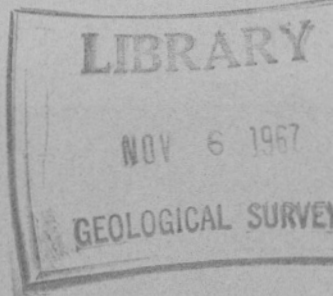


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DEPARTMENT OF MINES  
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THE MINERAL INDUSTRY  
OF THE DISTRICT OF MACKENZIE,  
NORTHWEST TERRITORIES

W. R. A. Baragar

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THE MINERAL INDUSTRY OF  
THE DISTRICT OF MACKENZIE,  
NORTHWEST TERRITORIES

By

W. R. A. Baragar

DEPARTMENT OF  
MINES AND TECHNICAL SURVEYS  
CANADA



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# THE MINERAL INDUSTRY OF THE DISTRICT OF MACKENZIE, NORTHWEST TERRITORIES

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## INTRODUCTION

This preliminary account is concerned with developments during the 1-year period (approximately) that ended with the close of the 1960 field season. The fossil-fuels industry is excluded. The emphasis is on properties in the prospect or development stages, rather than on producing properties. Descriptions of prospects are based primarily on the writer's own observations, in some cases supplemented by material supplied by companies or individuals who have kindly granted permission for its publication. The writer is grateful for the help and cooperation given by the staffs of companies and individuals whose properties he visited.

## ACCESS

Yellowknife is the base for most prospecting ventures in the Precambrian part of the District of Mackenzie. It is on the Mackenzie River system at the western edge of the Canadian Shield, and has excellent air, water, and road services connecting it with the country's main transportation networks.

Yellowknife became accessible from Edmonton by an all-weather road in September 1960 when the Great Slave Highway was opened. The highway passes around the west end of Great Slave Lake and joins the Mackenzie Highway about 18 miles south of Hay River. Prior to freeze-up in 1960 a privately owned barge was used at the Mackenzie crossing, but a Government-owned ferry is under construction and should be in service next summer. During the winter the crossing will be made on ice. The route is expected to be unserviceable for about a month or 6 weeks while the Mackenzie River is freezing in the fall and for a similar period in April and May while the road bed is soft.

Yellowknife is serviced daily by a scheduled airline and during the open-water period it receives barge traffic from the rail-head at Waterways, Alberta. Four charter airline companies provide a wide range of aircraft for servicing outlying points.

The following is a summary of freighting costs (September 1960) from Edmonton to Yellowknife:

Trucking

Class .....	1	2	3	4	5
Winter rate (dollars/100 lb)...	6.58	5.59	4.61	4.17	3.25

Summer rates are probably similar. Classes refer to different types of cargo; truck-load lots are class 5. During freeze-up, road freight is normally flown to Yellowknife from Hay River at a greater total cost.

Barge

Rates for class 5, general cargo (most common) from Waterways to Yellowknife are:

Carload lots (minimum 20,000 lb) .....	\$1.65/100 lb
Less than carload lots .....	\$1.75/100 lb

Air Cargo

Pounds	Edmonton to Yellowknife	Yellowknife to Edmonton
Less than 100 .....	\$ .18/lb	\$ .09/lb
100 to 1,800.....	14.97/100 lb	7.65/100 lb
1,800 to 3,000 .....	13.02/100 lb	6.65/100 lb
More than 3,000 .....	11.53/100 lb	5.89/100 lb

GENERAL PROSPECTING

A minor staking rush was precipitated late in the 1959 field season by the recording in September of 1,008 claims staked by Eldorado Mining and Refining Limited along Wopmay River. Other stakers—notably S. Yanik of Uranium City, Norman W. Byrne Limited of Yellowknife, and MacDonald and Kermeen of Uranium City—tied on to the Eldorado claims. By the year's end, 1,970 claims had been recorded.

These claims represent a continuous strip 70 miles long by 1 to 6 miles wide, along the eastern contact of a belt of sedimentary and volcanic rocks of the Snare group between latitudes 65 and 66° north. The contact zone is reported to be strongly sheared and may be

the site of a major east-dipping thrust fault (J. C. McGlynn, personal communication). The original claims were staked on the basis of airborne geophysical anomalies. During the early spring and summer Eldorado is reported to have tested a number of them by diamond-drilling. Several groups of claims near McPhoo Lake, near the north end of the belt, were optioned shortly after staking by six companies under the Byrne management. One of these companies, Consolidated Northland Mines Limited, acquired claims containing a copper-silver-molybdenum prospect on Calder River about a mile north of McPhoo Lake (about lat.  $66^{\circ}46'N$ , long.  $116^{\circ}24'W$ ). Ore minerals were reported to comprise pods of massive bornite and coarsely crystalline molybdenite up to a few inches long in a zone 30 feet wide. The prospect was trenched and sampled in April and the claims were mapped during the summer. Options acquired by the six companies have since been dropped.

In the 1959 field season Canadian Nickel Company Limited staked 123 claims on manganese showings along Fault River northeast of Hornby Bay, Great Bear Lake. Five claims and a fraction of a claim, all staked by Eldorado around the principal manganese showing at approximately the same time, were contained within the claim block. In December, Canadian Nickel was grafted a prospecting reservation for an area surrounding and containing their claims. The manganese showings were diamond-drilled and the reserve was mapped during the summer of 1960. Eldorado is reported to have done some drilling on their claims in the latter part of the season.

The Old Parr group of 15 claims, situated on Sproule Lake about 33 miles northeast of Yellowknife, was optioned from the owner, L. Garskie, by Vanguard Explorations Limited in January 1960. As a result several new claims were staked around the property by prospectors anxious to obtain favourable ground. During the spring and early summer Vanguard carried out an intensive evaluation program which included mapping, bulk-sampling, and diamond-drilling. Following this work, the option on the property was relinquished. McWatters Gold Mines Limited obtained an option on the adjoining Pard group of claims and in June and July these were mapped and prospected. Nothing of significance has been reported as a result of this work.

A drilling program was undertaken in March and April by the Consolidated Mining and Smelting Company of Canada Limited on the Co-Go group of 22 claims at Lac Duhamel in the East Arm region of Great Slave Lake. The group was optioned from Monpre Mining Company Limited in September 1959. Seven holes were drilled on two zones. The option was allowed to lapse at the end of August, 1960.



Consolidated Mining and Smelting was also active on their XLX claims at Turnback Lake about 58 miles east-northeast of Yellowknife. The XL and OK groups adjoining the XLX claims were acquired during the winter; in the summer, 18 claims were added to the property to form a total of 52. A geophysical survey was conducted over part of the property before the spring break-up and a two-man geological party was on the ground in the summer.

The Dark, Chick, and Al properties of Beneventum Mining Company Limited were optioned in March by Sand River Gold Mining Company Limited. The Dark and Chick groups are in the Gordon Lake region some 35 and 60 miles respectively northeast of Yellowknife. The Al claims are north of Campbell Lake, about 47 miles east-southeast of Yellowknife. An electromagnetic survey was conducted on part of the Dark group in April and early May, and 13 diamond-drill holes, aggregating 2,560 feet, were drilled to test two separate zones of gold-bearing quartz.

Diamond-drilling was done during the summer on the Point claims of Canadian Nickel Company Limited. These are located on the east end of Point Lake, about 190 miles north-northeast of Yellowknife.

The AUX group of six claims near Cameron River, about 45 miles northeast of Yellowknife, was optioned in July by Vanguard Explorations Limited. Vanguard staked a number of additional claims north and west of the optioned group, and later other stakers located claims to the south. Diamond-drilling commenced in September and continued until freeze-up in October.

Four companies—Consolidated Discovery Yellowknife Mines Limited, Consolidated Northland Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited—participated in an exploration program in the Courageous Lake area during the summer and fall. Work was concentrated on a 12-mile strip of 125 claims staked at various times during the year along the east side of a volcanic belt north of Courageous Lake. A total of 4,126 feet of diamond-drilling was completed on two gold-bearing zones on the Jax group of claims before freeze-up in September. Work is expected to continue in the spring of 1961.

The discovery of commercial quantities of the caesium mineral pollucite in a pegmatite in Manitoba, coupled with the increasing demand for beryllium, caused a renewed interest this season in the rare-element pegmatites of the Beaulieu River area. Several prospectors were active in re-examining promising pegmatite districts and a few claims were staked. The presence of pollucite in this region has not, to the writer's knowledge, been confirmed.

A number of claim groups about which the writer has little information, particularly in the Pine Point and Flat River regions, have been recorded during the year. In the Pine Point area these are as follows: 40 claims recorded by Dominion Explorers Limited along Little Buffalo River in groups 8 and 20 miles south of Great Slave Lake; 63 claims recorded by Conwest Exploration Company Limited, divided between a group 2 miles west of Dawson Landing on Great Slave Lake and a group adjoining the Consolidated Mining and Smelting property about 7 miles south of Pine Point; and 23 claims recorded by Canadian Nickel in three groups about 7, 8, and 11 miles south-southeast of Sulphur Point. In the Flat River region near the Northwest Territories - Yukon boundary, claim groups totalling more than 260 claims have been recorded this year by Cassiar Asbestos Corporation Limited, Canex Aerial Exploration Limited, Canada Tungsten Mining Corporation, and individuals.

Airborne exploration programs employing helicopter and fixed-wing aircraft were conducted in the District of Mackenzie this summer by Canadian Nickel Company Limited, Giant Yellowknife Mines Limited, and Eldorado Mining and Refining Limited.

With ore reserves exhausted, the Port Radium mine of Eldorado Mining and Refining Limited ceased production on September 16, 1960, and the plant closed a few days later. The mine had been in production since 1933 except for a period between 1940 and 1942. The exploration staff has remained at the property and will continue to use some of the facilities for their headquarters.

#### DATA ON HELICOPTER OPERATIONS

Eldorado Mining and Refining Limited very kindly provided the following information relating to their 1960 helicopter-mapping program.

An area of 8,000 square miles was systematically traversed by light helicopter during the period from June 1, 1960 to July 31, 1960 inclusive. Traverse lines were parallel, spaced 3 miles apart for two thirds of the area and 4 miles apart for the remainder. Helicopter mapping was supplemented by some ground traverses and air-photo interpretation. Data was plotted on a photo mosaic at a scale of 1 inch to 1 mile. All work was accomplished from two field camps and was supported by an Otter fixed-wing aircraft. The field party comprised three geologists, a draughtsman, a cook, and a helicopter pilot and engineer. The Bell D-1 and G-2 helicopters were used.

Statistics relating to the operation are as follows:

Area mapped (square miles) .....	8,000
Total cost (includes labour \$9,258; equipment and supplies \$3,142; air support \$41,388; and food, transportation, etc. from point of hire \$1,225)...	\$55,013
Cost per square mile .....	\$6.88
Days in field .....	61
Days spent in mapping .....	57
Total helicopter hours (mapping 273:28; ferrying 31:20; other 24:35) .....	329:23
Average helicopter hours per day .....	4 3/4
Helicopter cost (Bell G-2 \$22,090; Bell D-1 \$15,698) .....	\$37,788
Fixed-wing aircraft cost (includes gasoline caching) .....	\$3,600

### DESCRIPTION OF PROPERTIES

#### ANN GROUP

The Ann group, consisting of claims Ann 1-16 owned by W. Rossing of Camrose, Alberta, is located between Meridian Lake and Maufelly Bay in the East Arm of Great Slave Lake. The group was staked in June 1955 and has since been optioned first by Giant Yellowknife Gold Mines Limited and then by the Consolidated Mining and Smelting Company of Canada Limited. Work was performed by Giant on what is presently called the 'B-zone' during the summers of 1955 to 1957, and by Consolidated on the 'A-zone' during the summer of 1959. The latter company added claims Ann 17-64 during the tenure of their option and continued examination of these claims last summer after the option on the original group had lapsed. The property was visited by the writer on August 29th and 30th, 1960.

The B-zone is on claims Ann 1 and 2 and the A-zone on claims Ann 2 and 3. The most westerly exposure of the B-zone is about 1,800 feet northeast of the northernmost point of Meridian Lake; that of the A-zone is about 4,100 feet northeast of the same point. The

B-zone is exposed by eight trenches along a strike distance of about 600 feet, and the A-zone is crossed by five trenches evenly spaced along a strike distance of about 800 feet.

Rocks adjoining the mineralized zones are limestones and minor intercalated shales of the Kahochella formation. The rocks are folded and the fold axes trend about N40°E. In the vicinity of the A-zone the strata dip about 45°SW.

The A-zone is a quartz-carbonate stock-work that strikes about N40°E. Throughout its exposed length of 1,150 feet it ranges from 20 to 120 feet wide, with an average width of about 60 feet. The stock-work is almost entirely in limestone but it contains a few strips of reddish shale. In detail, the stock-work is composed of closely spaced, interlacing quartz-carbonate veins in limestone or silicified limestone. In the central part, relics of country rock are a minor constituent but toward the margins the spacing between veins increases to the point where the rock is limestone cut by a few widely spaced quartz-carbonate veins. Individual veins within the stock-work range from a fraction of an inch to several inches wide, and although they may have widely varying attitudes they tend to have a preferred attitude of about N40°E with steep easterly dips. This probably reflects the attitude of the stock-work as a whole.

Chalcopyrite and minor pyrite are the predominant sulphide minerals. Generally they are finely disseminated in particles of less than 1 mm diameter and only locally are blebs of chalcopyrite found as coarse as 2 cm long. Chalcopyrite is present in all trenches and can be found throughout the width of the stock-work. In the central part of the stock-work it may be found in both quartz-carbonate veins and inclusions of country rock, but at the margins of the stock-work, where veins are more widely spaced, it is generally confined to the veins. The highest-grade sections of the A-zone are considered by the writer to be in the western halves of trenches 1, 2, and 3 (numbered successively from the north). The assay results<sup>1</sup> of three chip samples, taken across the most promising part of trench 3, are listed below.

Sample	Length Measured from Northwest End of Trench (feet)	Assay	
		Cu(%)	Au(oz/ton)
1	0 - 12 .....	0.47	0.0075
2	12 - 24 .....	1.23	0.06
3	24 - 37 .....	0.65	0.005

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<sup>1</sup> W.R. Inman, Chief Chemist, Mines Branch, Ottawa.

B-zone was examined briefly. The zone is composed of a number of subparallel quartz-carbonate veins, ranging from about 1 inch to 3 feet wide, in red slates. The veins do not form a stock-work as in A-zone but are relatively widely spaced across widths of 20 feet or more. Chalcopyrite is disseminated through the veins but was not observed in the slates. Locally some spectacular specimens are found containing chalcopyrite masses of 1 inch or more across. The veins, generally in common with cleavage in the host rock, strike approximately N50 to 60°E and dip 50 to 60°SE. The B-zone is roughly on strike with the A-zone but is separated from it by a distance of about 1,500 feet, in which there are no outcrops.

### AUX GROUP

The AUX group of six claims was staked in November 1957 by A. Mandeville; the ground was formerly held by Prospect Street Syndicate. The group is 1 mile to 3 miles east of Cameron River at lat. 62° 48 1/2'N and long. 113° 11 1/2'W. The claims were optioned by Vanguard Explorations Limited in July 1960, and adjoining claims — S 1-9, Dip 1-9, Tea 1-8, and Ayr 1-8—were immediately added to the property. A drilling program to test the Frank vein and an associated vein on claim AUX 1 was undertaken by Vanguard in September and part of October. A. W. Jeckell, consulting engineer, was in charge of this operation. At the time of the writer's visit on October 4, ten men were on the property and drilling was in progress.

A description of the Frank vein and enclosing rocks is given by Lord (1951, p. 246)<sup>1</sup>. The following is a brief review of the geology of the deposit, including recently acquired information.

The Frank vein occurs in schistose granodioritic rock that contains closely spaced, subparallel, amphibolitic layers. Some of the amphibolitic layers are porphyritic, and most or all of them are probably basic dykes. The area lies on the western fringe of a north-trending dyke swarm which at this latitude is at least 2 1/2 miles wide. Dykes in the vicinity of the Frank vein strike about N10°W and dip steeply east. Granodiorite is in contact with volcanic rocks of the Yellowknife group a short distance to the west. The precise position of the contact is obscured by the numerous dykes that are similar in appearance to the volcanic rocks, but it is probably about 400 feet west of the Frank vein. Marked schistosity in wall-rocks in the vicinity of the deposit ranges in strike from N30°W to north and dip from 65 to 85°E. Lineations on the foliation planes pitch 65 to 85°N.

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<sup>1</sup> Dates in parentheses are those of publications listed in the References.

The Frank vein strikes about N15 to 25°E but swings slightly to the west towards its northernmost exposure. At the surface it dips from 70 to 80°E. The vein has been traced through a series of 15 trenches for a strike length of 160 feet. At the south end it appears to pinch out in granodiorite. Near the north end of the row of trenches the vein in each trench seems to parallel the foliation, which suggests that the vein may terminate northward in a series of en échelon lenses, each of which lies in the foliation plane. Vein material was intersected in a drill-hole about 30 feet north of the most northerly trench. At the surface the vein ranges from 1 foot to about 10 feet wide and may consist of either a single vein or a number of parallel closely spaced veins. It averages roughly about 4 feet in width. In drill-holes, up to 21 feet of vein matter has been intersected. A trench just west of the main vein, about 105 feet from its south end, exposes a zone of quartz veins about 5 feet wide. These veins parallel the foliation and appear to be subsidiary to the main vein.

Vein material is largely white to blue-grey quartz containing stringers and patches of carbonate. Pyrite, chalcopyrite, pyrrhotite, and arsenopyrite are the principal metallic minerals and they constitute 1 per cent or less of the vein material. Pyrite followed by chalcopyrite are the most abundant, and commonly occur in clusters of coarse crystals. Some of the clusters seen in surface exposures have weathered out to form rusty vugs. Lord (1951, p. 246) reported abundant visible gold in trenches 65 and 75 feet from the south end of the vein. The writer was shown specimens from one of these trenches that contained tiny flakes of gold embedded in the walls of rusty cavities. Presumably the gold occurs with sulphide minerals and remains when these weather out.

Three other veins or vein zones in the vicinity of the Frank vein have at one time been trenched. The trenches have fallen in and the exposures in the walls and floor are poor. These are 100 feet west, 100 feet west-northwest, and 275 feet northwest of the most northerly trench of the Frank vein. The first two trenches appear to have tested quartz-stringer zones parallel with schistosity. The most northerly trench exposes parts of a quartz vein that is at least 1 1/2 feet wide and is heavily mineralized with arsenopyrite and pyrite. This vein appears to strike about N35°E. Two diamond-drill holes placed below the trench failed to intersect the vein. Assay results from the diamond-drilling have not been released.

#### CON MINE

Throughout the year the Con gold mine of the Consolidated Mining and Smelting Company of Canada Limited at

Yellowknife maintained a production of approximately 500 tons of ore a day. Virtually all the ore comes from the 103 and 102 zones in the Campbell shear zone. The ore is treated by a combination of direct cyanidation, amalgamation of jig concentrates, and cyanidation of roaster calcine from a flotation concentrate. Gold recovery is about 92 per cent.

The Campbell shear zone is reached from the Con shaft by a crosscut several thousand feet long on the 2,300-foot level. Access to the 2,600-, 2,700-, 2,900-, and 3,100-foot levels is provided by B-3 winze. The 103 zone begins a few hundred feet north of the winze and extends northward into the property of Rycon Mines Limited, a company controlled by Consolidated Mining and Smelting. The 102 zone begins about 1,400 feet south of the winze.

Underground exploration work during the past year has been concentrated on the 2,900- and 3,100-foot levels. A drift on the 3,100-foot level was extended northward in the hanging-wall of the Campbell shear zone to about 2,000 feet north of the Rycon-N'Kana boundary. The N'Kana claims are owned by Conwest Exploration Company Limited but are presently under option to Consolidated Mining and Smelting. In the previous year a parallel drift on the 2,900-foot level had been extended to 1,000 feet into the N'Kana property. Exploratory drilling of the Campbell shear zone from the two hanging-wall drifts was in progress during the year.

Exploratory diamond-drilling from the surface was conducted this summer and fall on the N'Kana, Kam, and Kamex claims.

#### CONSOLIDATED DISCOVERY YELLOWKNIFE MINES LIMITED

The Discovery mine is on the west shore of Giauque Lake about 52 miles north-northeast of Yellowknife. An airstrip suitable for large freighter aircraft is situated at the mine and float-equipped aircraft use Giauque Lake. In recent years the mine has been serviced largely by Bristol aircraft from Yellowknife but in the winter months of early 1960 trailer-trucks were used successfully for the first time—at a considerable saving in transportation costs. The truck route follows the old tract-train road through Prosperous and Johnston Lakes.

In 1959 Discovery milled 51,708<sup>1</sup> tons of ore with an average grade of 1.64 ounces of gold per ton. The milling involves a

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<sup>1</sup> Consolidated Discovery Yellowknife Mines Limited, 13th Ann. Rept., 1959.

combination of amalgamation and cyanidation, and gold recovery during the year was 99.23 per cent. On December 31, 1959, ore reserves totalled 141,800 tons with an average grade of 1.42 ounces of gold per ton.

The mine comprises 23 levels, to a depth of 3,350 feet. A three-compartment shaft serves all levels; during 1960 it was deepened by approximately 600 feet to a depth of 4,050 feet with a view to establishing four new levels.

The geology of the property has been described by Lord (1951, pp. 124-131), Tremblay (1952, pp. 43-53) and Wiwchar (1957, pp. 201-209). The deposits are gold-bearing quartz veins in highly folded meta-greywackes and slates of the Yellowknife group. The apex of a lenticular belt of basic to intermediate volcanic rocks outcrops a few hundred feet south and slightly west of the shaft. Three principal zones are currently being mined or developed. The No. 1 or 'North' vein is in the form of a fold opening south. It plunges at a high angle to the north, rakes steeply westward, and is continuous from surface to the lowest level. No. 4 zone (vein) is an irregular vein or set of veins, up to about 150 feet long, that strikes generally north to northeasterly, dips steeply west, and rakes southward. It is known between the 6th and 16th levels and is considered also to be present on the 22nd and 23rd levels, where a similar zone is found. The opposing directions of plunge and rake of the No. 1 and No. 4 veins cause them to reverse their positions relative to one another between the 7th and 13th levels. On the 7th level No. 4 zone is just north of the apex of No. 1 vein fold whereas on the 13th level it is southeast of its east limb. On the 22nd and 23rd levels No. 4 zone is in the same position relative to No. 1 vein as it is on the 13th level. No. 16 vein is about 600 feet south and 300 feet west of the shaft and is reached from the main workings by crosscuts on the 10th, 12th, and 14th levels. This vein strikes about N15°E and dips 75°NW. The southern end swings west in a steeply-north-plunging syncline with attendant complex drag-folds. Ore developed in No. 16 vein on the 14th level averaged 0.54 ounce of gold per ton across a 3-foot width for a length of 198.5 feet.<sup>1</sup> Little is yet known of No. 16 vein below the 14th level.

#### DARK GROUP

The Dark group comprises claims Dark No. 1 and Egar Nos. 1-14. It is located on the east side of Gordon Lake about 57 miles

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<sup>1</sup> Consolidated Discovery Yellowknife Mines Limited, 13th Ann. Rept., 1959.



northeast of Yellowknife (approximately lat.  $63^{\circ}05'N$ , long.  $113^{\circ}08'W$ ). Dark No. 1 claim was staked in August 1959 by Pascal Smith and was transferred to J.M. Harriman a few days after it was staked. In March 1959 it was optioned by Beneventum Mining Company Limited and the Egar claims were staked around it. Beneventum carried out a program of X-ray drilling in April, May, and June, 1959. This company then optioned the claims to Sand River Gold Mining Company Limited, and in April and May further drilling was done on the Dark No. 1 claim. The property was visited briefly by the writer on May 17, 1960. Much of the information that follows is from drill logs and maps generously supplied by the Beneventum and Sand River companies.

The property is largely on water but includes a strip of the mainland on its northern and eastern sides, as well as several islands. Northrop Island on the Dark No. 1 claim is the site of discoveries made to date.

The islands and adjacent mainland are underlain by carbonaceous shales and greywackes of the Yellowknife group. These strike generally about  $N10$  to  $20^{\circ}E$  and dip vertically or steeply southeast. Three zones of gold-bearing quartz veins are known on the property.

No. 1 vein is at the north end of Northrop Island, underlying a shallow, boggy channel that separates the main island from a small island to the north. Information concerning the vein is largely from diamond-drill holes. The vein strikes about  $N45^{\circ}E$ , dips  $60$  to  $70^{\circ}SE$ , and has been traced for 315 feet. Vein material is quartz, commonly graphitic slate, and various amounts of pyrite, chalcopyrite, and pyrrhotite. Visible gold is reported from several drill-cores. Vein intersections in drill-holes range from widths of less than a foot up to 5 feet but average about 2-2 1/2 feet. The true width according to company calculations is 1.99 feet for a length of 235 feet.

No. 2 vein lies about 160 feet off the southeast edge of Northrop Island. At one place it outcrops just below water-level and can be readily seen from the lake surface. Drill-hole intersections indicate that the vein strikes about  $N30^{\circ}E$ ; its dip is uncertain but is probably steeply southeast. Quartz may be encountered at several places in any one drill-hole, but intersected widths of what appears to be the main vein range from about 6 to 34 feet. Vein material is quartz, some included greywacke and slate, and various amounts of pyrite, pyrrhotite, chalcopyrite, and arsenopyrite. Visible gold is reported from several drill-holes.

The third zone is expressed in the surface by coarse blocky quartz float at the southwest tip of Northrop Island. A drill-hole

placed below the float intersected 81 feet of vein material reported to contain visible gold at a number of places throughout this length. The attitude and shape of the quartz mass is uncertain.

Sand River Gold Mining Company Limited relinquished their option on the Beneventum properties. In the late fall the Dark group was optioned by a syndicate consisting of Consolidated Discovery Yellowknife Mines Limited, Consolidated Northland Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited.

#### GIANT YELLOWKNIFE MINES LIMITED

The Giant mine of Giant Yellowknife Mines Limited is on Yellowknife Bay, Great Slave Lake, about 3 miles north of the town of Yellowknife. It is the largest mine in the Northwest Territories and has been in continuous production since 1948. Effective June 30, 1960, Giant Yellowknife Gold Mines Limited amalgamated with Consolidated Sudbury Basin Mines Limited to form the present company.

The following account records activities up to July 1, 1960. Most of the material was supplied by the mine staff or was contained in the interim report of the company for 1959-1960, and in technical papers published by mine personnel.

The average daily milling rate during the period July 1, 1959 to June 29, 1960 was 997<sup>1</sup> tons. A total of 230,307 ounces of gold and 25,795 ounces of silver was produced. The mill heads averaged 0.784 ounce of gold per ton and the overall recovery of gold was 80.86 per cent. The following table gives an estimate of presently developed ore reserves, mostly from above the 1,250-foot level.

	Tons of Ore (including 10% dilution)	Grade (oz/ton)
Active stopes .....	1,320,500	0.79
Pillars .....	93,000	0.74
Pre-preparation stoping blocks ...	<u>1,127,000</u>	<u>0.80</u>
Total ore reserves .....	2,540,500	0.79

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<sup>1</sup> This and subsequent data on production and reserves is from the interim report of Giant Yellowknife Mines Limited for the period ended June 29, 1960.

Gold extraction from the complex Giant ores is accomplished by a process involving flotation, roasting of flotation concentrates, and cyanidation of the calcine. The milling procedures are described in a paper by Tait (in press). A two-stage fluosolids roaster of special design is employed, and roasting takes place at 925 and 875°F in each stage respectively. Roaster feed must be as coarse and granular as possible to maintain bed fluidity at these temperatures, hence grinding and flotation procedures are of special importance. Calcine from the roaster is quenched, washed in a two-stage circuit involving a preliminary wash and grind in fresh water, and passed to the cyanidation circuit. Gases from the roaster pass through a hot cottrel maintained at 600°F, then are cooled to 230°F and the resulting sublimate of arsenic trioxide is collected in a bag house.

The present milling procedures are the result of a long history of experimentation, and further refinement of milling techniques is continually in progress. One of the major problems remaining—a problem that is currently being investigated—is the extraction of approximately 3 ounces of gold per ton contained in the hot cottrel dust. During the past year a new metallurgical laboratory was completed for the purpose of aiding metallurgical research on the Giant ores.

Underground development extends over a vertical distance of 2,000 feet and a horizontal distance of about 10,000 feet. The mine is serviced by eleven levels and three shafts. A-shaft, near the south end of the mine, provides access to a small group of workings composed of four levels to the 750-foot level. At present it is used largely as a ventilation shaft. B-shaft, the most northerly of the three, serves five levels to the 750-foot level, and gives access to an upper group of orebodies near the north end of the mine. C-shaft is the main production shaft and serves eleven levels to the 2,000-foot level. The 750-foot level is the main haulageway and is the only level connecting all three shafts.

During the past year the major development work has taken place on the 2,000-foot, the 1,650-foot, and the 1,500-foot levels. A crosscut on the 2,000-foot level was started and driven to a point approximately 1,900 feet east of C-shaft. Its purpose is to explore the East zone. Drifts 500 feet and 125 feet long have been driven north and south respectively from the crosscut in the hanging-wall of the zone. One heading on the 1,650-foot level is also being driven to explore the East zone; by June 30 it had reached a point approximately 730 feet east of C-shaft. A second heading on this level is being driven northward to develop orebodies in the 'trough' region of the shear zone. A similar purpose is planned for the headings being driven north and south from C-shaft on the 1,500-foot level.

The geology of the property is described by Lord (1951, p. 162) and a recent account of the mine geology is given by Brown, Dadson, and Wrigglesworth (1959, pp. 107-116). A brief review follows.

The mine is in the predominantly basic volcanic formation of the Yellowknife group. On the property the volcanic assemblage strikes approximately N30 to 40°E and dips vertically or steeply in either direction. Tops of pillowed flows are to the southeast. The volcanic rocks are intruded by numerous irregular gabbro masses that are commonly elongate in an east-west direction. The mineralized shear zone containing the Giant orebodies cuts both volcanic rocks and associated gabbros and in turn is cut by diabase, porphyry dykes, and by late faults such as the West Bay and Townsite faults.

The shear zone generally ranges between 100 and 300 feet thick and is composed of chlorite, chlorite-sericite, sericite, sericite-carbonate, and siliceous sericite schist. The more sericitic phases commonly form the core of the zone and grade outward through chlorite schists into non-schistose volcanic rocks. Metallic minerals include pyrite, arsenopyrite, chalcopyrite, pyrrotite, stibnite and a varied group of antimony sulphosalts. Parts of the zone that are of ore grade generally contain 10 to 15 per cent metallic minerals. Other parts of the zone may be nearly devoid of metallic minerals. Quartz is an abundant constituent of the ore-grade material and commonly forms ribboned, rather indistinct veins that may transect the schistosity within the zone.

The shear zone has a fold-like configuration which, in an east-west section through the main part of the mine, broadly consists of two arches with an intervening trough. The structure strikes approximately N30°E and the west arch plunges gently northward, the east arch gently southward. The east flank of the western arch is known as the A.S.D. zone; the opposing flank of the eastern arch is the G.B. zone. West of the western arch the zone flattens to a gently undulating structure. Baker Creek valley marks the line of intersection of the western arch with the surface. The eastern arch is well below the surface at all places.

Schistosity within the shear zone dips steeply regardless of the attitude of the zone, and shows slight convergence towards the apexes of arches and trough. Above and below the shear zone the schistosity dies out in non-foliated volcanic rocks. Orebodies generally transect the schistosity.

The East zone, explored this year by the 2,000-foot-level crosscut and drifts, is the extended east flank of the eastern arch. It dips steeply from the arch to just below the 2,000-foot level, then flattens and continues eastward in a series of gentle undulations.

## HORNBY BAY RESERVE

This property originally consisted of 123 claims staked by Canadian Nickel Company Limited in the summer of 1959, following the discovery of a manganese deposit near Fault River northeast of Hornby Bay, Great Bear Lake. In December 1959 the company was awarded a prospecting reservation on 575 square miles covering the claims area and adjoining ground. The reservation, known as the Hornby Bay Reserve, consists, for the purpose of description, of two contiguous blocks—one bounded by lats.  $66^{\circ}40'$  and  $67^{\circ}10'N$  and longs.  $116^{\circ}50'$  and  $117^{\circ}20'W$ , and the other by lats.  $66^{\circ}40'$  and  $66^{\circ}50'N$  and longs.  $117^{\circ}20'$  and  $117^{\circ}40'W$ . During the summer of 1960 the Reserve was mapped and two manganese deposits were drilled. The writer visited the property on August 6 when the work was in progress.

The regional geology is shown on the map of North-Central District of Mackenzie (Fraser et al., 1960). The northwestern part of the Hornby Bay Reserve is underlain by gently dipping sandstones, quartzites, and conglomerates of the Hornby Bay group. These rest unconformably on gneisses and on quartz-feldspar porphyries and associated sediments of Cameron Bay - Echo Bay type that are exposed in the southeastern part of the Reserve. Part of the contact, northeast of Hornby Bay, is formed by a northeast-trending fault marked by the conspicuous lineal valley of Fault River. The manganese deposits are at the contact between Hornby Bay sedimentary rocks and underlying Echo Bay volcanic rocks, 12 1/2 and 19 miles northeast of the head of Hornby Bay. The writer visited only the southern deposit and the following description applies to it.

The contact of Hornby Bay sediments and underlying volcanic rocks is several hundred feet west of the lineal valley of Fault River. The Hornby Bay group strikes  $N50$  to  $60^{\circ}E$  and dips 10 to  $15^{\circ}NW$ . Bedding in tuffaceous members of the volcanic group is generally vague but one well-bedded member a few hundred feet east of the contact strikes about  $N5^{\circ}E$  and dips  $55^{\circ}W$ . Basal conglomerates of the Hornby Bay group are composed predominantly of volcanic boulders and are successively overlain by a quartz-boulder conglomerate and sandstones. The volcanic rocks are largely quartz-feldspar porphyries and, in common with the overlying basal conglomerates, are stained a deep red by hematite.

The manganese deposit comprises a seam of massive manganese minerals lying along the unconformable contact, and several zones mineralized with manganese in the volcanic rocks below the contact. In surface exposures the seam ranges from a few inches to more than 3 feet thick and can be traced intermittently along strike for about 800 feet. A small specimen of massive material from the seam

was identified by J. L. Jambor of the Geological Survey as braunite, a manganese silicate.

### JAX GROUP

The Jax group of 27 claims forms a north-south strip along the axis of Jax Lake (lat.  $64^{\circ}18'N$ , long.  $111^{\circ}27'W$ ) about  $3\frac{1}{2}$  miles west of Seahorse Lake in Lac de Gras map-area. The property is about 156 miles northeast of Yellowknife. Claims Jax 1-18 were staked in July 1960 and Jax 19-27 in September 1960 by N. W. Byrne Limited of Yellowknife for the prospecting combination of Consolidated Discovery Yellowknife Mines Limited, Consolidated Northland Mines Limited, Rayrock Mines Limited, and Radiore Uranium Mines Limited. The claim group incorporates part of the former holdings of Newnorth Gold Mines Limited. At the time of the writer's visit on September 20, a geological party under G. W. McConnell and a drilling crew were on the property. The crews were withdrawn a day or two later owing to the impending freeze-up.

At least four gold showings are known on the property but current work has been confined to No. 1 and No. 2 zones on claims Jax 11 and Jax 14 respectively. No. 3 zone is said to be parallel with No. 1 and about 600 feet west of it, on claim Jax 12, and No. 4 zone is just west of the north end of Jax Lake, on claim Jax 6. The former owners are reported to have trenched all four showings. The current exploration program has included trenching and diamond-drilling on both No. 1 and No. 2 zones.

The geology of the southern part of the claim group is shown at the northern extremity of Moore's detailed map of Courageous Lake area (Moore, 1956) and the regional geology is given on the map of Lac de Gras area (Folinsbee, 1949).

The property is on the eastern side of a belt of Yellowknife group volcanic rocks that ranges from 1 mile to 4 miles wide and extends southward to MacKay Lake. The contact of the volcanic belt with greywackes and slates of the Yellowknife group is on the eastern side of the Jax property, approximately along the longitudinal axis of Jax Lake. Both sedimentary and volcanic rocks strike roughly north and dip from steeply east to vertical. The volcanic assemblage comprises mafic lavas, subordinate felsic lavas, and possible tuffs.

No. 1 zone is just north of a small bay at the southwestern end of Jax Lake. It strikes approximately north, dips steeply east or vertical, and has been trenched over a strike length of about 800 feet. Widths of the zone range up to 5 or 6 feet. It is composed of stringer

zones of white to light grey quartz and quartz-carbonate in sheared biotitic amphibolite. The veins and stringers range in width from a fraction of an inch up to several inches and are more or less closely spaced. Layers of amphibolite schist that separate the quartz stringers may be silicified or partly replaced. The attitude of the schistosity and stringers within the zone roughly conforms with that of the schistosity in the adjoining volcanic rocks. Metallic minerals constitute less than 1 per cent of the zone material and are largely pyrrhotite, arsenopyrite, pyrite, and rare chalcopyrite. Visible gold has been reported from trenches and drill-holes.

No. 2 zone is on the south side of the small bay at the southwestern end of the lake, about 300 feet east of the projected strike extension of No. 1 zone. In most respects it is similar to No. 1 zone but it ranges up to 10 feet in width and is accompanied on its west side by a 30-foot zone of more widely spaced quartz veins and stringers. The zone strikes north and dips vertically or steeply west. It is exposed in trenches and outcrops for a strike distance of about 80 feet.

The results of detailed mapping have led company geologists to conclude that No. 1 and No. 2 zones are faulted segments of the same zone. Both showings are at or close to the contact between schistose mafic volcanic rocks on the east, and massive mafic volcanic rocks on the west. Both the contact and the mineralized zone show an apparent offset of about 300 feet at a point where topographic features permit the assumption of a northwest-trending fault. In the two rock units mapped it is uncertain whether or not different structures represent primary differences. The schistose volcanic rocks are thinly layered and may have been tuffs. If they were, the argument for faulting is greatly strengthened.

Drilling results are reported (Northern Miner, Nov. 3, 1960) as follows: Eight holes intersected vein material in No. 2 zone over a strike length of 200 feet and in a vertical range from 90 to 150 feet. The indicated grade of the material intersected is 1.16 ounces per ton across an average width of 3 feet. No. 1 zone was intersected in drill-holes along a strike length of 250 feet; its grade averaged 0.40 ounce of gold per ton across a width of 3 feet.

## LEN GROUP<sup>1</sup>

The Len group comprises claims Len 1-9, staked by Fred Dudlaw in June 1957 and presently owned by Fred Lypka, claims

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<sup>1</sup> Probably the old Murphy-Bell group (Lord, 1951, p. 206).

Len 10-18 staked by Len Peckham in May 1960, and claims Leba 1-9 staked by Leba Sehyenko in May 1960. The main showing is on Len No. 1 claim in a small salient of felsic volcanic rocks and intercalated argillite on the south shore of the southwest bay of Walsh Lake. The showing is a zone of slightly sheared, mineralized, and silicified rock, 50 or 60 feet wide, that strikes about N50°E and dips 75°S. A trench about 60 feet long with a maximum depth of 8 feet was excavated across the zone in the autumn of 1959. The southeastern 25 feet of the trench is heavily mineralized with pyrrhotite accompanied by minor pyrite and chalcopyrite. Northwest of this section the mineralization is light and spotty. Other mineralized zones are found to the northeast along the projected strike of the main showing, on a small island in the lake, and on the northeastern side of the bay. Old trenches were found on several of these zones. About 100 feet southwest of the main showing, greywacke and shale outcrop. Between the two outcrops is a northwesterly striking lineal valley that probably marks a fault.

The results of an initial sample taken from the trench by the owners indicated encouraging quantities of nickel with some vanadium. The writer visited the property on May 19, 1960 and took four chip samples across the trench. The results of these are tabulated below. Distances are measured from the southeastern end of the trench.

(Assays by W.L. Chase, Mines Branch, Ottawa)

Sample	Distance (feet)	Ni (%)	Au (oz/ton)	V (%)
1	5-20 . . . . .	0.02	tr.	0.006
2	20-30 . . . . .	0.02	tr.	0.008
3	30-36 . . . . .	0.025	0.005	0.008
4	36-43 . . . . .	0.02	0.005	0.006

#### OLD PARR GROUP

The Old Parr group of 15 claims is 33 miles northeast of Yellowknife, in the northeastern corner of Mineral Claim Sheet 85-1-12 (lat. 62°45'N, long. 113°30 3/4'W). Parts of Sproule and Old Parr Lakes and the intervening ground are within the claim group.

The claims were staked in May 1947 by L. Garskie and M. Bode. Several high-grade gold showings were found, and it was reported that in the next two years 195 ounces of gold was extracted by hand methods. In late 1949 the property was optioned by Garskie Gold Mines Limited, which had been organized for this purpose. The following spring a program of diamond-drilling, trenching, and sampling



was undertaken. Ten drill-holes, totalling 2,100.6 feet, were drilled under the Million Dollar and Caribou pits and along the northward extension of the vein concerned. The sampling results are said to have been discouraging and the option was dropped. During the following years Garskie single-handedly carried on a small high-grading operation with some success, and early in 1960 the property was optioned by Vanguard Explorations Limited. When the writer visited the property on June 15-17 an extensive evaluation program was in progress; this was under the direction of A. W. Jeckell.

The geology of the group has been described by Lord (1951, pp. 225-227) and is reviewed here, supplemented with later data. In preparing this account the writer has been greatly assisted by maps and reports generously provided by A. W. Jeckell.

The claims are underlain by metamorphosed greywackes and shales of the Yellowknife group. Virtually all quartz veins of interest lie within a rectangular area measuring approximately 1,000 by 2,000 feet that lies between Sproule and Old Parr Lakes, along an axis bearing about N65°E. Subsequent descriptions apply to this area. Meta-greywackes and slates, in beds ranging in thickness from a few inches to several feet, form a homoclinal succession that strikes N65 to 75°E. Dips range generally from 70 to 80°NW on the southeast side of the area to 45 to 55°NW on the northwest side. Graded bedding is common but because of shearing and the presence of numerous nodules of metamorphic minerals, it can rarely be used to determine the tops of beds. In the few places where top determinations were made with some confidence, the beds appear to be overturned. Bedding-plane lineations formed by the crests of small drag-folds in thin shale members are widespread and pitch at 60 to 70°NE. At least two pegmatite dykes are known in the area. They strike generally north-northwest and dip steeply to moderately west for most of their length, but each is stepped over at least once along a short section that strikes parallel with the bedding and dips moderately southeast. One of the pegmatites cuts through the vein at the Million Dollar pit and the other passes under Sproule Lake about 580 feet southeast of Garskie's cabin.

Quartz veins are numerous, particularly in the north-eastern half of the area. Two vein attitudes are dominant. One is parallel with the bedding and one strikes at about N40°W. Dips range from steeply northeast to steeply southwest. Veins and irregular bodies of quartz with random attitudes are abundant locally and may obscure the dominant trends. Bedding veins are the most persistent and may be traced for several hundred feet along strike. Generally they range from 1 inch to 6 inches wide but in places they swell abruptly to widths of up to 10 feet or give rise to veins or irregular quartz masses several feet thick that transect the bedding. The bedding veins

are in the slate members of the greywacke-slate assemblage and are commonly composed of thinly interlayered quartz and argillaceous material. In common with the host rock they are generally drag-folded. Transverse veins and bedding veins join in places and therefore appear to be of the same age. The majority of all types of veins are less than 6 inches wide.

Vein material consists of bluish grey or white glassy quartz with a small amount of muscovite and biotite, locally minor feldspar, and generally less than 1 per cent sulphide minerals. Arsenopyrite, pyrite, chalcopyrite, and pyrrotite are the most widespread sulphide minerals, but galena and sphalerite are important constituents of the Galena vein and are also found in the Million Dollar pit. Gold occurrences are erratic and appear to be independent of the attitude, size, or form of the vein; locally its appearance may be quite spectacular. Commonly, gold is found at the margins of veins and in the immediately adjacent wall-rock, or in the biotitic inclusions within the veins.

Two principal post-vein fault sets are recognized: a north-northwest, steeply-northeast-dipping set that roughly parallels one of the dominant vein attitudes, and a north-to-north-northeast set with steep easterly dips. Movement on the faults appears to be, at most, a few feet.

Workings consist of a number of widely scattered pits that have been mined by Garskie at various times in the past 13 years. The most important of these are the Million Dollar and Caribou, Jewelry Shop, Real High Grade, Old Parr, Sam Otto, and Galena. The locations of these pits are approximately as follows: the Million Dollar and Caribou pits are 500 feet on bearing S70°W from Garskie's cabin near the shore of Sproule Lake; the Jewelry Shop pits are 1,050 feet on bearing S65°W from the cabin; the Real High Grade pits are 200 feet on bearing S45°W from the Jewelry Shop pits; the Old Parr pits are near the shore of Old Parr Lake on bearing S45°W from the Real High Grade pits; the Sam Otto pits are 1,230 feet on bearing S30°W from the cabin; and the Galena pits are 520 feet on bearing S5°W from the cabin. All except the Galena pits are primarily on bedding veins but at the Jewelry Shop and Real High Grade pits the bedding veins are joined by subsidiary transverse veins. The Galena pits are on a pair of the north-northwest-trending veins. The Million Dollar pit is the most extensive of the workings and has been worked most recently. It is about 65 feet long 10 to 15 feet wide, and averages about 10 feet deep. A vertical shaft at the northeast end reaches a depth of about 40 feet. The Caribou pit, immediately southwest of the Million Dollar pit, is about 45 feet long and reaches depths of 7 and 8 feet at its northeast and southwest ends respectively.

The principal deposits are the vein running through the Million Dollar and Caribou pits, the 'Cabin Area' zone, and the Galena veins. The Million Dollar pit exposes a swollen, irregular part of a bedding vein that varies in width from 1/2 inch to 10 feet but averages 5 feet over a strike length of 150 feet. A fault striking N20°W and dipping about 70°E passes through the southwest end of the Million Dollar pit and displaces the vein about 10 feet south. The Caribou pit has been excavated on the faulted extension of the vein. Numerous smaller veins, subsidiary to the main quartz mass, are found in and near the pits. Visible gold was seen at several places in the Million Dollar pit and shaft. Pegmatite dykes intersect the vein just northeast of the Million Dollar pit and again in the shaft. Although pegmatite can be traced through the vein the two blend into one another at the contacts and the relationship between them is uncertain. The 'Cabin Area' zone was discovered during the course of Vanguard's examinations, when light overburden was washed from rocks in the vicinity of the cabin. The zone contains a profusion of quartz veins in an area about 200 by 60 feet, bounded on the north and south by prominent bedding veins. Veins within the zone range in width from a fraction of an inch to several feet and strike parallel with the veins in the two principal sets noted elsewhere. An estimated 10 per cent of the outcrop area is composed of vein material. Visible gold was observed in a few places, particularly along the southern bounding (Louis) vein. The two Galena veins are parallel and 1 inch to 2 feet thick, separated by 2 to 4 feet of greywacke and slate. They strike about N30°W and dip steeply southwest. They can be traced in pits and outcrops for a strike distance of about 60 feet and may continue northward for another 80 feet, where narrow quartz veins with a similar attitude are found intermittently along the strike. The veins end to the south against an east-trending fissure.

Vanguard's evaluation program included detailed geological mapping, bulk-sampling, and diamond-drilling.

Bulk samples ranged from 65 to 1,102 pounds and averaged 594 pounds. Each bulk sample was crushed to minus-1-inch size in a 5-by-6-inch crusher and reduced to two assay samples with a 1-inch riffle. A total of 52 bulk samples were taken of vein material in place and of loose material from previous excavations. Twenty-nine bulk samples from the vicinity of the Million Dollar and Caribou pits covered most of the surface and pit exposures of the widened part of the vein. The highest gold assays from the Million Dollar - Caribou vein are reported as follows:<sup>1</sup>

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<sup>1</sup> Assay figures are from a private report prepared for Vanguard Explorations Limited by A. W. Jeckell.

0.293 ounce per ton from the southeast side of the Caribou pit; 0.426 ounce per ton from the Million Dollar pit, 5 feet west of the shaft; 0.792 ounce per ton immediately west of the shaft; and 0.672 ounce per ton from a surface sample about 45 feet east of the Million Dollar pit. Most of the remaining samples assayed less than 0.100 ounce per ton. In addition, bulk samples were taken from a number of other veins on the property, including the Galena, Old Parr, and Sam Otto veins. One sample from the Galena veins assayed 1.170 ounces per ton and three samples of excavated rock from the Old Parr pits assayed 1.558 ounces, 0.551 ounce, and 0.756 ounce per ton. Most of the remaining samples contained less than 0.2 ounce of gold per ton.

Eight diamond-drill holes were placed under the 'Cabin Area' zone from the northwest, and three were drilled westward into the Galena veins. All assays from the 'Cabin Area' zone were less than 0.01 ounce of gold per ton. A 1.5-foot section of quartz from about 45 feet below the northern Galena pit assayed 0.460 ounce of gold per ton. Other assays of drill core from the Galena veins were low.

The program was completed on July 20 and the option on the property was dropped.

#### POINT CLAIMS

This property, owned by Canadian Nickel Company Limited, is located on the east end of Point Lake about 7 miles north of the Coppermine River inlet (lat.  $65^{\circ}03'N$ , long.  $112^{\circ}15'W$ ). Claims Point 1-12 were staked on July 1959 and Point 13-41 in August 1959. Claims 17-25 lapsed in September 1960 and claims 37-41 in October 1960. Although diamond-drilling was done during the summer of 1960, it had been completed at the time of the writer's visit on September 7, and no personnel remained on the property.

The claims are underlain largely by well-foliated, quartz-feldspar-biotite gneisses. Commonly the biotite content is about 20 per cent or less but some layers contain 50 to 60 per cent. Garnet is a common accessory mineral but is rarely abundant. The general strike of the foliation is from N5 to  $25^{\circ}E$  and the dip is about  $50^{\circ}E$ , but in detail it is commonly pygmatically folded. Several mineralized zones, marked by conspicuous gossans, occur within the gneisses—chiefly on Point claims 3 and 5. The zones are roughly parallel with the foliation in the host rock. The mineralization is mainly finely disseminated pyrrhotite and chalcopyrite.

The principal mineralized zone is on Point claim 5 about 1,500 to 2,500 feet south of the shore of Point Lake. It strikes about N15°E and presumably dips 50°E in conformity with the foliation. The zone ranges in width from 20 to 60 feet and can be traced intermittently for 850 feet along its strike. At the south end the zone passes beneath overburden, but an outcrop 200 feet directly south of this point contains a weakly mineralized zone 6 to 8 feet wide that may represent its extension. Farther south only scattered mineralized lenses could be found along the strike of the zone. At its north end the zone disappears beneath a bog. Three hundred feet farther north in the direction of its projected strike, an outcrop of gneiss contains a mineralized belt with a similar trend. The belt is composed of patches of weakly mineralized rock up to 30 feet wide and 30 or 40 feet long; these occur in succession for at least a few hundred feet northward. A parallel and similarly patchy zone of mineralized lenses is found about 300 feet to the west. Both of the latter zones are on Point claim 3.

The main zone contains from 1 to 10 per cent sulphide minerals, finely disseminated in gneiss. The copper content ranges up to an estimated maximum of 3 per cent, and considerable parts of the zone will probably carry from 1 to 2 per cent. In the parts of the northern zones examined, the grade appears to be lower.

A grab sample taken from the main zone about 730 feet from its south end gave the following assay<sup>1</sup>: gold, 0.005 ounce per ton; copper, 1.45 per cent.

#### TAURCANIS MINES LIMITED

The property of Taurcanis Mines Limited is in the barren lands about 150 miles northeast of Yellowknife, near the south end of Matthews Lake. It comprises claims Mad 1-18, Jeja 1-6, Rep 1-12, Win 1-18 (including three fractional claims), and Tib 1-4. The Mad, Jeja, and Rep claims have been surveyed. The property incorporates the holdings of Bulldog Yellowknife Mines Limited which was reorganized in 1956 to Taurcanis Mines Limited. An extensive underground development program under the direction of Consolidated Discovery Yellowknife Mines Limited has been in progress since that time. Deposits investigated by underground work to the present are of gold-bearing quartz in the Matthews vein and the South zone. The writer is indebted to the company for permission to examine their maps of the property and workings and to use some of the information in this report.

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<sup>1</sup> W. R. Inman, Chief Chemist, Mines Branch, Ottawa.

The camp is on the east side of Bulldog Lake. A steel-frame, two-story building, 192 by 32 feet, serves as the office, living quarters, warehouse, cook-house, heating plant, and recreation centre. A few smaller buildings are used for shops and other purposes. The headframe is 200 or 300 feet from the main building. The operation is serviced regularly by a Bristol aircraft which lands on the company's airstrip about 3 miles from the camp. With favourable winds, smaller aircraft can land on Bulldog Lake.

Underground workings comprise a 625-foot vertical shaft and levels at 175, 325, 475, and 625 feet. Drift lengths north and south of the shaft on each of the levels are tabulated below (September 1960).

Level	South of Shaft (feet)	North of Shaft (feet)
175 .....	600	45
325 .....	3,125	575
475 .....	625	0
625 .....	1,575	475

All drifts are in the Matthews vein but the 325-foot-level drift extends approximately 1,300 feet south of the end of the vein to the South zone. Raises between approximately 400 and 600 feet south of the shaft connect the upper three levels with one another and with the surface and a raise 1,000 to 1,200 feet south of the shaft connects the 4th and 2nd levels. Two other raises from the 2nd and 4th levels respectively terminate in the vein. At present a raise is being driven from the 2nd level at the South zone to the surface. According to plans announced recently<sup>1</sup>, the shaft is to be deepened to 1,225 feet and levels established at 775, 925, 1,075, and 1,225 feet. A decision on production is not expected until this program has been completed in the autumn of 1961.

The surface geology has been described by Lord (1951, pp. 185-187) and Moore (1956, pp. 43-44). Volcanic rocks of the Yellowknife group underlie the western part of the property and are in contact with sedimentary rocks of the same group on the east. The contact strikes approximately N15°E and dips 70 to 75°E, in conformity with attitudes in the adjoining sedimentary and volcanic rocks. The volcanic rocks are part of a northerly trending belt, 1 mile to 2 miles wide, that contains metamorphosed mafic and felsic lavas, breccias, and agglomerates, and associated gabbroic masses. Banded amphibolites

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<sup>1</sup> Consolidated Discovery Yellowknife Mines Limited, Prog. Rept., Nov. 8, 1960.

and garnetiferous amphibolites near the contact are interpreted by Lord (1951, p. 187) as recrystallized tuffs. The sedimentary rocks are meta greywackes, slates, and phyllites.

The Matthews vein is in the contact zone on the east side of Bulldog Lake, a few hundred feet south of Matthews Lake. It is parallel with the contact and is either in the sedimentary rocks close to the contact or along the contact itself. The vein has been traced in underground workings for a strike length of about 2,300 feet. The South zone is about 3,000 feet south of the shaft and is in sheared volcanic rocks 100 to 200 feet west of the contact. It consists of a number of sub parallel gold-bearing quartz veins and silicified zones distributed over an area reported to measure up to 300 by 500 feet.

Vein material in the Matthews vein is largely dark grey quartz, commonly mottled or ribboned with quartz of a lighter colour and seamed with thin sericitic partings. Arsenopyrite, the most abundant sulphide mineral present, is a minor constituent. Gold is visible in a number of places and is commonly found along the sericitic partings—in places as thin smears on the parting surfaces. Scheelite is present underground, and Moore (1956, p. 43) reports both scheelite and ferberite as vein constituents in specimens taken from the surface. Vein material of ore grade is generally indistinguishable in appearance from material that is barren or of low grade. The contact between vein and country rocks is generally sharp and little of the host rock appears within the veins.

The total ore reserve in the Matthews vein, to a depth of 650 feet, is estimated at 151,200 tons, grading 0.85 ounce per ton<sup>1</sup>. The ore is contained in a number of nearly vertically plunging shoots, two of which appear to be continuous from the surface to the lowest level. Most of the main ore shoot is between 300 and 600 feet south of the shaft, and on the four levels it has an average horizontal length of 225 feet and an average width of 3.6 feet. Total ore intersected on the 325-foot level aggregates 653.4 feet in length; it has an average grade, with allowance for 10-per-cent dilution, of 0.924 ounce per ton across a width of 4.7 feet<sup>2</sup>. Uncommonly wide, low-grade sections of the vein have recently been discovered on the 325- and 625-foot levels. Widths of up to 40 feet are reported, with much of the material grading between 1/3 and 1/2 ounce of gold per ton<sup>3</sup>. If this can be mined profitably it

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<sup>1</sup> Consolidated Discovery Yellowknife Mines Limited, Prog. Rept., Nov. 8, 1960.  
<sup>2</sup> Taurcanis Mines Limited, 11th Ann. Rept., Sept. 30, 1959.  
<sup>3</sup> Consolidated Discovery Yellowknife Mines Limited, Prog. Rept., Nov. 8, 1960.

would add substantially to present ore reserves. Work in the South zone has been largely exploratory and no ore has yet been developed.

#### XLX GROUP

The XLX group is owned by The Consolidated Mining and Smelting Company of Canada Limited. It comprises claims XL 1 and 2, OK 2-4, XLX 3-5, 7-9, 15-21, 37-45, 54-55, 58, 63-68, 70-83, and 84-86—that is, 52 claims in all. These form a strip that extends from the north point of Turnback Lake southward to approximately the bend in Beaulieu River about 2 1/2 miles below its outlet from Turnback Lake. The property is about 58 miles east-northeast of Yellowknife.

The XL and OK showings were staked in September 1937 by Garfield Smith and Lars Johnson for Aerial Exploration Syndicate. The claims were optioned by Westfield Mining Company in June 1938 and the main mineralized zone on claims XL 1 and 2 was tested with 14 drill-holes and 15 trenches. Six trenches totalling 25 cubic yards were excavated on mineralized zones in the OK group. The property was idle until 1951 and all but the surveyed claims—XL 1 and 2 and OK 2, 3, and 4—were allowed to lapse. In June of that year Consolidated Mining and Smelting staked 51 claims (XLX claims) around the XL and OK claims covering lapsed parts of the former property. Between April 1952 and April 1953 the company conducted magnetometer surveys over part of their claims and drilled 12 holes to test anomalies. During 1953 and 1954 the property was mapped and further geophysical surveys were made. This was followed by diamond-drilling in 1955. In the winter of 1959-60 the XL and OK claims were acquired by Consolidated Mining and Smelting and added to the property. Early that spring an E.M. survey was conducted over the northeast arm of Turnback Lake and during the summer a two-man geological party was on the property. The writer visited the claims on August 3.

The XL mineralized zone has been fully described by Lord (1951, pp. 298-300). A brief review, based on the writer's visit, is given below.

The XL zone is adjacent to a granite contact about 1,000 feet west of the northeast arm of Turnback Lake. It is in metasedimentary rocks of the Yellowknife group, represented by quartz-biotite gneiss and interlayered quartz-amphibole-biotite gneiss, garnet amphibolites, and garnet- and pyroxene-bearing crystalline limestone. The assemblage was probably derived from an interbedded succession of greywackes, shales, limestones, and calcareous tuffs or marls. The rocks strike N30°E and dip about 65°SE. Ore minerals, consisting principally of pyrrhotite, sphalerite, chalcopyrite, galena, and pyrite, appear to favour a dark, coarse-grained amphibolite member of the



metasedimentary assemblage. The mineralized zone is about 1,900 feet long and is commonly from 5 to 35 feet wide. Granite outcrops continuously along the northwestern side of the zone at distances ranging up to about 100 feet, and an eastward projection of the granite terminates the zone on the south. Between the mineralized amphibolite member and the granite, for much of its length, is a light greenish quartz-amphibole-biotite gneiss with a characteristic texture formed of radiating amphibole crystals. Quartz-biotite gneiss and locally crystalline limestone adjoin the mineralized zone on the southeast. Numerous granite pegmatites are found on both sides of the granite contact and some of these cut the mineralized zone. At its northern end the zone abuts pegmatite and has not been observed beyond it.

The OK claims are along the southeast side of Beaulieu River about 3/4 mile to 1 3/4 miles below Turnback Lake and about 5 miles southwest of the XL zone. The claims contain two principal showings. The northern showing is a 2-foot-wide zone, heavily mineralized with sphalerite and galena, in a biotite-amphibolite member of the Yellowknife group of metasediments. Rhyolite outcrops about 200 feet east of the zone and is succeeded eastward by basic metavolcanic rocks. The mineralized zone, in conformity with the host-rock assemblage, strikes about N20°E and dips 65°E. The zone is exposed into two trenches about 20 feet apart. South of the trenches scattered gossan zones can be found in outcrops for at least 200 feet, but they do not form a continuous zone. North of the trenches the rock is covered with overburden. The southern showing on claim OK 4 was not visited, but it is reported to comprise two small lenses of massive and disseminated sphalerite, pyrrhotite, and galena in quartz-biotite gneiss.

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ROGER DUHAMEL, F. R. S. C.  
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY  
OTTAWA, 1961

Price 25 cents Cat. No. M44-61/3