work was conducted on the claim group. It appears unfavourable results were obtained and that further work cannot be anticipated on the part of Canadian Nickel on this ground.

CAT, GET, and TEG Groups

A block of claims that comprise the CAT, GET, and TEG groups of 38, 52, and 116 claims respectively were staked by G. Turner, N. Advadluk, and private interests. They lie east of Fuz Lake and are bound, in part by latitude 65°42' and 65°45' and longitude 112°13' and 112°29'. Schiller flew over the claims and observed a number of gossans in amphibolites of the Yellowknife Group. No work has been done on the claims since they were staked.

Giant Yellowknife Mines Limited

Giant Yellowknife Mines Limited owns the J-5 group of 34 claims, the TREE, TESS, and PINE groups of 24, 28, and 30 claims respectively, and holds under option the AA group of 38 claims. From a base camp at Olga Lake (lat. 65°28', long. 111°48') the company carried out a program of prospecting in the Itchen Lake - Contwoyto Lake area and geological and geophysical mapping of staked ground. The AA, TREE, TESS and PINE claims were visited by Schiller on August 23 and 24, 1963.

The J-5 claims were staked in April 1963 and lie immediately south of the southwest corner of the northeast arm of Itchen Lake at lat. $65^{\circ}34'$, long. $112^{\circ}40'$ (N.T.S. map-sheet 86-H-10). These claims were not visited by the writers, but aerial reconnaissance over the claims revealed a number of gossans in northeast-striking amphibolites. The company did geological mapping and a magnetometer survey over the claims.

The company staked the contiguous TREE, TESS, and PINE groups of 82 claims in August, 1963. They lie south of the north-central arm of Point Lake and are bound by lat. $65^{\circ}17'$ and $65^{\circ}20'$ and long. $112^{\circ}55'$ and $113^{\circ}00'$.

The claims are underlain by biotite-muscovite-quartz schists, in part cordierite and/or andalusite-bearing, and amphibolites of the Yellowknife Group and quartzites, limestones, and slates possibly of the Epworth or Snare Groups. Small lensoid granite bodies, tens of feet long and intrusive into Yellowknife rocks, were noted east of the showing. The Epworth or Snare rocks lie in the northwest corner of the claim block and extend west an unknown distance. They strike about $N5^{\circ}W$, dip gently to the east and are separated from the Yellowknife rocks by a $N10^{\circ}E$ -striking fault. The Yellowknife rocks strike about $N10^{\circ}E$ and dip steeply to the east. A second east-striking fold direction centered over the main showing is in the form of a broad open anticlinal flexure that plunges steeply east. A number of tight drag-folds occur on the south limb and appear to have been important in localizing the sulphide mineralization.

The main showing lies in the south-central part of the claim block. It comprises two amphibolite beds up to 40 feet wide. The east bed can be traced 1,800 feet along strike, primarily by geophysical methods. To the south the beds are separated by about 200 feet of schistose rocks and to the north the beds converge to a point where they are cut off by a northwest-striking gabbro dyke. A northwest-striking diabase dyke cuts the amphibolite beds in the north-central part of the showing. Sulphide minerals and many quartz veins and lenses occur in fine- to coarse-grained amphibolite, in part garnet-bearing. Mineralized and unmineralized bands alternate across the entire width of the amphibolite bed, where the bed is tightly drag-folded. The drag-folds are a few tens of feet in amplitude. About 10 gossans a few hundred feet or less apart were noted. Eight gossans had been trenched for sampling purposes.

The sulphides consist of arsenopyrite, pyrrhotite, and trace amounts of pyrite. Arsenopyrite occurs in bands up to 3 inches wide as disseminated crystals up to 1 mm. long, and as large angular clots up to 2 cm. in size consisting of nearly massive crystals about 4 mm. long. Disseminated pyrrhotite in amounts up to 20 per cent

by volume of the rock is found in bands up to 1/2 inch wide. A grab sample of the more coarsely crystalline arsenopyrite in amphibolite assayed 0.12 ounces per ton Au and 1.42 ounces per ton Ag.

As seen in thin section, the amphibolites are composed of layers containing the following minerals: hornblende; grunerite, in part rimmed with hornblende; and an intergrowth of hornblende and grunerite. In addition they contain detrital and/or vein quartz, sulphides, and magnetite.

The company did reconnaissance geological mapping and ground E.M. and magnetometer surveys over the main showing.

The AA group was staked in August, 1963 and lies south of the northeast arm of George Lake at lat. 65°46'N and long. 112° 25'W.

The claims are underlain by metasedimentary rocks of the Yellowknife Group and consist mainly of grey, medium-grained quartz-feldspar-biotite schists. A number of conformable lensoid granitic bodies generally less than 200 feet long and a few tens of feet wide are found within the schists.

The claims cover two showings of interest that lie south and southeast about 1,000 and 2,000 feet respectively of the northeast arm of George Lake. At the former showing, schistose rocks strike N 80°W and dip 80°SW and contain a gossan up to 4 feet wide and 35 feet long. To the west the gossan tapers out whereas to the east it extends beneath overburden. South of the showing a few much smaller gossans were noted. The showing to the east was not visited but mineralized rocks from the showing were examined and appear to be similar to that described.

The showing consists of interbanded sulphide minerals of two types: (1) nearly massive, intergrown arsenopyrite and subordinate pyrrhotite occur in a few bands up to 2 inches thick; (2) disseminations and stringers of arsenopyrite and pyrite are found in colourless quartz veins that contain almandine (?) garnets up to 1 inch in diameter. The sulphides cut the garnets and are therefore younger than them. A grab sample consisting of arsenopyrite and trace amounts of pyrite in a garnet-biotite-quartz rock assayed 0.125 ounces Au per ton and 0.365 ounces Ag per ton.

New Athona Mines

The company owns the HOT group of 56 claims situated 8 miles east of Itchen Lake at lat. $65^{\circ}30'$ and long. $112^{\circ}23'$ (N.T.S. map-sheets 86-H-8 and 9). The claims are underlain by granite and metasedimentary rocks and interbedded mineralized amphibolites of the Yellowknife Group. During the summer the company completed reconnaissance geological mapping and prospecting on the claims. No further work on the property is expected.

Roberts Mining Company

The company owns the PIT group of 72 claims staked in February and March, 1963. They lie at latitude $65^{\circ}42'N$ and longitude $112^{\circ}18'W$ and tie onto the FUZ and BAT claims on the west and the CAT and WO groups on the north and northeast respectively (N.T.S. map-sheet 86-H-9). The claims are known to be underlain by gold-bearing amphibolites of the Yellowknife Group. They were not visited by the writers in 1963.

In August the company staked the MAR group of 112 claims to cover a nickel showing on the western peninsula at Itchen Lake (latitude $65^{\circ}33'N$; longitude $112^{\circ}50'W$; N.T.S. map-sheet 86-H-10). The showing is reported to contain sulphide-bearing veins associated with gabbroic rocks. Samples submitted to the writers contain pyrrhotite, niccolite, chalcopyrite, and gersdorffite¹. The company plans to conduct detailed studies on the property in 1964.

MON GROUP

The MON group of 13 claims was staked in 1937 on behalf of Consolidated Mining and Smelting Company Limited, at Discovery Lake 30 miles north of Yellowknife. The writers visited the property August 15, 1963 when the company was completing a drilling program.

The gold property is largely underlain by greywacke, slate, and argillite of the Yellowknife Group and contains numerous sills of gabbro and diorite that have been altered to amphibolites. Yellowknife Group volcanic rocks underlie the west and southwest part of the property. The main showing is an S-shaped quartz lens in a steeply plunging drag-fold on the northwest limb of a major fold. The fold opens northward and has an amplitude of about 6 miles.

¹Identification by R.N. Delabio, X-Ray Diffraction Laboratory, Geological Survey of Canada.

The main showing has been described in detail by Jolliffe (1940, p. 8) as follows:

..... Gold has been found in half a dozen or more quartz veins on this property. The main showing is in a steeply plunging drag-fold at the contact of altered basic sills and flows with sediments (chert, tuff, greywacke, and cordierite hornfels). The contact strikes north 30 degrees west, with sediments on the northeast and basic igneous rocks on the southwest. The beds and contact dip moderately to steeply to the southwest and are probably overturned. An S-shaped quartz lens about 20 feet wide and 50 feet long lies in the drag-fold. Quartz veins up to 3 feet wide extend along and near the contact for at least 40 feet southeast, and at least 250 feet northwest, from the lens. The quartz in the lens and veins is glassy and in places contains much hornblende or chlorite or both minerals arranged in vertically elongated foils or pencils up to several inches long, which are parallel to a similar structure in the adjacent basic igneous rocks. Metallic minerals make up less than 5 per cent of the vein matter and include pyrrhotite, arsenopyrite, pyrite, chalcopyrite, galena, sphalerite, a little native copper, and, in places, considerable gold. During the summer of 1938 a vertical prospect shaft located 50 feet southeast of the lens was put down and 160 feet of lateral work was done at a depth of about 60 feet. This limited underground investigation encountered only a few quartz stringers carrying low gold values.

During the summer of 1963 the company completed detailed geological mapping of the main showing and immediate vicinity. Nine holes were drilled to explore the vertical and longitudinal continuity of the quartz lens in the steeply plunging drag-fold. Results of the drilling failed to show any depth continuity to the gold values observed on surface, and surface mapping revealed no new targets. Consequently no additional work is planned for the property.

PINE POINT MINES LIMITED

Pine Point Mines Limited was visited by the writers on September 13 and 14. The property, which is controlled by Consolidated Mining and Smelting, lies 57 miles east of Hay River and about 8 miles south of Great Slave Lake. At present the lead-zinc property is in the developing stages with production scheduled to commence in early 1966.

History of the property goes back to the days of Klondike-destined prospectors who passed around Great Slave Lake. During the period 1898-1953 a considerable amount of geological work was undertaken at various times. Between 1953-1961 no work was done on the property. After the federal government announced in 1961 that construction would commence on the Great Slave Railway linking Grimshaw, Alberta and Hay River, exploration on the property resumed in 1962. In August, 1963 the federal government announced that an 18,000 KW hydroelectric plant would be constructed at Twin Falls on Taltson River to provide power to the mine and to communities in the area. Plans call for a 52-mile highway to link Pine Point City with the Mackenzie Highway 7 miles south of Hay River and a 52-mile rail-line to connect with the Great Slave Railway. Pine Point City is to be administered by the Northwest Territorial government.

Geology of the property was described by Campbell (1957, pp. 161-174). Historical accounts of early prospecting in the area are found in the Northern Miner (March 7, 1963) and in the Western Miner and Oil Review (August 1963, pp. 26-29). Less than 2 per cent of the property contains outcrop, hence all geological information is obtained from subsurface work, which to date includes more than 200,000 feet of diamond drilling, a considerable footage of churn drill holes, three shafts, and a number of test pits.

Ore deposits of galena and sphalerite are found in flat-lying dolomitic rocks of the Middle Devonian Presqu'ile Formation and occupy a northeast-striking mineralized belt 22 miles long and 2 to 4 miles wide. The sulphides are mainly contained within coarsely crystalline, vuggy dolomites, which are thought to represent an original sedimentary organic "reef" structure. The "reef" is bounded laterally by unmineralized, fine-grained to lithographic limestone. A smaller northeast-striking mineralized "reef" 3 miles long and about 1 mile wide occurs 3 to 4 miles north of the east-central part of the main "reef".

The ore is found as disseminations, banded crustations, and vug fillings in the dolomite. Massive deposits are apparently rare. The number of individual orebodies are not reported. Ore grades up to 7.4 per cent zinc and 4.0 per cent lead are reported for some orebodies; grades that are higher and lower are present also. Ore reserves have been reported to be in excess of 5,000,000 tons.

The mineralogy of the ores is relatively simple. Minerals present are sphalerite, galena, and minor amounts of marcasite, native sulfur, and bitumen. The sphalerite occurs in two distinct habits - coarsely and finely crystalline. The former is a typical,

brown variety whereas the fine-grained sphalerite occurs as finely banded nodules or concretions and in banded involuted encrustations all of which range from light creamy brown to brown.

The structural control of the ore may possibly be related to Precambrian fault structures of large magnitude. Southwest-striking faults found east of the Palaeozoic cover rocks can be traced beneath the mineralized belt and appear to be the likely avenue of mineralizing solutions. Possibly a post-Precambrian escarpment may have influenced the growth of the reef.

In 1963, the following work was completed during the period May-September:

Geological - geophysical:

- (1) An E.M. ground survey was conducted over part of the property in May. Results of the survey were apparently ineffective in delineating orebodies.
- (2) Approximately 220 holes were drilled totalling over 28,000 feet.

Mining and townsite facilities:

- (1) Mill and concentrator sites were cleared.
- (2) Stripping of overburden over one orebody was partly completed.
- (3) Fifty-three homes, two 50-man bunk houses, one recreation hall, and one pump house were constructed.

A 5,000 ton per day mill is to be constructed. Concentrates will be shipped to Trail for processing.

Mining will be predominantly by open-pit methods. Initially one orebody and possibly two orebodies will be made ready by late 1965.

RODSTROM YELLOWKNIFE MINES LIMITED

The property of Rodstrom Yellowknife Mines Limited is southeast of Martin Lake and about 2 miles northwest of Giant Yellowknife Mines Limited near Yellowknife. On February 14, 1963 principals holding major interest in the claims formed a private limited company for the purpose of exploring and developing the property.

The company owns a block of ground comprising 43 claims consisting of the contiguous claim groups J 1-13, JC, JC 1-3, C 1-16, R 1-10 as shown on N.T.S. map-sheets 85-J-8 and 9. The claims were staked in the fall of 1962 and in 1963 following the discovery of gold-bearing fracture zones and quartz veins in the granite southeast of Martin Lake. The discovery, like that of the FOX group just to the southeast¹, is of particular interest, as it is in the granite mass west of the Yellowknife greenstone belt, a region that has hitherto been largely neglected. The property was visited by the writers on May 27, 1963 and thereafter from time to time during the summer.

A brief description of the geology underlying the property follows. The country rock is largely pink to white, medium-grained, massive granodiorite. It has been intruded by numerous pegmatite and aplite dykes, which may constitute up to 20 per cent of the rock.

Gold occurs in sub-parallel fractures or shear zones that cut the country rock. The fractures or zones range in width from a few inches to 10 or 12 feet and are generally marked by a conspicuous red stain, which extends into the country rock for from 1 foot to 3 feet on either side of the zones. They commonly consist of sheared country rock and aplite with variable amounts of quartz. The zones may be related to a series of north- to northeast-trending lineaments (apparent on the aerial photographs) that converge on a point on the east side of the northeastern bay of Martin Lake. Several zones have been examined by the company on the property; at least four of them, which are designated as veins No. 1, 3, 7, and 15, warranted additional exploration.

No. 1 vein on claim J-3 has received most attention to date. The vein strikes north to northeast and dips 65° to 70° east. It can be traced about 1,300 feet on the surface; it disappears under overburden and Baker Lake on the north and south ends respectively. The No. 1 vein consists of sheared granite and aplite containing intermittent lenses, pods, and stringers of sugary, light grey quartz. The major metallic minerals are pyrite and hematite, which together form less than 1 per cent of the sheared rock. Specular hematite commonly coats the surface of fractures within the zone and red earthy hematite permeates the adjoining rock. Gold was observed in several places at the north end of the vein. Within a trenched section at the north end of No. 1 vein an ore shoot 110 feet long is reported to assay 0.78 ounce of gold per ton across 16 inches.

¹Baragar and Hornbrook (1963, pp. 27-29).

No. 3 vein on claim J-3 about 300 feet west of No. 1 vein strikes N 10°E to N 15°E and dips 7½ E. Unlike No. 1 vein it consists mainly of a 2- to 10-foot wide quartz vein, which persists throughout most of its exposed length of 800 feet. The quartz is white to light grey, sugary textured, and commonly thinly interlayered with aplitic country rock stained bright red by hematite. Two pits about 12 feet apart have been placed across the vein near the centre of its exposed length where it is 7-10 feet wide. There, the vein comprises mainly quartz with a little carbonate and some sheared country rock. Pyrite and hematite form less than 1 per cent of the vein.

No. 7 vein is exposed for about 200 feet on the east side of a peninsula in a small lake on claim J-7. What is possibly the north extension of the vein is exposed on a point on the east shore of the lake about 800 feet northeast of the peninsula. The vein strikes northeasterly and appears to dip steeply east. Sugary, light grey quartz and minor interlayered ribbons of aplitic material constitute most of the vein. Minor pyrite, galena, and chalcopyrite were observed in two trenches in the north end of the vein.

No. 15 vein on claim R-4 at the south end of the property was not examined by the writers. This vein is on the south side of Martin Fault, which strikes northwesterly through the property, whereas No. 1, 2, and 7 veins are on the north side. No. 15 vein consists largely of lens-shaped quartz bodies containing minor amounts of sheared country rock. Encouraging assay results are reported on samples from an 80-foot mineralized section of the vein.

During the fall of 1963 the property, except claims R 5-10, was geologically mapped on a scale of 1 inch equals 400 feet. Four areas surrounding veins No. 1, 3, 7, and 15 were mapped in detail on scales of 1 inch to 10 or 20 feet. To December 31, 27 holes totalling 2,013 feet were drilled. The No. 1 vein has been tested on the 50-foot level by 618 feet of drilling in 9 drill holes and on the 100-foot levels by about 300 feet in 2 drill holes. The No. 15 vein has been tested on the 25- and 50-foot levels by 11 holes. Veins No. 3 and 7 were tested by 1 hole and 4 holes respectively.

TUNDRA GOLD MINES LIMITED

Tundra Gold Mines Limited, formerly Taurcanis Mines Limited, is located just south of Matthews Lake at latitude 64°02"N and longitude 111°11"W, 150 miles northeast of Yellowknife. The mine is 20 miles northeast of the tree line in the barren lands and is the most northerly lode mine in the Western Hemisphere. Production is scheduled to commence in March, 1964. Work to date includes an extensive underground development program initiated in

the summer of 1957 and completed in November, 1962. Workings are on six levels: four successive levels to 625 feet and levels at 925 and 1,225 feet. On two levels, the total length of drifts is slightly more than 3,500 feet. In 1963, all surface buildings were completed and much of the mill equipment was installed. (See Western Miner and Oil Review, October 1963, pp. 52-53 for photographic coverage of surface buildings.) Stope preparation commenced in December, 1963. The property is managed by Consolidated Discovery Yellowknife Mines Limited, and participating interests are held by Dickenson Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited. A description of the geology of the property and the development work of the mine to the end of 1962 is reported by Baragar and Hornbrook (1963) and Baragar (1962; 1961).

Gold deposits occur in two types of quartz veins: (1) those that lie along or adjacent to a conformable contact between sedimentary and volcanic rocks of the Yellowknife Group; and (2) those that are found entirely in volcanic rocks. The contact strikes about N 15° W and dips 75° east. Meta-greywacke and slate form the hanging-wall. The volcanic rocks are amphibolites, in part garnet-bearing, and meta-tuffs.

Three separate deposits have been outlined in the mine — the Matthews vein, No. 2 vein, and the south zone. The major deposit is the Matthews vein, which lies along the contact or in the sedimentary rocks adjacent to the contact. The head-frame is located in the northern part of the Matthews vein. An ore shoot, from 250 to 600 feet south of the head-frame, about 350 feet long and from 2 to 5 feet wide has been outlined from surface to the 1,250-foot level. This shoot will provide all of the mill feed when production commences. Additional smaller shoots in the vein have been delineated and will be mined at a later date.

The No. 2 vein¹ is about 3,000 feet southeast of the head-frame and like the Matthews vein lies along or adjacent to the contact in the sedimentary rocks. The vein is not exposed at the surface, but has been traced for a length of 300 and 375 feet on the 625 and 1,225 levels respectively. In the vein one possible ore shoot 58.4 feet long, an average width of 6.3 feet, and a grade of 0.59 ounces of gold per ton, has been defined.

The south zone lies about 2,800 feet south of the head-frame and occurs entirely in volcanic rocks. It consists of a multitude of quartz veins up to a few tens of feet long and a few feet wide. They appear to be a north-striking, shallow east-dipping set

¹Described by Baragar and Hornbrook (1963, p. 43) as part of the south zone.

of fracture fillings. The zone is as much as 200 feet long and 20 feet wide and can be traced discontinuously from the surface to the 1,225 level. No ore shoots have been delineated in the zone, but further exploratory work will be done in this area.

Positive ore reserves in the main ore shoot in Matthews vein are calculated at 110,000 tons averaging 0.93 ounces Au per ton with a cutoff grade of 0.70 ounce per ton. There are an additional 200,000 tons of probable and indicated reserves averaging about 0.50 ounces per ton in the Matthews and No. 2 veins. Initial milling rate will probably start at 100 tons per day and subsequently increase to a maximum of 125 tons per day. Projected life of the mine based on present reserves is about 3 years. It is hoped that additional mineable ore shoots will be found in all three deposits to the 1,225 level. The possible extension of the Matthews vein to deeper levels will be investigated.

UPPER BACK RIVER

An area along the upper part of the Back River, near Regan Lake, 270 miles northeast of Yellowknife, was visited by one of the writers on September 5th and 6th, 1963. Falconbridge Nickel Mines Limited, Consolidated Mining and Smelting Company Limited, and the Big Four Syndicate (Consolidated Discovery Yellowknife Mines Limited, Consolidated Northland Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited) were active in the area during the summer. The property of the Big Four Syndicate was not visited as all personnel had departed from the field prior to September 5.

A brief description of the geology near Regan Lake that would be covered by N.T.S. map-sheets 76-B-13 and 76-G-3 and 4 and reported by Wright (1956) follows. North and south of Regan Lake the area is underlain by a belt of northwest-striking greywacke and slate of the Yellowknife Group. South of the belt are porphyritic felsites and rhyolites and agglomerates. From Regan Lake northwestward, westerly-striking volcanic rocks of Yellowknife Group type are exposed. The area immediately east of Back River is underlain chiefly by massive granite and allied rocks.

The sedimentary rocks in the area have undergone low-to medium-grade metamorphism. The greywacke-slate succession includes knotted quartz biotite schists.

Mineralized lenticular quartz bodies apparently as much as 10 feet long are exposed in a series of gossans in greywacke and slate north of Regan Lake. Heavily mineralized altered slate occurs

as fragments contained in quartz and as narrow schistose zones where in contact with quartz. The dark grey to milky white quartz commonly contains pyrite and the altered slate contains abundant needles of arsenopyrite. Locally the mineralized quartz and slate contain gold. Throughout the region, particularly south of Regan Lake, adjacent to the Back River, mineralized quartz veins occur in greywacke, feldspar porphyry, and volcanic rocks. Many of the quartz veins are reported to contain gold.

Big Four Syndicate

The Syndicate owns the OX group of 36 claims 1 mile west of Back River and about 12 miles south of Regan Lake (N. T. S. map-sheet 76-B-13). The group forms a continuous strip 3 claims wide, which adjoins the west side of the northern part of the TOBY group owned by Consolidated Mining and Smelting Company Limited, and adjoins the south boundary of the LARK group owned by Yellowknife prospectors.

Geological mapping, prospecting, and surface sampling were completed on the OX claims during the summer of 1963.

The OX claim group is underlain largely by porphyritic felsites and rhyolites and agglomerates with minor interbedded sedimentary and basic volcanic rock.

Gold is reported to occur in at least one of the numerous gossans on the property. The gossans are generally small but may be as much as hundreds of square feet in surface area.

The Consolidated Mining and Smelting Company of Canada Limited

The company owns two contiguous claim groups comprising 218 claims, as shown on N. T. S. map-sheet 76-B-13. The claims are located as follows: commencing at a point 6 miles south of the outlet of Regan Lake on Back River and extending south, the claims form a 12-mile strip that is roughly parallel to the river and as much as 2 claim-lengths deep on either side. The RUBY group of 70 claims and the TOBY group of 148 claims lie north and south respectively within the strip.

Geological mapping of the property early in the season on a scale of 1 inch equals 1/2 mile was followed by detailed mapping on a scale of 1 inch equals 600 feet. Ground magnetometer surveys were conducted on the TOBY group along a volcanic-sedimentary rock contact. In specific areas, including the main showing, E. M. surveys were used to determine the structure of mineralized quartz veins.

The area covered by the claims is underlain by greywacke, slate, and impure quartzite on the east side of the river, and acid and basic volcanic rock, tuff, and agglomerate on the west side. Intrusive bodies of diorite and feldspar porphyry crop out in a few places on the property.

The sedimentary rocks strike northerly and dip easterly. The volcanic rocks generally strike northwest and dip northeast at the south end where complex folding is reported, and strike more northerly at the north end. Mineralized quartz veins that locally contain gold are commonly found in feldspar porphyry and the volcanic and sedimentary rocks.

Company work during the summer was concentrated on a gold-bearing mineralized quartz vein in greywacke on the east bank of Back River (107°41'; 64°54') on TOBY claims 16 and 17. Drift covers the quartz vein, but it may be traced on surface by rusty quartz boulders and push-ups to where it disappears under the river at both ends. The vein strikes N10°E, dips 60° east, and has a true width in excess of 10 feet. The black vuggy quartz is heavily mineralized with pyrite and minor pyrrhotite. Visible gold was observed by the writers in one rusty boulder on the river bank at the north end of the surface trace of the vein. Six drill holes totalling approximately 3,000 feet were completed during the summer of 1963.

Falconbridge Nickel Mines Limited

The company owns three claim groups in the area, comprising 136 claims and including the following: the ACK group of 36 claims on N.T.S. map-sheet 76-G-4, 13 miles northwest of Regan Lake; the DON group of 42 claims on N.T.S. map-sheet 76-G-4, 2 miles north of the west end of Regan Lake; the SAM group of 58 claims on N.T.S. map-sheets 76-G-3 and 4, immediately north and east of Regan Lake; and the DON and SAM groups, which in part represent restaking of an old gold property of Algood Gold Mines Limited. Three gold deposits on the property are described by Lord (1951, pp. 68-70).

Throughout the 1963 field season the area, including the three claim groups, was prospected. Numerous gold occurrences were discovered and known occurrences were examined in detail. Geological mapping on a scale of 1 inch equals 800 feet was completed on the DON and SAM groups. Ground magnetometer surveys were conducted over gold-bearing zones on the property, including the gold deposits discovered by the previous owner, Algood Gold Mines Limited. Shallow trenches in these deposits have been sampled as well as numerous other gold occurrences on the property and in the immediate area.

The property is underlain by a greywacke-slate sequence of the Yellowknife Group. A few miles northeast of Regan Lake large folds with an amplitude of hundreds of feet were observed from the air by one of the writers — one fold 200 to 250 feet wide, trending north-northwest, and the other about 40 feet wide, trending northeast. Gold occurs in mineralized quartz and slate.

The gold showing on the ACK group was not examined by the writers. The company reports the showing consists of gold-bearing mineralized quartz veins and lenses in chloritic slate. The showing was discovered and staked late in the season, hence little work other than initial sampling has been completed.

The main showing called the Alksne deposit on the DON group was briefly examined by the writer. It has been described in detail by Lord (1951, p. 70) as follows:

No. 3 or Alksne Deposit is on Algood No. 11 claim about 3,200 feet south of No. 1 deposit. The enclosing slates and greywackes strike north 60 degrees west and dip 80 degrees southwest. Many small drag-folds were noted, and here and there the strata appear to be offset a few feet by left-hand faults that strike about northeast. The deposit is probably a zone of lenticular quartz bodies in mineralized slate. It outcrops as widely scattered groups of rusty, loose blocks for a length of about 1,200 feet on an average trend of about north 70 degrees west. Near its southeast end it trends about north 60 degrees west. Farther northwest it seems to occur as a number of en echelon segments arranged so as to suggest that they represent parts of a once continuous zone displaced by a series of transverse left-hand faults. Each segment, however, strikes about north 60 degrees west parallel with the adjacent strata. The quartz is grey or blue; it contains pyrite, and fragments of slate with numerous needles of arsenopyrite. The slate wall-rock also contains much similar arsenopyrite. Thirteen drill-holes have probed the zone for a length of 1,200 feet. Five of the six holes that explored the northwestern 740 feet of the zone afforded samples with true widths ranging from 1.2 to 17.5 feet and corresponding assays from 0.12 ounce to 0.44 ounce of gold a ton. Of the 17.5-foot sample, 4 1/2 feet assayed 0.60 ounce a ton.

The slate, adjacent to, or enclosed as fragments in the quartz has become more schistose by alteration and contains sericite, quartz, biotite, chlorite, and carbonaceous material. Abundant arsenopyrite needles in the altered slate are roughly oriented to lie

in the plane of schistosity. A well mineralized grab sample taken by one of the writers, consisting of equal parts of altered slate and quartz, assayed 1.06 ounces of gold a ton and 0.22 ounce of silver a ton.

W.J. GROUP

The W.J. group of 64 claims in the Sophia Lake area, 34 miles north-northeast of Yellowknife, was staked in the spring of 1963 by the Earl-Jack Syndicate. These claims in part represent restaking of an old gold property of J. Herriman and associates. Additional ground owned by the company in the area comprises the NOSE group of 36 claims. The claim groups are shown on N.T.S. map-sheet 85-J-16.

The property is underlain by basic volcanic rocks (in part pillowed), acid tuffs, and metasedimentary rocks, all of the Yellowknife Group. Rocks underlying the central part of the W.J. claim group appear to have the configuration of a tight fold opening and possibly plunging steeply northeast. Structural data is lacking, hence the true nature of the fold is not known. Two parallel ridges of volcanic rocks separated by a drift-filled valley are thought to be limbs of this fold, which has a northeast-striking axial plane. The valley is underlain by metasedimentary rocks. Both limbs dip steeply to the southeast, but the west limb is overturned; tops on the east limb are not known. What may be the nose of the fold has been displaced to the southwest by a northeast-striking fault that extends through the southern part of the property.

In the late 1940's the previous owners completed some trenching and about 2,500 feet of diamond drilling at the north end of the valley. An old trench on the east side of the valley at the base of the ridge of volcanic rocks on claim W J-7 exposes mineralized metasedimentary rocks. A grab sample, from rubble about the lip of the trench, containing abundant arsenopyrite and pyrite, minor pyrrhotite, and chalcopyrite, is reported by the Syndicate to have assayed 0.75 ounces of gold a ton.

On the basis of drill hole data beneath the trench and recent information revealed from surface mapping the Syndicate now believes the mineralized rocks obtained from the trench are not in place. Continued work on the property is planned with the assumption that the source of the mineralized rocks is on the property.

Detailed geological mapping, and geophysical and geochemical surveys were completed on the central part of the claim group. E.M. surveys will be conducted on the property during the winter of 1963-64.

W.T. GROUP

The W.T. group of 3 claims was staked in 1960 and 1963 by W. Ternowski of Yellowknife and is located on the south shore of Myrt Lake at latitude 62°47'30" and longitude 113°15' (N.T.S. map-sheet 85-I-14). The claims cover a gold showing that was originally staked as part of the S.D.C. group in 1938 by Dome Mines Limited (Lord, 1951, pp. 258-259). During the 1950's a number of successive groups owned and performed little or no work on the showing. In 1961 Giant Yellowknife Mines Limited optioned the W.T. and contiguous Myrt groups and conducted detailed geological mapping and sampling on both groups. Work completed by Giant at that time was reported by Baragar (1962, pp. 35-36). In April 1962, Consolidated Discovery Mines Limited optioned the W.T. groups and did geological mapping and drilling on the showing in 1962 and 1963.

The property is largely underlain by highly deformed greywackes and slates of the Yellowknife Group. The rocks generally strike northwest and dip steeply northeast.

The main deposit (No. 1 showing on claims W.T. 1 and 2) has been described by Baragar (1962, p. 35) as follows.

The deposit is an elongate quartz mass with associated quartz stock-work and stringer zones. It strikes northwest to north-northwest, is about 200 feet long, and has a maximum width of 40 or 50 feet. The enclosing greywackes and slates of the Yellowknife Group form an S-shaped drag-fold plunging steeply southeast and the quartz body lies mainly along the faulted middle limb of this fold. The fault is readily observed in the sedimentary rock, where it disrupts continuity between opposite elements of the double fold, but it cannot be traced through the quartz. The quartz body is generally well mineralized with patches of pyrite, arsenopyrite, sphalerite, galena, and chalcopyrite.

Dome Mines Limited previously reported the main deposit reserve as 503 tons per vertical foot assaying 0.20 ounces of gold per ton over a length and width of 240 and 25 feet respectively. Discovery's 1962 exploration program, which consisted of 1,206 feet of diamond drilling in 22 drill holes and extensive resampling of old trenches substantiated the ore reserve figures of Dome Mines Limited. In addition, the program results indicated a high-grade ore shoot within the main deposit of 85 tons per vertical foot assaying about .75 ounces of gold per ton.

In 1963 the company completed geological mapping of the property on a scale of 1 inch to 400 feet and more detailed mapping of the deposit itself. Sixteen holes, amounting to 2,724 feet of drilling, tested continuity of the high-grade ore shoot at depth. It appears gold-bearing widths are present to the 150-foot level similar to that found at the surface, but with a decrease in overall grade.

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