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DEPARTMENT OF ENERGY,
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PAPER 70-17

METALLIC MINERAL INDUSTRY, DISTRICT OF MACKENZIE, NORTHWEST TERRITORIES

(Report, 8 tables and 10 figures)

J.C. McGlynn

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J.C. McGlynn

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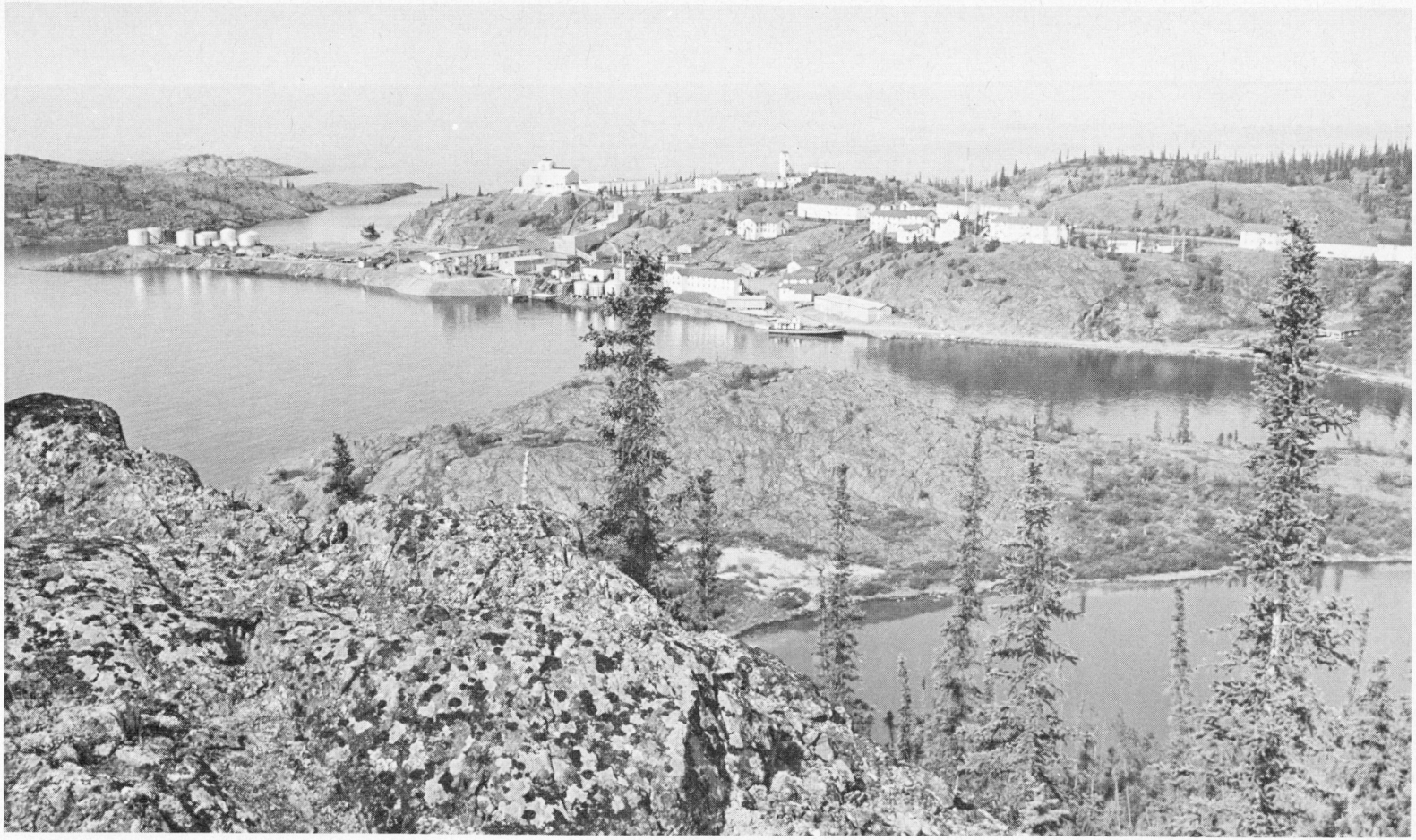

Port Radium, 1957

METALLIC MINERAL INDUSTRY
DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES

CHAPTER I

INTRODUCTION

GENERAL STATEMENT

This report deals with the mineral industry of the District of Mackenzie in the Northwest Territories. Although one of Canada's most recently developed mining areas, the value of its mineral production has been substantial. Between 1932, when production was first recorded, and 1963, total value of mineral production has been $261,547,179 plus the unpublished value of pitchblende produced between the years 1945 and 1953 and the value of oil production.

Similar reports were published by C.S. Lord in 1941 and 1951. Only properties which have been discovered or developed since 1948 are described, and for descriptions of older properties that have been inactive since 1948, the reader is referred to Lord's reports (Lord, 1941, 1951). The writer has examined most of the properties described at least once between the years 1953 and 1958. An attempt has been made to describe all mineral prospects that were discovered or active between 1948 and 1958; however, omissions are inevitable and such omissions do not imply that the property lacks merit.

The writer gratefully acknowledges his indebtedness to officials and staffs of mining and exploration companies and to prospectors in the area. This report is possible only because of their consistent co-operation. Invaluable aid was received from the staff, both in Yellowknife and Ottawa, of the Resources Division of the Northern Administration Branch of the Department of Indian Affairs and Northern Development. Free use has been made of published and unpublished reports of officers of the Geological Survey of Canada.

In this report, only metallic mineral deposits are described. No effort has been made to cover the substantial exploration activities for oil and gas because the author has not had the facilities to keep in touch with developments in this industry. Pertinent papers are included in the bibliography so that reader can learn of some of the developments in this industry since 1948.

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POPULATION

Between the years 1911 and 1931, the population of the Northwest Territories rose from 6,507 to 9,316, an increase of 43 per cent. In the twenty years following 1931, during which time most of the mineral developments took place, the population rose from 9,316 to 16,004, an increase of 72 per cent. During this period, the white population of the District of Mackenzie rose from 867 to 4,915, an increase of 467 per cent. Most of this increase is related directly or indirectly to the development of the mineral industry. The following table gives the population figures as determined from the various censuses.

Table I

Population of the Northwest Territories and Mackenzie District

1911 - 1961

	Northwest Territories				Mackenzie District			
Year	Total	Whites	Indians	Eskimos	Total	Whites	Indians	Eskimos
1911	6,507	1,650	4,857		4,823	not available		
1921	8,143	1,028	3,873	3,242	6,946	not available		
1931	9,316	1,004	3,689	4,623	5,321	867	3,672	782
1941	12,028	2,290	4,334	5,404	7,294	2,119	4,322	853
1951	16,004	5,321	3,838	6,822	10,279	4,915	3,838	1,503
1961	22,998	9,765	5,256	7,977				

In 1961 the population of the Northwest Territories was 22,998, of which 9,765 were whites. The bulk of this increase has taken place in the District of Mackenzie where most of the white population is concentrated in the settlements of which Yellowknife, with a population of about 3,500 is by far the largest. Most of the Indians now live in or near the settlements within the treeline with the largest populations at Fort Rae, Fort Smith, Yellowknife, and the Aklavik area. The Eskimos live along the Arctic Coast and are concentrated in the various settlements especially Coppermine and the Aklavik area although a few live inland in the Contwoyto Lake area. With a few exceptions they take little or no part in mining or prospecting.

For a recent detailed analysis of population of the area, the reader is referred to: "The Northwest Territories Today"; a reference paper for the Advisory Commission on the Development of Government in the Northwest Territories, issued under the authority of the Minister of Northern Affairs and National Resources and published by the Queen's Printer in 1965 (Cat. No. R29-6265).

CLIMATE

The climate is characterized by long cold winters, short warm summers and light precipitation; much of the area can be classed as sub-Arctic. The data in Table 2 are from records kept at Yellowknife but are

Table II. Climatological Table for Yellowknife, N.W.T.

MONTH	AIR TEMPERATURE (° F) at Station Level								Precipitation (inches)					
		Mean Daily			Mean Monthly		Absolute		Mean Monthly					
	Mean Daily	Maximum	Minimum	Range	Maximum	Minimum	Maximum	Minimum	Precip.	Rain fall	Snow fall	Precip. days	Rainy days	Snow days
January	-18	-10	-26	16	16	-48	37	-60	0.5	-	5	9	0	9
February	-14	- 6	-23	17	16	-46	43	-60	0.5	-	5	10	0	10
March	10	10	-10	20	34	-38	42	-46	0.4	T	4	7	0	7
April	14	28	7	21	49	-21	60	-38	0.4	0.1	3	5	1	4
May	40	49	31	18	67	14	79	4	0.5	0.5	1	5	4	1
June	54	62	45	17	78	34	85	28	0.6	0.6	T	6	6	0
July	60	69	52	17	81	42	86	33	1.3	1.3	T	9	9	0
August	58	65	50	15	78	39	86	34	1.2	1.2	-	10	10	0
September	45	51	39	12	66	25	79	18	1.0	0.9	1	9	8	1
October	30	35	25	10	52	5	65	-9	0.9	0.5	4	9	4	6
November	7	15	1	14	35	-25	46	-34	0.8	0.1	8	12	0	12
December	-12	-4	-19	15	18	-42	37	-55	0.7	T	7	12	0	12
Annual	22	30	14	16			86	-60	8.8	5.1	37	103	42	62
Years of Obs.		14-15			14-15		16		14-15			14-15		

more or less applicable to most of the district. The season of open water on Great Bear Lake lasts from about July 15 to October 15 and on Great Slave Lake from June 15 to October 30. Smaller inland lakes are open for slightly longer periods. The southern limit of permafrost trends southeasterly from the Yukon-Northwest Territories boundary through Fort Simpson and Fort Providence, east to Yellowknife and around the east end of Great Slave Lake and then southerly along the 108 degrees west to the 60 degrees north (Jenness, 1949). Patches of permafrost are known to occur south of this line.

To gain some perspective about the climate of the District of Mackenzie relative to that of more southerly areas of Canada, the reader is referred to Table III (Robertson, 1955).

Table III

Comparative Climatic Data

Average Mean Temperatures in Selected Months

Location	Years of Observation	January	July	November to March	June to August
Northwest Territories					
Yellowknife	10	-18	60	-8	57
Port Radium	11	-15	54	-7	51
Quebec					
Chibougamou	14	-3	61	8	58
Knob Lake	5	-13	55	1	52
Ontario					
Sudbury	16	10	66	18	64
Manitoba					
Winnipeg	66	-3	67	9	64
Flin Flon	23	-7	66	4	62
Alberta					
Edmonton	56	6	62	16	60

The differences in temperatures during summer months are not too striking but during the winter the difference is substantial, an average of 17 degrees between Yellowknife and Winnipeg. The climate in the Northwest Territories is not a physical obstacle to development but it does contribute significantly to higher costs of development. Costs of heating, construction, transportation, and clothing are increased by the length and coldness of the winter. A measure of extra heating costs is provided by data on annual total "degree-days" of heating requirement (Robertson, 1955). By definition there are as many "degree-days" as there are degrees difference in temperature between a basic point of 65 degrees Fahrenheit and the mean temperature for any day with a mean below 65 degrees. The average degree days of heating required in Yellowknife each year is 15,600 whereas at Edmonton, Winnipeg, Sudbury, and Chibougamou, the figures are 10,300, 11,000, 9,500, and 12,400 respectively. In other words, about fifty per cent more heat is required in Yellowknife in a year than at Edmonton or Winnipeg. This has a marked effect on the cost of living or operational costs in the north.

CHAPTER II

GENERAL FACTORS RELATING TO THE MINING INDUSTRY

HISTORY OF MINING

For a complete history of mining up to the year 1948, the reader is referred to Lord (1951). Following is a brief summary of the above work.

The first really significant historical event related to the development of the mineral resources of the Northwest Territories was the discovery of oil at what is now Norman Wells on the Mackenzie River. Oil seepages were leased in 1914 and drilling initiated in 1920. Oil was developed in commercial quantity and quality and a small still was built in 1921 to produce gasoline and diesel fuel. There was little demand for these products until after the establishment of the Great Bear Lake camp.

In the late twenties, high base metal prices and the general prosperity encouraged some prospecting and a little development. The bush aircraft was first used for transportation at this time. This work met with little success but copper mineralization was discovered in the Coppermine area and in the east arm of Great Slave Lake and lead-zinc deposits at Pine Point were drilled and a considerable tonnage of ore outlined.

Widespread attention to the area was first attracted by the discovery, in 1930, of silver and pitchblende by Gilbert Labine at what is now Port Radium on Great Bear Lake. In 1932 over two hundred men were at work in the area and several thousand claims were staked. The first metal mine in the Northwest Territories, the Eldorado Mine, began producing in 1933.

From Great Bear Lake, prospectors were attracted to the Yellowknife River area and to the east arm of Great Slave Lake, partly by geological information being published by the Geological Survey of Canada. The first significant gold discoveries in the Yellowknife area were made in 1934 on the east side of Yellowknife Bay. In 1935 gold was discovered on the west side of the bay by a member of a field party of the Geological Survey of Canada. This occurrence was privately staked and the adjoining Con and Negus claims were staked soon after. After several years of development work, the Con Mine began production in 1938 and the Negus Mine in 1939. Thus Yellowknife became an established camp from which prospectors wandered to explore favourable areas inland from Great Slave Lake. Many gold showings were discovered and partly developed in the late thirties as a result of this effort.

During the war years the tempo of mining activity decreased and finally in 1944 because of labour shortages, the gold mines were forced to close temporarily. In the same year, however, the Eldorado Mine which had closed in 1940 due to disorganized markets, was acquired by the Crown and reopened to produce uranium. Also during the war, the refinery at Norman Wells was enlarged, production of oil was increased and a pipeline to carry oil to the Yukon was completed. As a result of this expansion and attendant exploration for oil, reserves and refinery capacity at Norman Wells are sufficient to supply the local market for years to come.

During the war years, wartime demand led to an intensive search in the area for tungsten, columbium, tantalum and other rather rare metals. Pegmatites east of Yellowknife were explored at this time for these and related elements but commercial deposits were not discovered although several interesting prospects were located.

In 1944, Frobisher Exploration Company rather courageously initiated a diamond-drill program on the Giant Yellowknife property. Results finally indicated a gold deposit exceeding in size and grade any known in the district. A frantic rush to stake, restake and examine properties began; soon several hundred mining companies held claims in the Yellowknife area. As labour and supply shortages eased with the end of the war, gold production resumed at Negus in 1945 and Con in 1946. Giant Yellowknife Mines, Limited began production in 1948. During this time, Neil Campbell, geologist for Consolidated Mining and Smelting Company of Canada, after careful field work concluded that the faulted extension of the Giant shear system occurred at depth on the Con and Negus properties. Drilling confirmed this hypothesis and the life of both mines, particularly the Con Mine was substantially lengthened. As a result of prospecting in outlying areas a small high grade gold deposit northeast of Yellowknife was developed by Consolidated Discovery Yellowknife Gold Mines and production began in 1950.

In the early fifties, prospectors began to concentrate their search on uranium. A number of showings were discovered northwest of Yellowknife in the Marion River area, north from there in the Hottah Lake area, in the Nonacho Lake area, and in the East Arm of Great Slave Lake. In 1957, Rayrock Mines Limited began producing uranium concentrates in the Marion River area. This mine, unfortunately, was forced to close down in 1959 due to lack of ore.

In the late forties, Consolidated Mining and Smelting Company of Canada and Ventures Ltd. began an extensive development program of the lead-zinc deposits at Pine Point. By 1953 millions of tons of ore had been outlined, and in the early 1960s a railroad was built to Pine Point from Grimshaw, Alberta, and production of lead-zinc concentrates began in 1964.

In 1953, depletion of ore caused the Negus Mine to close and for the same reason, the Eldorado Mine stopped production in 1960.

Presently, then, three gold mines are producing in the Yellowknife area and large tonnages of lead-zinc ore are being produced at Pine Point. Two uranium mines have produced in the past, one for many years, and several gold mines have in the past produced substantial quantities of ore.

MINERAL PRODUCTION

Minerals produced in the Northwest Territories in 1963 were estimated to be worth $14,726,747. Almost all came from the District of Mackenzie. Total value of production between 1932, when production was first recorded, and 1963 is about $261,547,179. This figure does not include part of the uranium production or the value of oil and gas. Annual production in the Territories amounts to between one and two per cent of the national total. In 1963, crude oil production at Norman Wells was 630,000 barrels valued at $633,754. Figures for production of various metals in the past few years are given in Table IV.

Table IV

Value of Mineral Production (in dollars), Northwest Territories

	1955	1956	1957	1958	1959
Gold	11,092,001	12,149,447	11,407,604	11,683,615	13,626,802
Silver	51,565	62,701	60,376	63,179	61,937
Copper			95,672	220,748	292,157
Nickel			734,157	2,648,538	2,689,239
Pitchblende	13,248,198	9,176,076	8,801,769	9,572,847	8,155,729
Total	24,491,764	21,388,224	21,099,578	24,825,864	24,825,864

	1960	1961	1962	1963	
Gold	14,194,631	14,449,028	14,974,924	14,609,250	
Silver	70,659	73,419	84,814	107,216	
Copper	315,016	270,440	194,928	10,281	
Nickel	2,669,645	2,604,789	1,503,837		
Pitchblende	9,231,698				
Total	26,481,649	17,397,676	16,758,503	14,726,747	

TRANSPORTATION

The traditional transportation routes from the south to the District of Mackenzie followed natural waterways namely the Mackenzie River system. This river system still provides a principal route for transportation of freight. Northern Transportation Company, a Crown Corporation, operates tugs and barges on the river system from southern termini at Waterways, Alberta, and at Hay River on Great Slave Lake to all communities on Great Slave Lake, along the Mackenzie River and along the Arctic Coast from Colville River to Spence Bay. The shipping season begins in mid-June and continues to about the end of September.

Scheduled air service to and in the region is provided by Pacific Western Airlines which operates regular flights between Edmonton and most major settlements in the District of Mackenzie. Local charter services are located in most major centres. Yellowknife has the largest number of charter companies with the greatest variety of float- and ski-equipped aircraft. Major airports in the region are built and operated by the Department of Transport.

Yellowknife, Fort Providence, Enterprise, Hay River, Pine Point, and Fort Smith are connected by the Mackenzie Highway System to Grimshaw, Alberta. A ferry service in summer and ice bridge in winter negotiate the Mackenzie River at Fort Providence, so traffic to Yellowknife is not possible

during break-up and freeze-up, a total period of about four months each year. Trucking companies in Edmonton and Grimshaw operate on the highway system and Canadian Coachways provides a regular bus service between Edmonton and Yellowknife.

Pine Point is served by a railroad from Grimshaw, Alberta, which is operated by the Canadian National Railways.

COMMUNICATIONS

Postal service is available in all settlements in the District of Mackenzie. Communications in the area have been greatly improved in recent years by the opening and growth of the Canadian National Telecommunications land lines. Most settlements along the Mackenzie River and along the western Arctic Coast are now serviced by a land line along the river. A second land line system provides telephone service to Yellowknife, Fort Smith, Pine Point and Fort Resolution from Hay River and a third tropospheric scatter radio system services Cambridge Bay, Snare River and Port Radium from Hay River. There are a total of twenty-one telephone exchanges in the District of Mackenzie.

The most extensive radio network in the region is operated by the Department of Transport for its aeronautical and meteorological services. Public message service is maintained in settlements not serviced by commercial land lines. The Department of Indian Affairs and Northern Development, the Royal Canadian Mounted Police, the Hudson's Bay Company and several missions also have radio networks for their own use.

Radio broadcasting is controlled by the Canadian Broadcasting Corporation. This company's Northern Service provides a short wave service to the north with a daily schedule. Most of the Mackenzie District is served by the medium wave, Mackenzie Network based at Yellowknife which is connected to the national radio network.

POWER

All power in the district is generated by diesel engines or by hydro-electric plants. Diesel-electric power is generally used in outlying small settlements and by developing mines. The Eldorado Mine was completely serviced by diesel generated power. Diesel fuel was shipped to the property by barge and stored in tanks. The cost of their power was about 1.79 cents per kilowatt-hour.

In 1941, production of hydro-electric power was started at a plant between Bluefish and Prosperous Lakes about fifteen miles north of Yellowknife. The plant is owned by Cominco Limited and supplies the Con Mine and the town of Yellowknife. The turbine is rated at 4,700 horsepower and the generator has a capacity of 4,200 KVA. Power is delivered at 33,000 volts.

In 1948 a hydro-electric plant was completed on the Snare River at the outlet of Bigspruce Lake about ninety miles northwest of Yellowknife by a Crown Corporation now known as the Northern Canada Power Commission. The plant is rated at 8,350 horsepower. Power is transmitted at 115,000 volts along a 94-mile transmission line to a substation on the property of Giant Yellowknife Mines Limited and there converted to 33,000 volts for

delivery to consumers. The Giant Mine, Discovery Mine, and the town of Yellowknife use this power. Rayrock Mines was connected to the plant by a transmission line and used the power while it was in operation. Recently this plant has been increased by building a dam and generating plant eight miles downstream, the rated capacity of which is 9,200 horsepower. In addition to these plants, all the mines have stand-by diesel electric plants for emergency uses.

Northern Canada Power Commission operates small diesel electric plants at Fort Smith, Fort Simpson and Inuvik. A similar plant is operated at Hay River by a private power company.

Other potential sites for hydro-electric developments in the District of Mackenzie include the lower Lockhart River (125,000 h.p.), Tazin-Talston River system (200,000 h.p.), Great Bear River (30,000 h.p.) and Camsell River (4,000-6,000 h.p.). A plant on one of the Talston River sites was completed in 1965 with a capacity of 18,000 kilowatts and supplies power to Pine Point.

In 1965, the mining industry consumed about 65 per cent of the total electric energy generated in the Northwest Territories.

MINING REGULATIONS

Prior to 1960, mining lands in the Northwest Territories were administered under the Regulations for disposal of Quartz Mining Claims and there was no provision for disposal of rights on certain lands underlying coastal waters of Canada. On May 26, 1960 the Canada Mining Regulations were passed by Order-in-Council P.C. 1960-717. The new regulations were made pursuant to the Territorial Lands Act and Public Lands Grants Act thus authorizing disposal of mining rights under coastal waters.

The new regulations include major revisions of the old regulations and introduce the concept of Prospecting Permits which gives exclusive exploration rights on the permit area for periods up to three years in return for fixed expenditures.

Copies of the Canada Mining Regulations can be obtained from any offices of Department of Indian Affairs and Northern Development. The regulations are administered by the Resources Branch, Department of Indian Affairs and Northern Development.

CHAPTER III

GENERAL GEOLOGY

INTRODUCTION

Little geological mapping was done in the District of Mackenzie prior to 1921; systematic mapping of map-areas at 1-mile and 4-mile scales began in 1936, but as late as 1950, large areas of the district remained unmapped. In 1952 the Geological Survey of Canada first used the helicopter as a traversing vehicle on reconnaissance mapping parties and since then work has progressed rapidly. By 1962 most of the Canadian Shield and a large part of the area underlain by younger rocks on the mainland of the Northwest Territories was mapped on a scale of at least one inch to eight miles. In a few areas of economic or special geological interest, more detailed studies at scales ranging from one inch to one mile to one inch to five hundred feet have been completed.

Lord (1951) has synthesized results of geological investigations prior to 1950 and includes references to earlier literature. The geology of the Proterozoic rocks has been summarized by Brown and Wright (1957). Most recently the Precambrian geology of the mainland of the Northwest Territories has been described by Fraser et al. (1960).

Stockwell in recent work (1961, 1964) has divided the Canadian Shield into a number of structural provinces and defined a number of Precambrian orogenies and devised a time stratigraphic classification for Precambrian sedimentary and volcanic rocks. The structural provinces are defined mainly by broad differences in internal structural trends and style of folding. Boundaries are drawn along structural discontinuities where one trend is truncated by another as along major unconformities or orogenic fronts. Although based mainly on geological evidence, the divisions have been strengthened by isotopic dating of many rock types. The Slave, Bear and part of the Churchill structural provinces are located in the District of Mackenzie. Stockwell also has defined a number of orogenies in the Canadian Shield of which three occur in the District of Mackenzie. The last major period of folding metamorphism and intrusion of granitic rocks in the Slave (Structural) Province is known as the Kenoran Orogeny and in the Bear (Structural) Province as the Hudsonian Orogeny. Mean age of isotopic dates from the Slave Province is 2,460 m.y. and from the Bear Province, 1,785 m.y. These dates can be interpreted as a minimum age of major orogenic events. Similarly in that part of the Churchill (Structural) Province in the District of Mackenzie the last orogenic event is called the Hudsonian Orogeny.

The Precambrian orogenies and the erosional interval that follows each of them provides a basis for a time-stratigraphic classification of the sedimentary, volcanic and intrusive rocks of the Shield. Stockwell (1964) suggested that Archean and Proterozoic be considered as eons and defined Archean as including all rocks older than or involved in or emplaced during the Kenoran Orogeny. The Proterozoic Eon includes the time from the close of the Kenoran Orogeny to the beginning of the Cambrian.

The Proterozoic is, in turn, subdivided into Aphebian defined as the time between the close of the Kenoran and end of the Hudsonian orogenies, the Helikian that includes the time between the end of the Hudsonian and

Grenvillian orogenies and the Hadrynian for that time between the end of Grenvillian Orogeny and beginning of the Cambrian. These divisions are called eras. Because of lack of precise dating of deposition of the many Precambrian sequences smaller time divisions are not defined and rock-stratigraphic terms such as formation and group must be employed.

ARCHEAN

The Yellowknife and possibly the Wilson Island Groups are the oldest rocks in the District of Mackenzie and the only rocks known certainly to be Archean. These two groups of rocks are not in contact and, therefore, their relative age relations are unknown but both are cut by granitic rocks dated at about 2,400 m.y. They are in the Slave (Structural) Province as defined by Stockwell (1961).

The Wilson Island Group is exposed in the western islands of the East Arm of Great Slave Lake and is best developed on Wilson Island where the strata are more than 11,000 feet thick and consist of acidic lava flows with interlayered conglomerate and arkose, overlain by crossbedded quartzite, dolomite and metamorphosed shales, which in turn are succeeded by phyllites and minor interbedded quartzites (Stockwell, 1936b). Iron-formation is locally exposed and in places the sediments have been metamorphosed to biotite gneiss and locally granitized. The strata are thrown into easterly-trending tight folds. Beds dip 45 degrees to vertical and are commonly overturned. These rocks are thought to be intruded by granitic rocks of variable composition and for the most part are separated from younger rocks by faults.

The term "Yellowknife Group" is applied to all Archean volcanic and sedimentary rocks north of Great Slave Lake. From Yellowknife these rocks extend north to Point Lake, northeast to just beyond Bathurst Inlet and to the Western River and north of east to Clinton-Colden and Artillery Lakes. The volcanic rocks of this group are massive to pillowed andesites or basalts metamorphosed to greenstones or amphibolites with minor intercalated tuffs and breccias, pillow breccias and dacites. These rocks commonly contain irregularly shaped masses of fine-grained metadiorite or metagabbro. At Yellowknife the volcanic sequence is estimated to be about 22,000 feet thick (Henderson and Brown, 1952b). The volcanic rocks are commonly at the exposed base of the sequence but in some areas are underlain by sedimentary rocks (Ross, 1959). The lowermost volcanic or sedimentary rocks of the group are in contact with granitic rocks that intrude them. Normally the volcanic rocks grade up into the sediments through a zone of interbedded volcanic, sedimentary tuffaceous rocks with no recognized structural discordance or erosional interval. However, at Yellowknife, an unconformity has been mapped by Jolliffe (1946) and Henderson and Brown (1952b) between the volcanics and sediments.

The overlying sediments are for the most part well bedded greywackes or subgreywackes and shales. Locally, limy rocks, quartzites and paraconglomerates occur in the sequence, the latter always near the base of the sediments. Graded bedding is abundant. Near granitic rocks, these rocks are converted to quartz-mica schists that contain metacrysts of andalusite, cordierite, staurolite, garnet and sillimanite in varying combinations depending on the grade of metamorphism and variation in original composition.

Table V

Precambrian Correlation Chart for District of Mackenzie

(Precise correlation between localities and within age divisions not implied)

Locality	Great Slave - Great Bear Lakes	Great Bear Lake to Arctic Coast	Coppermine River - Point Lake Area	Bathurst Inlet	Thelon Area	Nonacho Lake - Talston River	Great Slave Lake
Helikian 900-1600 m.y.	Diabase dykes and sills of various ages	Diabase dykes and sills of various ages	Diabase dykes and sills of various ages Muskox Complex	Diabase dykes and sills of various ages	Diabase dykes and sills of various ages	Diabase dykes and sills of various ages	Diabase dykes and sills of various ages
		Coppermine River Group, Hornby Bay Group	Coppermine River Group, Hornby Bay Group	Coppermine River) Group, Kanuyak Formation, Parry Bay Formation, Tinney Cove Formation	Dubawnt Group - Thelon Formation		
Aphebian 1600-2400 m.y.	Granitic and related rocks	Granitic and related rocks	Granitic and related rocks				
	Cameron Bay Group, Echo Bay Group, Snare Group, Epworth Group	Cameron Bay Group, Echo Bay Group, Epworth Group	Epworth Group	Goulburn Group		Nonacho Group	Et-Then Group Diorites and related rocks, Great Slave Group
Archean 2400 m.y. and earlier	Granitic and related rocks		Granitic and related rocks	Granitic and related rocks	Granitic and related rocks	Granitic rocks	Granitic and related rocks
	Yellowknife Group		Yellowknife Group		Volcanic and sedimentary rocks and derived gneisses, may be in part Aphebian	Volcanic and sedimentary rocks and derived gneisses	Wilson Island Group, Yellowknife Group

All of these rocks are cut by granitic rocks of variable composition and texture and in some areas by numerous pegmatites. Because of the reconnaissance nature of most of the mapping so far completed, it is impossible to classify these rocks into any sort of granite series (Read, 1955). But there does appear to be a broad zone of deep level granitic gneisses and high-grade metasediments bounded roughly by Indin, Point, Contwoyto, MacKay, and Gordon Lakes. In this area, the rocks appear to be gneissic and to contain bands and large zones of migmatites and highly metamorphosed and partly granitized sediments. The rocks are cut by massive clearly intrusive granodiorites or monzonites. Outside this area where large areas are underlain by rocks of the Yellowknife Group, the granitic rocks appear to be higher level, probably intrusive rocks with local border zones of migmatites. In these areas, two ages of granitic rocks are often distinguished, the younger being muscovite-biotite granodiorites that cut the older granitic rocks and commonly occur in circular or ellipsoid-shaped masses that are surrounded by aureoles of metamorphism. Pegmatites are associated with these younger rocks. Such rocks are considered to be fairly high level intrusives and appear to be the most potash-rich of all the granitic rocks in the area. Micas from granitic rocks of all environments or levels, dated by the K-Ar method, are about 2,400-2,500 million years old. The degree of regional metamorphism of the Yellowknife rocks in the zone of gneissic rocks tends to be higher than in the other areas.

Rocks of the Yellowknife Group are complexly folded along axes that trend in two directions that vary throughout the area. The angular relations between the two fold directions remain about constant and the two systems probably formed at about the same time. Folding is roughly contemporaneous with metamorphism and intrusion of granitic rocks. The later folding is commonly expressed in the sediments as steeply plunging cross folds. The sediments are always more tightly folded than the volcanic rocks. Some shear zones, at least, in both volcanic and sedimentary rocks were developed during the folding and represent bedding shears, axial plane shears, sheared incompetent beds or movement along contacts of rocks of differing competency. Some of the shears in the thick relatively competent masses of volcanic rocks may develop during the folding of these rocks.

There are a number of isolated patches of metasediments and hornblende gneisses west of the Nonacho Lake and south of Great Slave Lake. The sediments are usually metagreywacke-shales or subgreywackes. The metasediments are bounded by gneisses – migmatites presumably derived from the sediments during formation of the granitic rocks. A group of sedimentary and volcanic rocks occur in the southeast corner of the District of Mackenzie around Snowbird Lake (Taylor, 1956a). Between this area and Nonacho Lake, a number of small patches of highly metamorphosed sediments are found in the granitic rocks. At Snowbird Lake, the rocks comprise quartzites and greywackes that contain a few bands of magnetite iron-formation. Metamorphosed basalts, andesites and basic tuffs are associated with the sediments. These rocks are tightly folded, metamorphosed and granitized and grade into granite gneisses. The age of these rocks is uncertain but they are thought to be Archean rocks that have been sheared and faulted possibly during a phase of the Hudsonian Orogeny.

APHEBIAN

Six groups of Aphebian rocks (the Snare, Echo Bay and Cameron Bay, Great Slave, Epworth and Et-Then Groups) occur in the District of Mackenzie in scattered areas separated by intervening areas of older or younger granitic rocks. They are separated from Archean rocks by a profound unconformity and some are cut by granitic rocks that yield ages of 1,700 to 1,850 m. y.

Snare Group rocks occur in north-trending belts along the margin of the Slave Province and as isolated patches within younger granitic rocks to the west. At Basler and Kwejinne Lakes, and to the southwest, Snare rocks lie with marked angular unconformity on the Archean Yellowknife Group and granitic rocks (Lord, 1942a). Farther north the structural unconformity becomes less obvious due to the gradual elimination of the angular discordance as a result of the greater intensity of folding of the Snare Group. The succession consists of quartzite, dolomite, shale and siltstone; the relative amounts of these varies throughout the geosyncline. At Basler Lake and to the southwest the basal rocks are white or light grey, crossbedded quartzite with a few thin beds of shale. Near the base the quartzite is feldspathic and contains a few lenses of quartz-pebble conglomerate. At the base it contains a few fragments of basement rocks. Thickness varies from less than 100 feet to about 1,000 feet. At Basler Lake, a thin shale member occurs near the top of the quartzite which is overlain by sandy dolomite at least 300 feet thick. The quartzite at Kwejinne Lake is overlain by black shale and west and southwest of Basler Lake appears to be overlain by dark, finely laminated shale that contains another quartzite. North of Basler Lake the basal quartzite is overlapped by dolomite which can be traced along the unconformity to the north end of the belt of sediments. The dolomite is overlain by alternating thin beds of siltstone and finely laminated shale of unknown thickness. It is probably several thousand feet thick. In many places the siltstone and shale beds are each less than an inch thick and the rock has a varved appearance. Locally the couplets increase in thickness to 3 or 4 inches. In the thicker couplets graded bedding and fine cross-laminations are evident. Within these rocks are units of quartzite, dolomite and shale, each several hundred feet thick, the number and stratigraphic position of which are unknown because of the complexity of the structure. Some of the quartzite and dolomite units grade along strike into siltstone and shale.

The transition zone with dolomite is marked by zones in which calc-silicate lenses are numerous. West and south of Basler Lake quartzite, shale and dolomite occur in various stratigraphic successions whereas to the north, metamorphosed equivalents of siltstone-shale with minor quartzite or dolomite are dominant. At Grant Lake, the metamorphosed rocks are overlain unconformably by basic lavas some of which are pillowed and contain intercalated thin bands of cherty sediments and Snare-like sediments. Pink or red feldspathic sandstone and red or grey shale overlie the volcanic rocks and are tentatively included in the Snare Group.

The Epworth Group, a conformable sequence of sedimentary and volcanic rocks with a thickness of at least 15,000 feet, lies on Archean volcanic rocks and granites with marked unconformity. Fraser (1966) has established five formations. The lowest, 2,000 to 3,000 feet of grey and pink quartzite with some beds of argillite and quartz-pebble conglomerate, may be absent locally. The succeeding 2,000 to 5,000 feet are stromatolitic dolomite with a few interbeds of argillite. This formation locally forms the

basal unit of the group. Thinly bedded siltstone, argillite, and greywacke with thin bands of quartzite and dolomite, at least 3,000 feet thick, overlie the dolomite and are in turn overlain by 3,500 feet of limestone with interbedded grey and red argillite. The youngest formation, 1,200 feet thick, comprises red mudstone and siltstone which grades upwards into feldspathic, calcareous sandstone. Pillowed and massive andesite and related fragmental rocks occur locally within the sediments.

The siltstones and shales of the middle formation are metamorphosed to phyllite and andalusite-bearing or garnetiferous biotite schist where intruded by granite in the west. The metasediments also occur as patches within the granite and can be traced southward to where similar rocks are considered to be part of the Snare Group. It seems reasonable to assume that the middle unit of the Epworth Group is the stratigraphic equivalent of the Snare siltstone and shale and that the underlying dolomite and quartzite are also equivalent. The uppermost two Epworth formations may be equivalent to similar strata that lie above Snare volcanic rocks north of Grant Lake.

The Great Slave Lake Group in the East Arm of Great Slave Lake has been divided by Stockwell (1936a, b) into six formations, the basal units of which rest on a deeply eroded surface. It is about 20,000 feet thick. The strata occur in an easterly-trending synclinorium. Along the north flank the strata dip very gently south but are folded in the central and southern part. The rocks are cut by sills, laccoliths and possibly also stocks of hornblende-biotite diorite or quartz diorite. A biotite from one of these intrusions yielded a K-Ar age of 1,845 m.y., indicating that the rocks are Aphebian in age and were folded during an early phase of Hudsonian Orogeny.

The basal Sosan Formation is from 3,000 to 5,000 feet thick and composed of feldspathic quartzite, a sandy stromatolitic dolomite member and, near the top, red or pink siltstone and shale. The Kahochella Formation is up to 7,000 feet thick and consists of red shale, siltstone, arkose, carbonate and a few beds of oolitic iron-formation. In the central part of the basin, andesite flows and pyroclastics with intercalated red sandstone and shale occur within the sequence. The Pethei Formation comprises about 1,500 feet of limestone and dolomite with abundant stromatolithic zones along the north limb of the synclinorium. Lateral equivalents (Hoffman, 1968) in the southern part of the basin are fine-grained limestone and interbedded limestone and argillite and in the southwest are graded beds of greywacke and shale, with interbeds of chert and limestone. Conformably overlying the Pethei Formation are red mudstone, dolomite and limestone forming the Stark Formation. Breccias, probably of different origins, are common in the carbonate rocks. The Tochatwi Formation comprises about 3,000 feet of nonmarine molasse-type red sandstone and shale. The youngest rocks of the Great Slave Group form the Pearson Formation which consists of 500 feet of basalt, commonly vesicular and amygdaloidal, with related tuff and thin beds of argillite.

The Goulburn Group in the Bathurst Inlet region which comprises a conformable sequence, about 15,000 feet thick, is divided into five formations (Fraser, 1964). The sediments have been moderately folded about axes that strike north-northeast. Folding is more intense along Bathurst Inlet where fold axes strike in a northerly direction. The Goulburn lies unconformably on the Archean Yellowknife Group and Kenoran granites. They are cut by gabbro sills and diabase dykes that yield K-Ar whole rock ages of about 1,200 m.y.

The basal formation of the Goulburn Group attains a maximum thickness of 3,500 feet and comprises, from the base up, grey to green quartzite and grit, dolomite with stromatolitic zones, and interbedded quartzite and maroon to grey argillite with local silty layers and stromatolitic dolomite. These rocks are overlain by up to 7,500 feet of thick bedded, massive, pink to red feldspathic quartzite and orthoquartzites with thin interbeds of conglomerate. These rocks are succeeded by about 2,000 feet of purplish green or grey argillites with thin interbedded grey limestone and dolomite overlain by about 800 feet of grey to pink dolomite with abundant stromatolitic zones. The uppermost formation is composed of interbedded red-grey or maroon siltstone and argillite with red crossbedded arkose near the top. The arkose contains granules of specularite.

The Goulburn, Epworth, Snare and Great Slave Groups are thought to correlate and to have been deformed and in the case of the Epworth and Snare Groups to have been intruded by granitic rocks and metamorphosed during a phase of the Hudsonian Orogeny.

The Cameron Bay, Echo Bay, Et-Then and Nonacho Groups are younger successions of sedimentary and volcanic rocks that were formed during this orogeny or just after it and are, therefore, late Aphebian or Helikian in age. The Cameron and Echo Bay rocks are cut by granodiorite and felsite porphyry intrusions that may be intrusive equivalents of the volcanic rocks. The Et-Then and Nonacho sediments are not cut by granitic rocks and are not metamorphosed but are moderately folded.

The Echo Bay and Cameron Bay Groups of sediments occur in the Great Bear Lake area. Cameron Bay rocks are found in an area roughly bounded by Great Bear, Hottah, and Grant Lakes and Wopmay River whereas the Echo Bay Group is restricted to within an area of about thirty square miles around Port Radium. Strata of the Echo Bay Group comprise pyroclastic beds, cherty sediments and minor limestone and conglomerate that are overlain by porphyritic and amygdaloidal lava flows that contain thin layers of tuff. The beds dip moderately except near granitic masses. The base of the section is not exposed as it is cut off by younger granitic rocks but about 9,000 feet of section has been observed (Feniak, 1947).

Rocks of the Cameron Bay Group consist of maroon coloured conglomerate, arkose and shale. Locally volcanic breccia occurs in the group and volcanic rocks similar to those of the Echo Bay Group are found in the Cameron Bay sediments. Pebbles in the conglomerates consist chiefly of volcanic rocks similar to those associated with the sediments. Relationships between the Cameron and Echo Bay Groups are uncertain as contact areas between the two groups are drift covered but the occurrence of similar volcanic material in both groups suggests that they are closely related in time.

The Nonacho Group is confined to a long, narrow belt extending northeast through Talston and Nonacho Lakes from Thekulthili Lake. An extension of these sediments was mapped by Wright (1957) in the Tent-Whitefish Lakes area. The Nonacho Group in its lower part typically comprises conglomerate, arkose and shale, and feldspathic quartzites. The conglomerate, the dominant rock type in the lowest exposed part of the sequence, is made up of granite boulders of various compositions and textures and a few quartz boulders in an arkose matrix. Higher in the section, arkose, feldspathic sandstone and locally shales occur. The rocks in the band of sediments between Tent and Whitefish Lakes is schistose sericitic

impure quartzite with some sheared conglomerate. Several small areas west of the Nonacho rocks are underlain by similar sediments that have been correlated with the Nonacho Group. The sediments rest unconformably on a basement composed of granitic gneiss, migmatite and massive granodiorite. Faults commonly occur in the contact area and obscure the age relationship of the sedimentary and granitic rocks. Rocks of the Nonacho Group are thrown into folds that trend northeast and plunge both to the north and south.

Late Aphebian rocks known as the Et-Then Group occur at the East Arm of Great Slave Lake. These coarse, clastic sediments rest unconformably on rocks of the Great Slave Group or on older Archean rocks. The basal unit is the Murky Formation, a conglomerate that contains closely packed rounded boulders of rocks from nearly every unit of older rocks. The conglomerate varies rapidly in thickness up to about a maximum of 2,000 feet. The overlying Preble Formation is a coarse, feldspathic crossbedded sandstone. These rocks are nearly flat lying except near faults.

HELIKIAN

According to Stockwell (1961) all rocks formed in the interval between the Hudsonian Orogeny and the end of the Grenvillian Orogeny are Helikian in age. In the District of Mackenzie, rocks thought to be Helikian or younger include the Hornby Bay and Coppermine Groups around Coppermine, the Tinney Cove, Parry Bay and Kanuyak Formations near Bathurst Inlet and part of the Dubawnt Group along the Thelon River in the eastern part of the district.

Rocks of the Hornby Bay Group unconformably overlie folded Epworth rocks south of Coronation Gulf and rocks of the Cameron Bay Group north of Great Bear Lake (Fraser et al., 1960). The group consists of several thousand feet of quartzite and interbedded pebble conglomerate that are well exposed north of Great Bear Lake. The quartzites are overlain conformably by about 4,000 feet of dolomite and shaly dolomite. The quartzite is normally white and clean but near the lower contact with older granitic rocks may be coarse-grained purplish arkoses. The dolomite is buff or grey with abundant stromatolites in some beds. Hornby Bay strata are generally flat lying or very gently dipping.

Flows and overlying sediments of the Coppermine River Group occur in a broad belt that extends from Coronation Gulf to the area north of Great Bear Lake where they are overlain unconformably by Paleozoic strata. About 12,000 feet of dark brown, green or purplish, very fine grained, basaltic flows commonly with amygdaloidal tops, form the lower part of the group. North of the Dismal Lakes, these rocks overlie the Hornby Bay dolomites conformably and dip gently north at about ten degrees. Dips become shallower higher in the section. The upper parts of the Coppermine River Group overlie the volcanics unconformably and consist of red and grey quartzites, dark coloured shales and buff to grey dolomite. Interlayered with these sediments are sills of gabbro, some of which are very thick. The whole sequence may be as much as 15,000 feet thick (Fraser et al., 1960). Similar sediments with gabbro sills which occur on the Arctic Coast between Darnley Bay and Clinton Point are separated from Coppermine sediments by overlying Paleozoic rocks. According to Fraser et al. (1960) a number of characteristic features common to both groups of sediments indicate their

stratigraphic equivalents. This being so, it seems likely that the Coppermine rocks are folded into a broad syncline along an easterly-trending axis. The upper sediments and the lavas are cut by gabbro sills and dykes that may be of several ages. Cream, red and buff coloured quartzites of the Tinney Cove Formation, which includes thin conglomerate beds with boulders of underlying strata, overlie unconformably rocks of the Goulburn Group in the Bathurst Inlet area. Except near faults these rocks are very gently deformed. They are overlain, probably conformably, by the Parry Bay Formation that consists of at least 550 feet of thick bedded, fine-grained, grey or buff dolomite and limestone with stromatolitic zones and minor amounts of interbedded brown dolomite and red or green shale and shaly dolomite. On islands in the mouth of Bathurst Inlet, but nowhere on the mainland, rocks of the Kanuyak Formation lie with slight angular unconformity on Parry Bay strata. Reddish brown dolomite and calcareous shales are the dominant lithologies. Basalts of the Coppermine Group and overlying sediments disconformably overlie rocks of the Kanuyak and Parry Bay Formations and are separated from older strata by an unconformity.

The Thelon Formation of the Dubawnt Group of rocks is exposed along the eastern border of the District of Mackenzie southeast of Bathurst Inlet along the Thelon River. According to Wright (1955) these rocks rest unconformably on basement granitic rocks. The Thelon strata in the District of Mackenzie consist of white or mottled quartzite and in an area near the Thelon River are overlain conformably by dolomites. The Dubawnt rocks are flat lying or very gently dipping and are cut by a number of northwest-trending diabase dykes.

The Tinney Cove Formation is lithologically similar to Hornby Bay quartzites and the Thelon Formation of the Dubawnt Group. On the basis of lithologic similarity and stratigraphic position, the Parry Bay dolomite is tentatively correlated with the Hornby Bay dolomite and the post-Thelon carbonate (Fraser et al., 1960). Rocks of the Kanuyak Formation have no known equivalents in the region. These rocks are separated from Aphebian rocks deformed during a phase of the Hudsonian Orogeny by an angular unconformity and are cut by basic dykes and overlain by lavas that date in the range 1,000 to 1,400 m. y. indicating that the sediments are Helikian in age.

FAULTS

Many faults, most of which are marked by well defined lineaments, have been recognized in the District of Mackenzie. In addition, many other lineaments are known and these may mark the positions of unrecognized faults. Three regional trends of faulting are apparent in the area irrespective of the ages of rocks cut by the faults.

A north to west of north trending group of faults is common around Yellowknife and north to Indin Lake. Such faults also occur in the Bear (Structural) Province between Great Slave Lake and Great Bear Lake, east of Great Bear Lake, also south of Great Slave Lake. Where movement can be determined these faults commonly have a left-hand strike slip as a major component. The best known example of this system is the West Bay Fault at Yellowknife, along which the west side has moved 16,140 feet south and 1,570 feet down relative to the east side (Campbell, 1948). These faults dip almost vertically and are marked by narrow breccia or gouge zones. A

north-trending zone of mylonites and phyllonites defines the location of a fault along Wopmay River which may be a thrust fault along which deep level gneisses on the east have been moved up to the west against sediments and volcanics cut by high level granitic intrusions (Ross and McGlynn, 1958).

Northeast-trending faults are numerous in several parts of the area. Most prominent are the Macdonald and related faults in the East Arm of Great Slave Lake. The Macdonald Fault can be traced along strike over a distance of more than 300 miles. It is marked by a prominent lineament over much of this length and by a wide zone of mylonites and crushed rock. Many minor faults curve off the south side of the major fault. Much of the movement on this and other parallel and related faults in the East Arm of Great Slave Lake appears to be normal but there is some suggestion of major pre-diabase strike-slip movement on the Macdonald Fault. The horizontal component of movement appears to be right-handed. Traces of the southeast continuation of the fault system beneath the Paleozoic cover rocks can be detected on aeromagnetic maps (Douglas, 1959). According to Douglas, steep dips and minor folds are found in the Paleozoic rocks suggesting post-Devonian movement along these faults. Other northeast-trending faults occur between Great Slave and Great Bear Lakes. One of these, the Marion River Fault, displaces strata horizontally for about eight miles with the northwest side moving down some unknown amount (McGlynn, 1957). The movement sense on this and other faults of similar orientation in the area is right-handed. These faults dip nearly vertical. Similar faults have been mapped by Fraser et al. (1960) north and northeast of Great Bear Lake displacing strata of the Epworth, Hornby Bay and Coppermine Groups. Such faults are steeply dipping and offsets are left-handed. Displacements of up to five miles have been mapped. Where observed by the author, these faults are commonly bounded by zones of crushed rock or breccia and mylonites and often have a large number of related splays and cross-faults.

Northwest-trending, vertical dipping faults are found around Yellowknife, in the Marion River area, and around Indin Lake. Many of these may be related to the more northerly trending faults. They are similar in many respects to both the northerly and northeasterly faults. Some of the northwest-trending faults have left-hand displacement. The most spectacular of these faults occurs in the Bathurst trench and extends from Bathurst Inlet southeast to near the Back River and possibly to the Dubawnt rocks. Goulburn strata are separated from older granitic gneisses and Yellowknife-type rocks to the northeast.

Many of these faults, particularly in the Bear (Structural) Province, contain "giant" quartz veins or stockworks. These are not simple veins but stockworks of milky white quartz. The country rock, where it is not in fault contact with the quartz veins, is silicified to the extent that in many places there is a complete gradation between rock and quartz. At least three ages of quartz can be distinguished in most stockworks. Commonly one contact of the vein is a fault and sometimes these faults cut across the vein indicating some movement after the formation of the quartz. There is some evidence that localization of stockworks in faults is partly controlled by slight variation in the strike and/or dip of the faults (McGlynn, 1957).

The age of faulting is difficult to determine from present data. The three sets of faults cut all the Precambrian rocks and rarely if at all affect the Paleozoic rocks in the area. Some faults appear to be pre- and others

post-diabase but since the diabase may not be of the same age, this observation does not precisely date the faulting. Evidence indicating continued movement along some faults over long or unknown periods of time adds further difficulties. Faults of all orientations occur in three different structural provinces affected by orogenies of different ages. It is, therefore, not certain that, for example, all north-trending faults in these different provinces are the same age; in each province some of the faulting may be related to events that occurred in that particular province.

PHANEROZOIC ROCKS

The following very brief and general description of the Paleozoic and younger rocks is chiefly a summary of published papers by Douglas and associates (Douglas, Norris, Thorsteinsson, Tozer, 1963; Douglas, 1959; Douglas and Norris, A. W., 1959; and Douglas and Norris, 1959, 1960, 1961, 1963). The part of the District of Mackenzie underlain by post-Precambrian rocks can be divided roughly in two for the purpose of this description. The Interior Plains extend to the Arctic Coast between the Mackenzie River and the Canadian Shield. The remaining area is largely part of the Mackenzie Mountain system.

The Interior Plains are underlain by flat-lying or gently dipping lower Paleozoic, Devonian, Carboniferous and Cretaceous sediments that thicken southward and westward from the Shield boundary. Significant unconformities occur at the base of the Paleozoic, Middle Devonian and late Lower Cretaceous. West of Great Slave Lake, basal Cambro-Ordovician sandstones are erratic in distribution and thickness and partly result from filling of topographic lows in the basement. Middle and Upper Devonian rocks comprise carbonates, shales and evaporites. To the west these rocks grade into thick shales in the Liard area. Permian rocks occur along the Petitot River on the southwestern corner of the district and Cretaceous rocks underlie much of the Horn Plateau west of Great Slave Lake. Basement topographic highs possibly related to faulting in the Precambrian rocks affected the Lower Paleozoic sedimentation and caused local facies changes.

West of Great Bear Lake on the Interior Plains, shales and carbonates of Ordovician and Devonian age appear to dip gently to the west. These rocks are in many areas overlain by thin Cretaceous shales. North and northwest of Great Bear Lake, west-dipping Ordovician and Middle Devonian shales and carbonates are covered by Cretaceous shales and sandstones.

The Mackenzie Mountain area includes the Mackenzie and Franklin Mountains, the intervening lowlands and the Liard Plateau. Lower Paleozoic and Devonian carbonates, shales and sandstones are exposed in the mountains along with some Proterozoic sediments. The plain and plateau areas are underlain by thick units of Ordovician, Silurian and Middle Devonian limestones and shales that are covered by Upper Devonian, Carboniferous and Cretaceous rocks. Rocks in the Liard Plateau are thrown into long, slightly faulted, gentle folds that plunge both to the north and south and trend east of north. In the Mackenzie Plain east of the Mackenzie Mountains, the rocks are folded into long narrow synclines and broad anticlines that are cut by cross faults of minor displacement. In the Mackenzie Mountains the folds are generally broad and open but locally tightly compressed and trend roughly parallel to the range which is in plan convex to the east.

CHAPTER IV

ECONOMIC GEOLOGY

GENERAL STATEMENT

In the District of Mackenzie gold from three mines at or near Yellowknife and oil and natural gas at Norman Wells are produced. In the past, uranium has been mined at Port Radium at Great Bear Lake and Rayrock in the Marion River district. Silver was also extracted at Port Radium. Several mines in the Yellowknife area have produced gold but are now closed. Small amounts of columbium-tantalum and lithium concentrates have been mined in small operations on pegmatite deposits east of Yellowknife. Large reserves of lead-zinc ore occur at Pine Point just south of Great Slave Lake and production from these deposits has begun. Partly developed showings of gold, uranium, lead-zinc, copper-zinc, copper, nickel and lithium occur in Precambrian rocks of various ages and are described herein.

Lord (1951) provided an excellent review of the distribution of and types of deposits of metallic minerals. Jolliffe (1948) and Lang (1961) have described the distribution of various types of mineral deposits and outlined metallogenic provinces.

ARCHEAN

At present all the gold production from the District of Mackenzie is from the area underlain by Archean rocks. Three mines, two at Yellowknife and one fifty miles northeast of Yellowknife account for this production. Pegmatite deposits, copper-lead-zinc showings, nickel and massive sulphide deposits are also known to occur in these rocks.

The Archean rocks occur in the Slave Province and consist of basic and minor intermediate or acidic volcanic rocks and greywacke or subgreywacke and shales; all are complexly folded and metamorphosed and intruded by granitic rocks which date about 2,400-2,500 m. y.

Gold is by far the most widely distributed economic mineral in these rocks. Almost every belt of volcanic or sedimentary rocks of reasonable extent contains gold showings and there seems to be no obvious variation in type from one belt to another. Gold-bearing quartz veins occur in both volcanic and sedimentary rocks. In the volcanic rocks in the Yellowknife area gold occurs in quartz or quartz-sericite veins or in masses that are localized in dilatant zones along shear zones. These shear zones consist of chlorite-carbonate schists; near masses of quartz, the schist grades to sericite-carbonate-quartz schist which in turn grades to quartz containing variable amounts of sericite. The shear zones may occur along faults or be caused by movements in the lavas that took place during folding. Characteristic sulphides in these deposits are pyrite, arsenopyrite, chalcopyrite, stibnite, sphalerite, pyrrhotite, galena and various sulphosalts. The mineralogy in veins in volcanic rocks outside of the Yellowknife belt is commonly simpler with pyrite, arsenopyrite and minor chalcopyrite, pyrrhotite and sphalerite being the common assemblage. The alteration zones around the quartz bodies are less well developed. Scheelite occurs in some deposits in the

volcanic rocks. In sedimentary rocks of the Yellowknife Group, gold-bearing quartz veins occur in bedding shears, small folds, in axial plane shears and in other structures related to the folds in the sediments. The gold is limited to veins that occur in metamorphic aureoles around granitic intrusions and may be restricted to rocks that have reached a certain degree of metamorphism. They are rarely found in low grade rocks or close to granites in very high grade schists but most commonly occur in knotted biotite schists where andalusite or cordierite is developed. Besides quartz and gold, the characteristic minerals include small amounts of pyrite, sometimes arsenopyrite and sphalerite, galena and locally tourmaline, feldspar and actinolite. Gold is commonly erratically distributed in the veins and may be concentrated in warped parts of the containing shear that has provided a dilatant zone along the structure. Alteration zones along the veins are narrow or nonexistent. Pyrite or tourmaline may occur in the wallrocks of the veins.

Occurrences of copper, lead and zinc in varying relative amounts are found in the southwest, south and northeast parts of the area underlain by Archean rocks. East and northeast of Yellowknife, sulphides occur in metamorphosed greywacke or subgreywacke and shales of the Yellowknife Group near high level intrusions of granitic rocks that commonly appear circular or elliptical in outline. The sulphides are localized in folds, either in axial parts of the fold or along the limbs, or in shear zones that are probably related to the folding. Commonly pyrite or pyrrhotite are the most abundant sulphides with lesser and variable amounts of chalcopyrite, sphalerite and galena. Sphalerite is the most abundant of the latter three minerals. These minerals are usually disseminated in the zones of massive or heavily disseminated pyrite or pyrrhotite that replace the country rock. Quartz lenses occur in the mineralized zones but contain only minor amounts of sulphide. In a number of showings, the mineralized zone is in or near limy beds within the sediments suggesting an additional chemical control for the localization of these minerals. The distribution of zinc, copper and lead is usually erratic within the sulphide zone. In areas where these showings occur, zones of barren sulphides are fairly common and are marked by gossans. Similar mineralization with chalcopyrite being the most abundant valuable mineral occurs north of Artillery Lake.

West of Bathurst Inlet in volcanic and sedimentary rocks of Yellowknife Group type, a large number of gossans occur around the James and Hood Rivers. These occur in shear zones mineralized with pyrite or less commonly pyrrhotite. In most such deposits the sulphides are barren but in a few significant amounts of chalcopyrite and sphalerite are found within the mineralized zone.

Gossan zones are common in various areas (e.g. Winter Lake area, McCrea River area) in the central part of the Slave Province. Dozens of these have been examined by various exploration groups but few have been found to contain interesting mineralization. They commonly consist of massive to disseminated pyrite or pyrrhotite with few quartz lenses in metamorphosed and often highly metamorphosed hornblendic rocks and sediments, or in high grade granitic gneisses. Often there is no obvious controlling structure or enclosing alteration zone. Such zones are parallel to bedding or foliation planes. Some of the sulphide masses may have been metamorphosed along with the wall-rocks or formed during the metamorphism of the country rocks. Small erratically distributed amounts of copper, nickel or zinc occur in some of these deposits.

Nickel and copper occur in a gabbroic body that cuts rocks of the Yellowknife Group southeast of Yellowknife, and is intruded by granitic rocks. Pyrrhotite and minor chalcopyrite are disseminated in zones within the gabbro near its contact with granite.

Pegmatites are abundant east of Yellowknife in the metagreywacke shales of the Yellowknife Group. The pegmatites are confined to the metamorphic aureoles in the sediments around high level granitic intrusives that appear to cut older gneissic granitic rocks. The pegmatites occur both along the bedding in the sediments and in structures that cut across the bedding and may be related to the folds in the sediments. Many pegmatites consist simply of feldspar and quartz with minor tourmaline and no obvious internal zoning. Other pegmatites are more complex in that they are internally zoned (Rowe, 1952). Some of these pegmatites contain economically interesting amounts of lithium, usually in spodumene, niobium and tantalum in columbite-tantalite and beryllium in beryl. In the Ross Lake area, Hutchinson (1955) showed that the distribution of these and a few other exotic minerals were zoned away from a muscovite-biotite granitic intrusion that cuts a complex of granodiorite gneiss, biotite gneiss and amphibolite. The latter complex is in contact with amphibolites and nodular schists (metagreywacke-slate) of the Yellowknife Group. The inner zone containing giant pegmatites with graphic granite as a major constituent is followed by a narrow belt of graphic granite and beryl-bearing pegmatites. Pegmatites in the third zone contain beryl and, in the next zone, contain beryl, and columbite and tantalite are characteristic. In the fifth zone spodumene and rarely columbite are found. The plagioclase becomes more acidic away from the granite and the mode of emplacement and origin varies also. In the general region pegmatites are found only in knotted schists suggesting their emplacement occurs during the metamorphism. It seems likely that further work will show that the zonal relationships discovered by Hutchinson in the Ross Lake area will apply to the whole region in which these rare element pegmatites occur. Over the years several pegmatites have been mined for short periods for columbite-tantalite and for lithium and others have been prospected and drilled.

A few copper and certain nickel showings occur in Archean rocks along the north shore of McLeod Bay in the East Arm of Great Slave Lake. These occurrences are considered typical of those found in Aphebian rocks in Great Slave Lake and so are not described here.

In summary, gold, copper-zinc-lead deposits are found in Archean rocks in the Slave (Structural) Province along with some rare element pegmatites. Uranium is not found in significant amounts in these rocks nor is silver except as an alloy in gold. Sulphide deposits occur as replacement deposits in structures often related to folding or possibly as metamorphosed constituents of metamorphosed or partly granitized sediments or volcanic rocks. In both types of deposits ore minerals are chalcopyrite, sphalerite and galena; these are associated with the more abundant pyrrhotite and pyrite.

APHEBIAN

Aphebian rocks occur in both the Bear and Churchill (Structural) Provinces. In the southern part of the Bear Province, sediments are shelf or just off-shelf facies comprising quartzites, dolomites, shales and finely banded siltstone-shales. In places, these rocks are overlain by basic

volcanic rocks. West of the Wopmay River and around Great Bear Lake the sediments are predominantly arkoses and red shales with some conglomerate and the volcanic rocks are porphyritic andesites or dacites and tuffs and volcanic breccias. These rocks are intruded by granitic rocks that date about 1,800 m.y.

In the Churchill Province south of Great Slave Lake, Aphebian sediments consist of conglomerates, arkoses and red shales and greywacke shales. Volcanic rocks are not abundant. These rocks are also cut by granites that are about 1,800 m.y. old. There is some evidence that the granitic rocks are partly reworked or reheated Archean rocks.

In the East Arm of Great Slave Lake, Aphebian rocks comprise quartzites, arkoses, dolomites and shales with some intercalated basic volcanic rocks. These rocks are cut by small, high level, diorite or quartz diorite intrusions.

Bear Province

Until recently a substantial mineral production came from the two uranium mines at Port Radium, Great Bear Lake and in the Marion River area northwest of Yellowknife. A large number of uranium occurrences have been found in these areas and in the intervening area. Silver, copper and cobalt showings also occur in Aphebian rocks of the Bear Province.

At Port Radium the uranium occurs in pitchblende in faults or in fracture zones related to a major fault. The mineralization comprises pitchblende, chalcopyrite, native silver and bismuth, pyrite, argentite, galena and a complex of sulphoarsenides of cobalt and nickel and minor amounts of sulphides of copper, silver, zinc, manganese and molybdenum in a gangue of quartz, carbonate, hematite and altered wall-rock. In other uranium or silver deposits in the area, the mineralization is much simpler with only a few of the above minerals present. All occur in fracture or fault zones and some are found in giant quartz stockworks in fault zones. In the southern part of the province, the deposits are less complex. Pitchblende occurs in fracture zones that are related to prominent faults. Quartz and hematite are commonly the only other minerals present. In places, these zones occur in giant quartz stockworks in faults. West of the Wopmay River, several uranium deposits consist of magnetite that contains disseminated pitchblende, chalcopyrite and possibly other radioactive minerals; the magnetite occurs along foliation planes in granitized sediments or granitic gneisses.

Cobalt is found in the Great Bear Lake area in fracture zones often with carbonate gangue and sometimes with silver. Both silver and cobalt were at times produced as a byproduct at Port Radium.

Copper mineralization is widely distributed throughout the parts of the Bear Province underlain by Aphebian rocks, and a number of showings have been staked and partly developed. Copper minerals, with bornite and chalcocite or chalcopyrite, often occur in fracture zones related to major faults or in giant quartz stockworks in such faults. At Port Radium, fairly large masses of chalcopyrite occur in parts of the uranium-bearing structures. In all cases the mineralization occurs as fracture fillings along with quartz and sometimes carbonate; replacement deposits are not found.

Churchill Province

In the Aphebian rocks in the East Arm of Great Slave Lake, copper, uranium, nickel and silver showings have been found. None of these has been mined. Throughout this area and along the north shore of McLeod Bay in Archean rocks, copper occurs as chalcopyrite disseminated in quartz-carbonate veins in fracture zones that are probably related to major faults that cut these rocks. Most such occurrences are small but locally, in stockworks of quartz veins in extensive fracture zones, fairly large mineralized zones have been outlined. One or two copper showings consist of disseminated chalcocite or bornite in fracture zones in granitic rocks.

Uranium occurs in a number of localities around Stark Lake in the central part of the East Arm of Great Slave Lake. The uranium-bearing mineral is usually uraninite which most commonly occurs in fractures in peculiar actinolite-apatite veins locally known as diorite pegmatites. These veins occur in quartz diorite but rarely, if ever, in sediments of the Great Slave Group. Uranium, possibly in pitchblende, commonly accompanied by cobalt minerals, also is found in a few fracture zones in granitic rocks in this area.

A few nickel and silver showings occur in the western part of the East Arm and on the north shore of this part of Great Slave Lake. They consist of fracture zones that contain carbonate and quartz veins with niccolite and/or native silver along with minor amounts of cobalt minerals. A basic dyke near one of these showings contains disseminated pyrrhotite and small amounts of nickel, copper and cobalt.

South of Great Slave Lake in the Churchill Province, uranium, copper, lead-zinc and nickel occurrences have been discovered and some partly developed but there has been no mineral production from this area.

Lead-zinc deposits with or without copper minerals occur along the south shore of Great Slave Lake and around Thuban Lakes. Sphalerite and galena in various proportions and sometimes chalcopyrite are disseminated with pyrite in vuggy quartz-carbonate veins in fracture or fault zones. Small lenses of massive sulphides may occur within these veins. No significant amounts of precious metals are found in these deposits. The enclosing rocks are metamorphosed sediments or hornblendic rocks and in one occurrence rocks of the Great Slave Group. In sediments of the Nonacho Group east of these deposits a somewhat more complex type of mineralization comprising sphalerite, galena, chalcopyrite, bornite and various silver minerals and possibly other sulphides occur in a quartz vein in a fault.

Copper showings occur in rocks of the Nonacho Group and nearby granitic gneisses. Bornite and chalcocite and/or chalcopyrite are disseminated in fractures with some quartz lenses in fracture zones. In the area west of the Nonacho sediments, one nickel-copper showing has been found along the contact of a basic dyke. Pyrrhotite, chalcopyrite and pyrite occur in brecciated dyke materials.

Uranium showings have been discovered in the Nonacho sediments and nearby granitic gneisses. In these occurrences pitchblende occurs in fractures with minor quartz and hematite. The mineralization is in zones composed of a number of braided fractures that are related to regional faults. West of the Nonacho sediments, uranium and sometimes associated thorium occur in highly metamorphosed and partly granitized sediments that

commonly contain irregularly shaped pegmatite masses. Uranium minerals, usually unidentified, are disseminated within the gneisses. In one or two such occurrences, small fractures within these zones contain pitchblende. The uranium content in such occurrences is usually quite low.

In summary in Aphebian rocks in both the Bear and Churchill Provinces, uranium, copper, lead-zinc, cobalt, nickel and silver mineralization is found. The containing structures are commonly faults or fracture zones related to faults. In the Bear Province, giant quartz stockworks often occur in the faults. Wall-rock alteration around the deposits is limited. The deposits occur in sedimentary or volcanic rocks and in granitic rocks intrusive into these rocks. The metallic and gangue minerals fill fractures and rarely replace country rock; massive sulphide replacement deposits are not found. Within the area, the characteristics of the mineralization vary somewhat. In the Bear Province at Port Radium, pitchblende is associated with a complex of many minerals whereas, in the southern part of the province the associated mineralization is simpler and in many respects, these deposits are similar to those south of Great Slave Lake in the Churchill Province. However, in the latter area, giant quartz stockworks are less common. In the East Arm of Great Slave Lake uranium, most often, occurs in uraninite in amphibole-rich dykes in granitic rocks. In the Bear Province and south of Great Slave Lake in the Churchill Province copper occurs in bornite and chalcocite as well as in chalcopyrite whereas in the East Arm of Great Slave Lake the common copper mineral is chalcopyrite. Pyrite or pyrrhotite is not abundant in any of the copper showings. In the Bear Province, lead-zinc minerals are uncommon and usually occur as accessory minerals; but in the Churchill Province, sphalerite and galena in distinctive carbonate-quartz veins occur in a rather restricted area along the south shore of Great Slave Lake and south to the Thuban Lakes area. Silver and niccolite occur together in carbonate-quartz veins in the west part of the East Arm of Great Slave Lake and along the north shore of the lake in this area. This mineralization is similar to part of the complex mineralization found around Port Radium.

HELIKIAN

Helikian rocks in the northern part of the Bear (Structural) Province rest on granitic rocks that date about 1,800 m.y. and are cut by basic rocks from which a few potassium-argon whole rock ages of about 1,200 m.y. have been obtained.

Copper and nickel showings are found in these rocks north of Great Bear Lake and around Bathurst Inlet. In the basic lavas of the Coppermine Group, native copper occurs as flakes in tiny fractures and in amygdules. Bornite, chalcocite and minor chalcopyrite occur in amygdules and in fault or fracture zones in the lavas along with quartz-carbonate veins. A giant quartz stockwork that appears to cut sediments of the Epworth Group on the Tree River near the Arctic Coast contains disseminated chalcopyrite and pyrite. Native copper and bornite and chalcocite occur in the Bathurst Inlet area in rocks similar to those of the Coppermine River Group.

Nickel and copper sulphides have been found in the Muskox Complex on the Coppermine River. This complex of basic igneous rocks cuts the Hornby Bay sediments and may be about the same age as the Coppermine lavas. The sulphides occur, for the most part, along the contacts of the intrusive complex.

In summary, most of the mineralization in the Helikian rocks occurs in and seems related to basic lavas or intrusive rocks. The few occurrences in the sediments are found near the contacts with basic rocks.

PHANEROZOIC

Oil and gas are produced from rocks of Devonian age at Norman Wells, and deposits of lead and zinc occur in rocks of the same age around the southwest end of Great Slave Lake in the Pine Point and Windy Point areas.

Large tonnages of lead-zinc ore have been developed at Pine Point and production from this area began in 1964. These deposits consist of sphalerite and galena along with marcasite and pyrite in vuggy dolomites. Ore bodies contain both massive and disseminated sulphides that result from replacement of the sediments. Similar but less extensive mineralization occurs in Devonian rocks along the west shore of Great Slave Lake. Deposits of nonmetallic minerals such as gypsum and salt are known to occur in various areas underlain by Paleozoic rocks but they have not so far been developed.

SUMMARY

Each structural province and/or orogeny has its own characteristic types of mineral deposits. Lang (1961) and Jolliffe (1948) have defined metallogenic provinces and subprovinces based on these various characteristics; the boundaries of these provinces roughly coincide with those of the structural provinces as defined by Stockwell (1961) and used in this report.

In the Slave (Structural) Province in which Archean rocks occur, gold is widely distributed along with replacement deposits of sulphides containing lead-zinc and copper in varying proportions. Pyrite and pyrrhotite are abundant and chalcopyrite is the common copper mineral. These deposits most often are found in volcanic or sedimentary rocks commonly within metamorphic haloes around granitic rocks in structures that are thought to be related to the folding of such rocks. In parts of the area rare-element pegmatites occur in a similar environment. These relations suggest that the mineralization is closely related in time to the intrusion of and the metamorphism, granitization and folding of the volcanic and sedimentary rocks.

In contrast to the Slave Province, gold deposits are not found in the Bear and Churchill Provinces in rocks of Aphebian age. Rare element pegmatites do not occur. The sediments are shallow water facies as opposed to deeper water greywackes of the Archean. Uranium deposits are the most widely distributed and are most abundant in the Bear Province. Silver, cobalt and nickel deposits are also found in these rocks but are rare in the older rocks. The remaining significant mineral occurrences are those of copper, lead and zinc. Bornite and chalcocite are common copper minerals in these provinces. Most of the deposits including those of base metals, occur in faults or fracture zones related to faults as fracture fillings. Large scale replacement of country rock is not evident. The faults bear no obvious relation to the regional folding and are high level type structures. Some showings occur in granitic rocks that cut the sediments. The age of the

mineralization is uncertain but ages of pitchblende (maximum of 1,300 m. y.) in the Bear Province, suggest that uranium mineralization is significantly younger than the nearby granitic rocks. The nature of the containing structures, the lack of replacement, and the possible age of mineralization suggest a less intimate relationship with intrusion of granitic rocks, metamorphism or regional folding, than the relationships that are found in the Slave Province.

The mineral deposits in rocks of Helikian age are similar in many respects to those in Aphebian rocks. There is, however, less variety in that only copper and nickel occurrences have so far been discovered. Bornite and chalcocite are again the most abundant copper minerals. Most of the showings occur in basic lavas or intrusive gabbros and these rocks probably are the source of the mineralization.

CHAPTER V

DESCRIPTION OF PROPERTIES

DEPOSITS IN ARCHEAN ROCKS IN SLAVE PROVINCE

Giant Yellowknife Mines Limited (1)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-8.

Introduction

Giant Yellowknife Mines, Limited, owns the Giant Mine, the largest mine in the Northwest Territories. The mine is on the west side of the north end of Yellowknife Bay about 2 miles north of Yellowknife. The company owns 26 claims that include Giant Nos. 1-20, Giant No. 21 fraction, Giant X fraction, and Giant X Nos. 1, 3 and 5 claims. Also a large interest is held in the 6 Lolar claims that adjoin the property on the east. The property is bordered on the north by the property of Akaitcho Yellowknife Gold Mines Limited and the company holds the PA group of 8 claims that adjoins the claims of Akaitcho Mines on the north.

For an account of the history of the property and a description of the camp and plant, the reader is referred to Lord (1951) or Pitcher (1953). Gold was first produced at the mine in 1948.

Development

The following table summarizes the underground development up to June of 1960. It is modified from a table given in the company's annual report of that year.

Table VI

Underground Development, Giant Yellowknife Mines Ltd.

Shaft sinking	3,696 feet
Ore and waste passes	7,409 feet
Raising-development	4,223 feet
Fill	2,157 feet
Drifting and crosscutting	79,181 feet
Stope preparation	
Drifting, crosscutting	15,701 feet
Raising	18,134 feet
Box holes	22,286 feet
Arsenic disposal chambers	
Drifting and crosscutting	1,478 feet
Raising	897 feet
Box holes	759 feet
Stoping	182,625 tons
Underground diamond drilling	756,855 feet

The mine has been developed from three vertical shafts known as A, B and C shafts. A shaft was sunk to 793 feet and levels developed on the 200, 325, and 750 horizons. The East zone and N. Ext. East zone were developed and mined from this shaft. The A shaft now serves as a service and ventilation opening. The B shaft is 779 feet deep and is a three-compartment shaft with one skip compartment. Levels are located at the 100, 250, 425, 575 and 750 horizons. The North ASD, Muir and North Giant zones have been developed from this shaft. The C shaft is located between the A and B shafts and is a five-compartment shaft. It is now the main production shaft through which all ore and waste are hoisted. It is slightly over 2,000 feet deep. Levels are cut on the 250, 425, 575, 750, 950, 1,100, 1,250, 1,400, 1,650,1,800 and 2,000-foot horizons. The ASD and GB zones are developed from this shaft. All three shafts are connected by the 750-foot level.

Open, cut-and-fill, and shrinkage stopes are used for mining the ore. Most stopes are cut-and-fill types. This method best suits the nature of the orebodies as they are of irregular shape and may be either steep or flat dipping. Waste and gravel fill have been used in the past in the cut-and-fill stopes but now sand fill delivered from the mill is used in most stopes. A great deal of definition diamond drilling is necessary to determine the shape, size and grade of orebodies so that they can be properly mined. This drilling is usually done on cross-sections at 50-foot intervals although in places a 25-foot interval is necessary.

The ore-bearing structures have been explored by underground workings along a length of over 10,000 feet. Much surface drilling has also been done. More recently holes have been drilled from surface near the north end of the property near the boundary with the adjoining Akaitcho property and on the PA group of claims that are adjacent to the north end of the Akaitcho property.

Milling

Gold occurs in a complex association with arsenopyrite and other metallic sulphides and antimony sulpho-salts. Much of the gold is believed to occur as submicroscopic inclusions in arsenopyrite or possibly in solid solution in arsenopyrite. This association makes for a most refractory ore that is very difficult to mill efficiently. Direct cyanidation has never been effective and at present no attempt is made to recover any gold by amalgamation of jig concentrates. The basic steps in the milling process now consist of crushing and grinding, flotation of sulphides and other metallic minerals, roasting of flotation concentrate and cyanidation of the calcine. The critical part of the process is the roasting circuit. Much research has been done to develop effective roasting methods and equipment.

An Edwards type hearth roaster was installed in 1949. In 1952 a prototype two-stage Fluosolids roaster was put into service. In 1957 a Kiln roaster was installed for high temperature treatment and recyanidation of calcine residues. However, the ore at depth in the mine was much more refractory than near surface ores and in 1958 recovery was only 68 per cent. In that year a new two-stage Fluosolids roaster of advanced design was installed. Recovery increased to about 80 per cent and as improvements are made higher recoveries are expected. For a detailed description of the Giant mill and roaster, the reader is referred to papers by Grogan (1953), and to a recent paper in which the new roaster is described by Tait (1961).

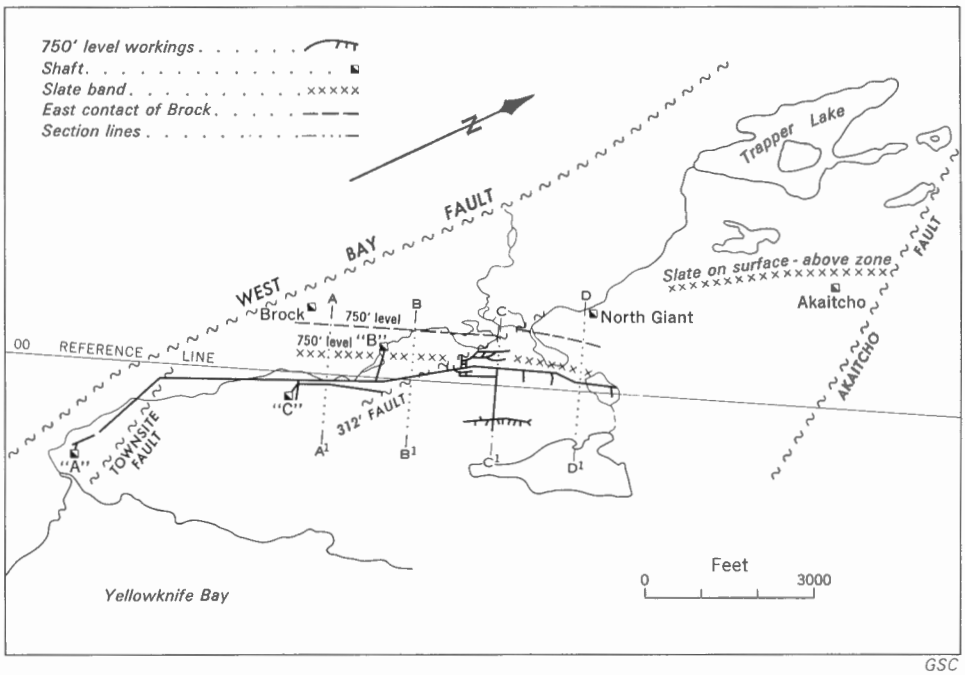

Figure 1. Diagrammatic map of the productive part, Giant property. (after Brown et al., 1959)

Geology

The geology of the area has been described by Henderson and Brown (1948, 1949, 1952a, b). The geology of the property has been described by Lord (1951), Dadson and Bateman (1948) and Bateman (1952). The geology, shear zones and ore controls have been described in the above papers and discussed in detail by Henderson and Brown (1950b, 1952b), Brown and Dadson (1953), Boyle (1954a, b, 1961) and most recently by Brown, Dadson, and Wrigglesworth (1959) (see Fig. 1). A brief summary of these works follows.

The property is underlain mostly by basic volcanic flows and related basic intrusions. Pillow lavas are abundant and amygdaloidal and variolitic flows occur at several horizons. Beds of tuffs and fragmental material and slate bands locally occur between flows. One band of more acidic rocks occurs on the property where it is called the Brock Member. Henderson and Brown refer to these rocks as the Townsite flows. The rocks consist of dacites, porphyritic dacites, breccias and agglomerates and possibly some intrusive dacite porphyries. These rocks are cut by granodiorites that outcrop just west of the property and by late diabase dykes that are later than the shear zones and ore but which are displaced by late faults. All the rocks older than the granodiorites are slightly to moderately metamorphosed and schistosity is developed in some areas.

The lavas on the property trend at about 30 degrees and dip steeply to the west. Top determinations indicate that the flows face to the southeast.

These rocks are cut by faults that are divided into two broad groups: pre-diabase faults, locally referred to as shear zones, and post-diabase or late faults. The late faults commonly strike between north and northwest and dip steeply to the west. Movement seems mainly horizontal and 'left hand'. These faults displace the earlier shear zones and are post ore mineralization. They are marked by narrow zones of rock breccia or gouge in contrast to the schist zones associated with the pre-diabase faults. The most important late fault on the property is the well known West Bay Fault. Movement on this fault has been calculated by Campbell (1947) who estimates that the west side has moved 16,140 feet south and 1,570 feet down relative to the east side.

The most important pre-diabase faults or shear zones trend between north and northeast and transect the flows at small angles. Some small zones parallel the flow contacts. On the Giant property the zones dip both to the east and west. Movement along these zones seems small. The shear zones are marked by development of chlorite schist, and chlorite-sericite and sericite schists in varying combinations. Carbonate is present in the schists. The schist zones vary in width from a few inches to several hundred feet.

The ore deposits on the Giant property are localized in Giant shear zone system. The shear zones consist of chlorite sericite and sericite schists. Carbonate is a constituent of all the schists. Around orebodies, the succession, outward from the orebodies, is typically: siliceous ore, sericite schist, chlorite schist, and massive flow rocks. The changes outward from ore are gradational. Quartz and carbonate veins, lenses and stringers are common near the orebodies. Nonproductive zones may have all these features except ore grade material but commonly sericite schist is absent.

Ore material typically contains 30 to 90 per cent quartz and 5 to 10 per cent metallic minerals. Ore consists of bands of quartz, carbonate and sericite schist. In the cores of ore shoots, the ore is highly siliceous with only small amounts of schist. Orebodies are generally tubular in shape but in detail are very irregular because of many apophyses extending along schist planes. In detail some orebodies seem to consist of a series of quartz lenses sometimes en echelon separated by narrow bands of mineralized and sometimes silicified sericite schists.

Mineralization consists of a complex assemblage of metallic minerals. Pyrite in fine grains is the most abundant sulphide. Next in abundance is arsenopyrite which occurs in fine disseminations and acicular crystals in the quartz and schist. Other sulphides include light to medium brown sphalerite found in masses of crystals and veinlets in quartz and minor amounts of chalcopyrite. "Grey minerals", a term which includes stibnite, bournonite, jamesonite, chalcostibite, boulangerite, berthierite and freibergite occur as massive aggregates in the quartz and schist and in radiating needle-like crystals in quartz and in vugs. Stibnite is probably the most abundant mineral in this group. The distribution of these minerals varies throughout the mine. They are much less abundant in the East zones than in the zones farther north in the B and C shaft areas. In a general way, they seem more abundant at depth, i.e. below the 425-foot level, than in the near-surface orebodies. They are less abundant at the north end of the Giant property and are rare in the mineralized sections found in the PA group of claims. In a general way, "grey minerals" occur in greatest concentrations

in the most productive zones and high grade ore is commonly associated with high concentrations of these minerals. Within the productive zones from ore shoot to ore shoot there is considerable variation in total amount and kinds of these minerals. Most of the gold is very finely divided and seems to occur to a large extent in arsenopyrite.

Descriptions of the shear system and structural controls of the ore-bodies have been subject to different interpretations by various geologists who have studied the Giant shear system. This system has been traced from the West Bay Fault at the south end of the property north and north-northeast for more than 2 miles beneath the drift-filled valley of Baker Creek to the north end of the property. Shear zones on the property of Akaitcho Yellowknife Gold Mines are thought to be the northern extension of the Giant shear system which means that the system can be traced to the Akaitcho Fault, a late fault. On the northeast side of the Akaitcho Fault, a shear zone system extends from the fault northeast to and past Vic Lake probably represents the faulted extension of the Giant shear system. On the Giant property the shear system has been explored and developed along a length of over 12,000 feet.

The flows on the property have an average strike of about 30 degrees and they dip steeply to the west and face southeast. The shear zone also has an average trend of 30 degrees but at the south end of the property in the A shaft area, they strike slightly east of north. In the C shaft area the zone strikes at about 30 degrees and north of B shaft the strike is about 20 degrees. In detail the strike of the zone generally transects that of the flows at a small angle. In plan the shear system is not straight but curves slightly and in the C and B shaft areas the axis of the curve strikes about northwest. In cross-section as interpreted by company geologists (Brown et al., 1959) the zone has the form of a composite anticline and syncline followed by a second anticline the east limb of which goes down to unknown depths possibly with further fold-like elements. In Table VII modified somewhat from Brown et al., the various zones are listed and their relations to the elements of the fold-like structures are also included.

Table VII

Relations of Ore Zones to Structural Elements

		West Antiform		East Antiform	
Area	Western Flat	West Limb	East Limb	West Limb	East Limb
A shaft		West zone	Creek zone	East zone	E. East zone
C shaft	Big Giant zone		ASD	GB "	East GB "
	Sneddon "				
B shaft	Ole "	High grade zone	North ASD zone	GB "	East GB "
	Low angle "				
North	North "		Muir zone	GB ? "	East GB? "

It will be noted from an examination of the cross-sections in Figures 2, 3 that over a distance of 4,000 feet between sections 1500 S and 2500 N the crest of the western anticline plunges north at 15 to 25 degrees whereas the trough of the central syncline and eastern anticline plunges south at about

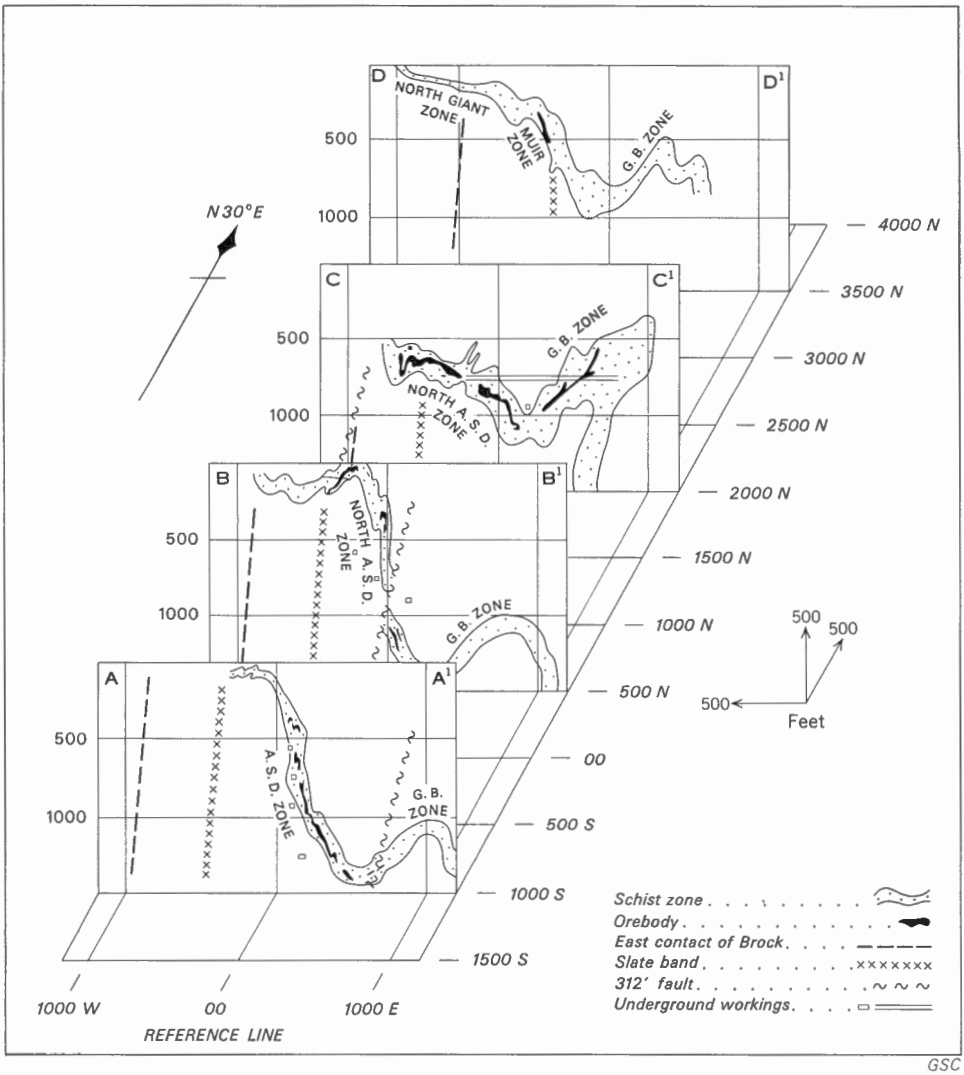

Figure 3. Cross-sections of Giant ore zone. (after Brown et al., 1959)

10 degrees over this same distance. The amplitude of these fold-form structures decreases from 1,600 feet at C shaft to 600 feet, 4,000 feet to the north. The North Giant zone is believed to be the southerly extension of the Akaitcho zone. The average strike of schistosity within these zones is about 30 degrees. Local and sometimes sharp variations in strike occur near the axis of the fold-like structures. The schistosity has a westerly dip of 70 to 80 degrees in the west-dipping limbs of the fold-forms but near the axis of these structures and on the east-dipping limbs, the dip is steeper to the west, sometimes vertical and occasionally very steep to the east. Drag folds occur in the zone commonly in the crests or troughs of fold-like structures. Within these zones orebodies occur in silicified sections. The ore is commonly

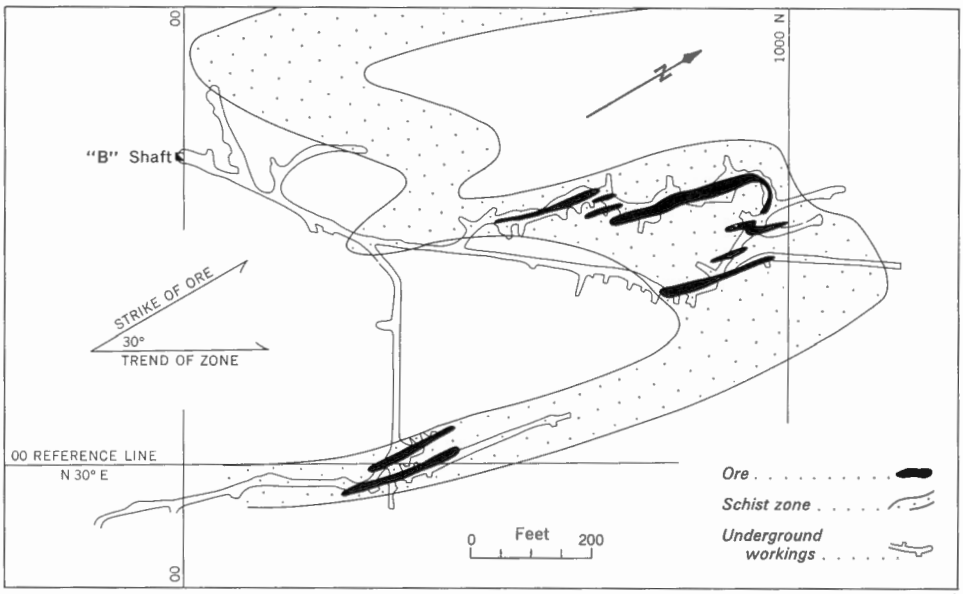

Figure 4. Plan illustrating strike of ore shoots and zones, Giant system. (after Brown et al., 1959)

ribboned with alternating bands of quartz and sulphides and sericite-carbonate schist. Quartz and sulphides also may occur as interstitial fillings in what seems to be a breccia of contorted schist fragments. Greatest concentrations of ore are found most often at the crest or west of the crest of an anticline-like structure or in the trough or west of the trough of a syncline-like schist zone. In some sections, the ore shoots occur in the trough or crest of the fold-like schist zones and extend for some distance up or down the limbs. Ore shoots, therefore, commonly cut across schist planes both down dip and along the strike.

Brown et al. (1959) suggest that many of these features can best be explained by a theory involving simple folding of a horizon or group of horizons into anticlinal and synclinal folds (Figs. 3, 4). The schistosity would be a sort of axial plane cleavage. They also point out several features that do not fit this hypothesis. Many ore shoots cut across the strike of the containing schist. The ore shoots often strike north in contrast to the trend of schistosity and flows of 30 degrees. Certain structures, especially the North Giant zone with its flat easterly dip of 15 degrees in flows that dip at a high angle, cannot be explained by a folding hypothesis. Moreover the folding hypothesis does not fit the regional geology as mapped. The volcanic rocks have been mapped as part of a homoclinal succession of flows. The Giant shear system cuts across these flows both along strike and down dip. This relationship is also shown by the position of the shear system relative to two markers in the succession, namely, the contact between the Brock or Townsite flows and the more basic volcanic rocks, and the Akaitcho slate band (see Fig. 1). Because of these discrepancies to a folding hypothesis, the company geologists have proposed an alternative explanation namely that the shear

zones are caused by shearing due to compressive stresses oriented roughly at right angles to the strike of the flows and oblique to the dip of the flows. The various orientations of the shear zone and the schistosity are correlated with elements of the strain ellipsoid diagram. Ore shoots are thought to be localized in dilatant or low pressure zones in the structure.

Other workers in the area namely Henderson and Brown (1952a) and Boyle (1954a, b), have proposed somewhat different interpretations. The GB zone of Brown et al. was named the Bow Lake system by Henderson, Brown, and Boyle (Fig. 2). They considered the Bow Lake shear to be a separate system although a possible junction between the Giant and Bow Lake schist zones at the north end of the property was suggested. Development work at depth in recent years has shown that the Bow Lake or GB zone joins with the Giant shear system at depth. Otherwise there is close agreement among all workers as to location, orientation and constitution of the shear zones or systems. They suggest from a study of the stratigraphy in the succession of lavas that the Giant shear system and its faulted extension to the south known as the Campbell system, are part of or are related to an early fault. The displacement along the proposed fault is thought to be significant but unknown because of lack of properly oriented marker horizons and complexities caused by the numerous late faults that cut both the lavas and shear zones. The shear zone is considered to consist of a number of branching shears separated by masses of unsheared rock. The fold-like configuration mapped by Brown et al. is thought to be caused by the junction of shear zones of various orientations. The chief ore controls then are considered to be the formation of low pressure or dilatant zones in or near the junctions of these separate shear zones into which ore material migrates.

Con and Rycon Mines (2)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-8.

The Con and Rycon mines are on the west side of Yellowknife Bay about two miles south of Yellowknife. The Con Mine is on the Con group of claims owned by Cominco, Limited. The Rycon Mine, about 2,000 feet east of the Con Mine, is on the P and G group of claims owned by Rycon Mines, Limited. This latter company is controlled by Cominco, Limited. Ryan Gold Mines Limited holds a 40 per cent interest in Rycon Mines, Limited. In 1954 the Negus claims were added to the Con Mine holdings so that now the company holds about 40 claims in the area. In 1958 Cominco made an agreement with Conwest Exploration Limited to develop the latter's N'Kana group of claims that extend from the north boundary of the Con property to the town of Yellowknife. For a complete account of the history of the property the reader is referred to Lord (1951).

The Con mill in 1960 treated 190,626 tons of ore compared with 191,299 tons in 1959. The former amount was made up of 114,541 tons averaging 0.51 ounces of gold per ton from the Con Mine and 76,085 tons averaging 0.72 ounces of gold per ton from the Rycon Mine. The mill handles about 500 tons of ore per day.

For a detailed description of the camp, plant, mill and general operations, the reader is referred to a recent paper by the engineering staff (Anonymous, 1956). A recent detailed description of the milling operation is given by Lauer (1957).

Development

The main shaft at the Con Mine is the C-1 vertical shaft. It is a 3-compartment shaft that goes down to the 2,300-foot level. Sixteen levels to develop the Con shear system and the Rycon zone are serviced by this shaft. All ore is hoisted up the C-1 shaft. The Negus and Rycon shafts are maintained as escapeways and ventilation shafts. The B-3 winze was sunk in 1950 to explore and develop the Campbell shear zone. It was collared on the 2,300-foot level, 3,500 feet east of the main shaft and sunk vertically to a depth of 525 feet. Levels were developed on the 2,450, 2,600, and 2,750-foot horizons. The winze has the same dimensions as the main shaft so that similar equipment can be used. In 1955 the winze was deepened to open up a level on the 2,900-foot horizon and in 1958 again deepened to establish a level on the 3,150-foot horizon.

Stoping methods include open, shrinkage and cut-and-fill stopes. The open and shrinkage stopes are used on the upper levels in the Con shear system. All stopes in the Campbell zone are cut-and-fill. Sand fill consisting of sized tailings from the mill is pumped down into the mine through enlarged drillholes for back-fill. The bulk of the back-fill is provided in this way.

The ore in the Con, Rycon, and Negus shear zones is essentially mined out and these zones have been intensely explored. In 1958, a few small stopes in the Con shear zone were being mined and some broken ore was still being drawn from some shrinkage stopes. The bulk of production is, therefore, from the Campbell shear zone below the 2,300-foot level.

Recent underground exploration work has been concentrated on the Campbell zone. This work consists of drilling the zone with a series of holes usually spaced at 100-foot centres from a series of drifts on the above mentioned levels. This work has been done on the Con, Negus and Rycon ground. The latest phase of the work began in 1958 on the part of the shear system on the N'Kana ground.

Geology

The geology of the area has been described by Henderson and Brown (1948, 1952). The geology of the property has been described by Lord (1951), Campbell (1949), and by company staff (Anonymous, 1954). The shear zones and ore controls are described in the above publications and discussed in detail by Henderson and Brown (1952), Boyle (1954a, b, 1961). A brief summary of these works follows.

The claims are underlain mostly by basic volcanic lavas and related basic intrusives. Pillow lavas are abundant and amygdules and variolites are common in some flows. Beds of tuff and fragmental material locally occur between flows. These rocks are moderately metamorphosed and are cut by

two small masses of granodiorite. Diabase dykes are the youngest rocks in the area. The lavas trend northeasterly and generally dip steeply to the southeast. Top determinations indicate that the succession faces southeast.

These rocks are cut by two broad groups of faults: pre-diabase faults locally referred to as shear zones and post-diabase or late faults. Although some small shear zones strike parallel to flow contacts, the most important trend north to northeast and transect the flows. In general they dip west with moderate to steep dips. Movement along these faults seems small. The shear zones are marked by development of chlorite schist and chlorite-sericite schist both of which contain carbonate. The schist zones vary in width from a few inches to several hundred feet. The late faults commonly strike north to northwest and dip steeply to the west. Movement is mainly horizontal and 'left hand'. These faults displace the earlier shear zones and are post-ore mineralization. The faults are marked by narrow zones of rock breccia or gouge in contrast to the schist zones associated with the pre-diabase faults.

The ore deposits on the Con property are localized in pre-diabase faults or shear systems (Fig. 5). Productive zones occur in the Con, Campbell and Negus-Rycon shear zones. The Con system, until recently the most productive along much of its length, consists of a single shear zone that strikes at 20 degrees and dips about 60 degrees to the west. The shear averages about 50 feet in width. Where most of the ore occurs, however, the zone is made up of several component shear zones that range in strike from 15 to 30 degrees and dip from vertical to 30 degrees west. The ore zone, therefore, coincides with a slight strike deflection, a general decrease in dip, and the splitting of the zone into several shears separated by horses of unsheared rock. It is thought that these conditions localized dilatant or low pressure areas into which ore material migrated to form orebodies. In detail ore shoots are localized in this way by local decrease in dips, strike changes, and at the junction of shear zones.

The Campbell shear zone from which most of the ore is now being mined, is about 3,500 feet east of the Con shear at depths of 1,000 to 2,000 feet. It is thought to be the faulted extension of the Giant shear and actually outcrops beneath Yellowknife Bay. It varies in width from several hundred to nearly 1,000 feet. The shear has been traced by drilling and underground work for about 2 1/2 miles from the West Bay Fault to beyond Kam Point. The zone strikes at about 25 to 30 degrees and the hanging-wall dips to the west at 40 to 50 degrees. The schistosity in the zone dips 60 to 70 degrees west. The zone is made up of interlacing shear zones separated by horses of unsheared rock. The shear zones consist mainly of chlorite schist and some chlorite-sericite schist both containing carbonate.

The third zone consists of the Negus-Rycon shear system which extends in a southeasterly direction through the Rycon and Negus properties and appears to link the Con and Campbell shear zones. The zone strikes at 335 to 350 degrees and dips at 45 to 65 degrees to the west. The width of the zone varies from a few feet to 30 feet. The shear zones consist of chlorite and sericite schist.

All orebodies occur in the shear zones. They consist chiefly of shoots containing many large, irregular-shaped lenses of fine-grained, white to grey quartz and sericite carbonate schist, partly replaced by veins and lenses of quartz. These masses tend to be separated from the chlorite schist by a zone of variable width of sericite-carbonate schist. Fine-grained

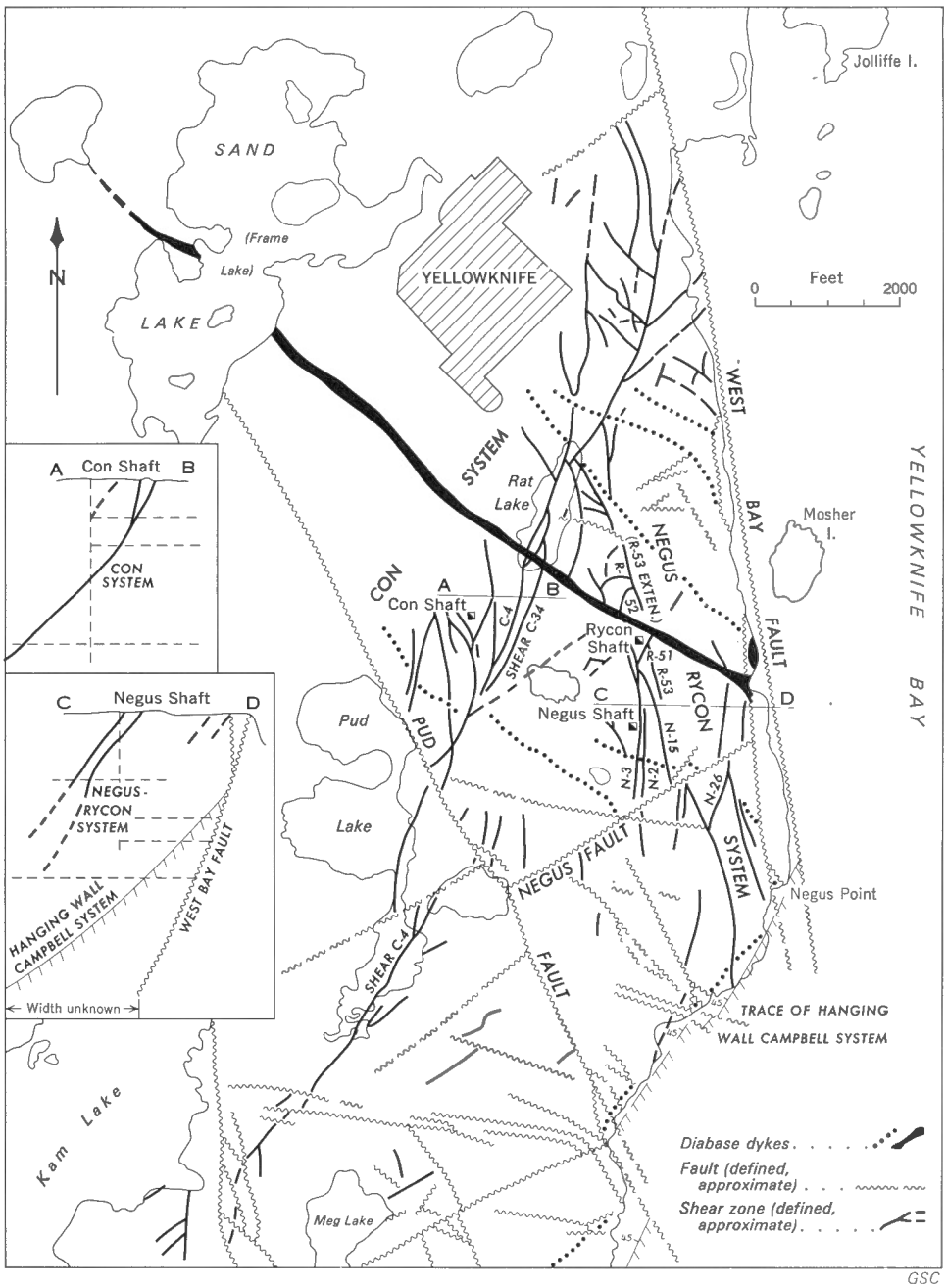

Figure 5. Surface plan and sections of the Con, Campbell, and Negus-Rycon systems. (modified from Boyle, 1961)

pyrite and arsenopyrite occur in the quartz and schist along with minor amounts of sphalerite, galena, stibnite, jamesonite and a number of other lead antimony sulpho-salts. Gold is finely divided and commonly occurs in sulphides. These ore shoots rarely extend across the shear zone completely but occur as a series of en echelon lenses that may dip more steeply than the ore shoot as a whole. Such orebodies range up to 40 feet in width and 600 feet in length. A second type of ore occurs locally that consists of veins of white to black, locally banded quartz mineralized with fine to medium grained pyrite, arsenopyrite and some sphalerite, galena and lead-antimony sulpho-salts. Free gold is commonly visible. The veins are generally narrow and irregular in strike and dip. In the Campbell zone a third type of ore is found that consists of lenses and veins of coarse-grained, locally pinkish quartz with some carbonate, sparse sulphides and visible gold. Sericite is generally absent in the enclosing wall-rocks of these veins.

Negus Mines Limited (3)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-8.

The Negus Mine is located on the Negus Group of 6 claims located 2 miles south of Yellowknife. Gold was produced at the mine from 1939 to 1952 except for the year 1944-45 when the mine was closed due to labour shortages. The mine closed in September, 1952 because of depletion of the ore. In 1953 the mineral rights to the Negus claims, the surface rights on one claim, the headframe, hoist room and some other buildings were sold to Cominco, Limited. The mill, roaster, some buildings and much equipment were retained. Most of these holdings and equipment including surface rights on the claims were sold to the Rayrock Mines Limited in 1957.

In the years of its operation the company produced about $9,489,658 worth of gold. To the end of 1951, a total of 437,803 tons of ore had been mined. In 1951, the last full year of operation, $755,325 worth of gold was produced from 64,511 tons of ore. The average gold content of the ore was $11.15 per ton and the daily milling rate was 200 tons.

The ore was drawn from the Negus shear zone and the Campbell shear zone. The Negus zone was depleted of ore in the late 1940s; the zone was worked down to the 1775 horizon from 13 levels. The Campbell zone was developed from the main shaft on the 1,425- and 1,775-foot levels and by a level from a winze sunk from the 1,775-foot level to the 2,150-foot level.

The history, camp, mill and geology of the property has been described by Lord (1951). The geology of the claims has been described by Henderson and Brown (1948). The shear zones and ore zones are described by Henderson and Brown (1952) and Boyle (1954a, b; 1961).

Akaitcho Yellowknife Gold Mines, Limited (4)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-9.

Akaitcho Yellowknife Gold Mines, Limited owns the AES group of 24 claims. The property is 4 miles north of Yellowknife and is bounded on the south by the claims of Giant Yellowknife Mines, Limited. The history, development, ore reserves and geology of the property have been described in detail by Lord (1951). The property has been inactive since 1949 except for a small amount of drilling done in 1959. These holes were drilled essentially for structural information in an effort to correlate the Akaitcho shear zone with those on the adjoining property of Giant Yellowknife Mines, Limited. It was concluded on the basis of this drilling and surface mapping that the Akaitcho and North Giant zone are part of the same structure.

Yellorex Mines, Limited (5)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-8.

Yellorex Mines, Limited own a group of claims on the west shore of Yellowknife Bay about 2 miles south of Yellowknife that include the PRW No. 1-5, PRWX No. 1 and 3-6, Cag 1, 8 and 9, DAW 10 fraction, and CAGEX No. 1 and 2 fractions. In the years between 1945 and 1950, over 50 holes were drilled on the property. Many of these holes were drilled through the ice of Yellowknife Bay. In 1949-50, 10 holes with a total footage of 15,000 feet were drilled. These long holes were drilled to test the southern extension of the Campbell shear zone which was traced by drilling along the full length of the property. It does not outcrop on shore but is completely covered by Yellowknife Bay. Gold values were encountered in a number of drillholes. High values of gold ranging between 0.63 and 1.39 ounces per ton were cut over narrow widths in three of the drillholes. The property has been inactive since 1950.

The geology of the claims is shown on the detailed maps of Henderson and Brown (1948, 1952) and is only summarized here. The claims are underlain by basic lavas of the Yellowknife Group that strike north of east and dip steeply to the south. These rocks are cut by the Campbell shear zone, which strikes east of north and dips west. It consists of chlorite-carbonate schist and locally sericite-carbonate schist. Locally quartz and carbonate stringer zones are found in the sericite schist. The quartz is mineralized with pyrite and some arsenopyrite and chalcopyrite. Gold values occur in the quartz-rich portions of the zone.

Kamcon Mining Limited (6)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-8.

Kamcon Mining, Limited is controlled by Cominco Limited, but Kamlac Gold Mining, Limited also holds a substantial interest in the company. The company holds the Kam group of claims which are about 5 miles south of Yellowknife on the west side of Yellowknife Bay. Some surface work and drilling has been done over the years. In 1950 about 8,000 feet of diamond drilling were completed near Kam Point under the direction of Consolidated Mining and Smelting Company of Canada, Limited (now Cominco Ltd.). The drilling was done to test the southern extension of the Campbell shear system.

The geology of the area, described in detail by Henderson and Brown (1948, 1952), is only briefly outlined here. The claims are underlain by northeast-striking basic flows that are cut by gabbro. The rocks dip southeast and face in the same direction. They are cut by a number of northwest-striking, late faults which displace the east of north-trending, west-dipping, Campbell shear system to the east. The Campbell shear system near Kam Point, therefore, occurs off the west shore of Yellowknife Bay. Holes were drilled to the east from the shore of the bay just north of Kam Point. The shear system was located and a number of significant gold-bearing intersections were found within the shear.

Earlier work was concentrated on shear zones in the volcanic rocks on the mainland. Gold values across narrow widths were found in about 20 of these zones. Over 10,000 feet of drilling was completed to test these zones. No orebodies were outlined by this work.

Captain Mines, Limited (7)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-9.

Captain Mines, Limited was, until 1957, known as Captain Yellowknife Gold Mines, Limited. The company owns the Protection group of 3 claims. The property is located on the east side of Vee Lake about 6 miles north of Yellowknife and about 3 1/2 miles north and a little east of the B shaft on the property of Giant Yellowknife Mines. In the late 1940s, some surface work was done and at least 8 holes were drilled on the claims and in 1950 a shear zone, mapped by Henderson and Brown (1950), was tested by 11 drill-holes. At least one chloritic shear zone was intersected but only short sections of the core were mineralized with pyrite and arsenopyrite and these sections contained very low amounts of gold. Most of the drilling was done on Protection Nos. 2 and 3 claims. No work has been done on the claims since 1950.

The geology of the property is shown on maps by Henderson and Brown (1950, 1952). The claims are underlain mainly by basic lavas, some of which are pillow lavas, and intrusions of fine-grained gabbro. The formations strike northeast, dip steeply to the southeast and face to the east. These rocks are cut by east of north-striking chlorite-carbonate shear

zones. These zones appear to dip at low angles, 20-45 degrees, both to the east and west. Narrow widths of the shear consist of sericite schist, some of which is mineralized with pyrite and arsenopyrite and contains quartz stringers.

Lynx Yellowknife Gold Mines, Limited (8)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-9.

Lynx Yellowknife Gold Mines, Limited own the Lynx No. 1, Fox No. 1 and Gold Nos. 1-6 claims. This group adjoins the property of Akaitcho Yellowknife Gold Mines, Limited on the north and is about 6 miles north of Yellowknife. This company formerly held about 8 additional claims named the Fox and Lynx but in 1957, they lapsed and were staked and acquired by another company. Between 1945 and 1947 considerable work including geological mapping and diamond drilling was concentrated on a carbonate shear zone. In 1950 about 10,000 feet of drilling was completed on the property. To the author's knowledge a total of about 40,000 feet of drilling has been done by the company, at least half of which was done on the ground now held by the company. No work has been done on the property since 1950.

The geology of the property is shown on detailed maps by Henderson and Brown (1950, 1952). The claims are underlain by basic and intermediate lavas of the Yellowknife Group that strike northeast, dip steeply, and probably face southeast. The rocks are cut by shear zones that strike northeast and east of north and which, in part at least, dip gently to the southeast. The zones consist of chlorite-carbonate schist. Parts of the zones are rich in buff coloured carbonate and locally quartz veins or stringers are present. The veins are mineralized with pyrite and arsenopyrite. No orebodies have been outlined by the drilling but low values of gold have been cut in a number of holes and gold-bearing zones have been traced over considerable lengths.

Mate Yellowknife Gold Mines, Limited (9)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-9.

Mate Yellowknife Gold Mines, Limited owns the Kim Group of 4 claims on the west side of Yellowknife Bay. The claims adjoin and are east of the north end of the property of Giant Yellowknife Mines Limited.

The geology of the claims is discussed by Henderson and Brown (1952, 1949) and Boyle (1961). Briefly the claims are underlain by basic and intermediate lavas of the Yellowknife Group. These rocks dip steeply and strike about northeast and are cut by chloritic shear zones and a number of late faults.

In the late 1940s, 15 holes were drilled to test a shear zone on the property, but no ore was outlined. In 1950, 4 deep holes were drilled in an attempt to intersect the down dip extension of the Muir zone which outcrops on the property of Giant Yellowknife Mines Limited. Total footage of this program was 7,750 feet. Two of these holes were drilled at a common

corner of the properties of Giant Yellowknife Mines, and Mate Yellowknife, and Atlas Yellowknife Gold Mines, and the three companies shared the costs. The holes flattened at depth and did not reach the required horizon, however, shear zones were intersected in at least two of these deep holes. In one vertical hole on the Mate property a zone of chlorite sericite schist was cut over a core length of 63 feet. About one third of this length was mineralized with pyrite and quartz stringers and one ten-foot section contained arsenopyrite and stibnite. Gold values in this mineralized section were very low. No work has been done on the property since 1950.

Consolidated Discovery Yellowknife Mines, Limited (10)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-P-4; Lord, 1951; Tremblay, 1952; Wiwchar, 1957.

Consolidated Discovery Yellowknife Mines, Limited has a producing gold mine on the west end of Giauque Lake 52 miles north-northeast of Yellowknife. The property comprises the Avis Nos. 1 and 2, Lux Nos. 1-4 claims and the Discovery and Quinn fractional claims. For an account of the history of the property the reader is referred to Lord (1951) and Tremblay (1952). The mine has been producing continuously since January 1950.

Camp and Plant

The mining and milling plant has a daily capacity of 150 tons. Most of the older plant buildings are of frame construction and are sheathed with asbestoside and, where necessary, fully insulated. Newer plant buildings are steel constructed, Butler-type buildings.

Power is obtained from the Snare hydroelectric plant by way of Yellowknife and is delivered to the mine from Yellowknife along a 42-mile single pole transmission line that transmits power at 34,500 volts. The power line was built in 1953 at a cost of $7,700 per mile. Standby diesel-electric units are maintained at the mine for emergency use.

All buildings are steam heated from a central heating plant that uses wood for fuel. Secondary electric power (at about 45 cents per kilowatt hour) is used for part of the heating requirements when it is available. Wood for fuel is cut locally and hauled to the mine during the winter months. Heat is required in most buildings for about 10 months of the year. Heating costs in 1958 amounted to 46 cents per ounce of gold produced or roughly 80 cents per ton of ore milled.

The average number of employees at the mine is 115. About twenty families reside in the camp so that the total population is about 175. A number of houses and apartments have been constructed for the married employees and a small school is provided by the company for their children and operated by the Federal Government. Recreational facilities have been created through the co-operation of the company and an Employees' Recreation Club, the company supplying material and the club the labour. Such facilities include a recreation hall with auditorium for moving pictures, reading room, game rooms etc., an enclosed 2-sheet curling rink, an outdoor hockey rink

cushion, and a baseball diamond and soccer field. Also for summer use, a 30-40-foot swimming pool using heated water from the plant has been constructed.

Transportation

The company has used various methods of transportation for freight from Yellowknife to the property. Until recently, heavy freight, having been shipped to Yellowknife by water and warehoused there, was shipped to the property by tractor train over a winter road. Tractor trains operated from January to April. Express, personnel, emergency freight, mail and fresh food was flown to the property in ski- or float-equipped small aircraft. In 1956 work began on an airstrip at the mine. The strip is 3,500 feet long and 150 feet wide and is made of and surfaced with tailings from the mill. About 250,000 tons of tailings have been placed on the strip. During the winter season the strip is suitable for Bristol aircraft with a payload of about 6 tons. It is planned to surface the strip with gravel so that it can be used throughout the year. The strip up to the end of 1959 had cost about $37,000. Since the strip was completed, all freight has been flown to the mine. The cost per ton is higher by air but this difference is offset by the reduction in capital tied up in supplies, elimination of warehouse space and costs and elimination of many of the high cost trips by small aircraft. Freight charges by Bristol aircraft to Discovery from Yellowknife are about $40.00 per ton. This charge includes expediting, loading and local trucking. Costs of freight etc. by Otter aircraft is about $120.00 per ton. In 1958, a year when all freight was flown to the property, the costs amounted to 72 cents per ounce of gold produced. During that year 1,260 tons were flown to the property. During the past few years freight has been trucked during the winter months to the property by tractor trailer trucks directly from Edmonton.

Development

The mine is serviced with a three-compartment shaft with a hoist capable of working to depths of about 4,000 feet. In 1959 the ore zones were opened up to the 3,350-foot horizon with levels at about 150-foot intervals. Mining of ore was extended down to the 2,750-foot level. Most of the ore has been mined from the No. 1 or North zone and the No. 4 zone. Other small zones have been explored and if economical, mined on various levels in the mine. The West zone, about 350 feet southwest of the North zone in the volcanic rocks, has been explored on 4 or 5 of the upper levels but no ore has been mined from it. On the 950-foot level a drift was driven southwest to the southern boundary of the property. Drillholes at 100-foot intervals were drilled both to the east and west but no ore sections were encountered. On the upper levels shrinkage stoping was the mining method used but on deeper levels it was necessary to convert to cut-and fill methods to cut down on dilution due to slabby walls.

Geology

The geology of the property and deposits, described by Lord (1951), Tremblay (1952) and most recently by Wiwchar (1957), is summarized here. The property is underlain by volcanic and sedimentary rocks of the Yellowknife

Group. Volcanic rocks occur in a belt that extends southwesterly from the Lux No. 3 claim to the southern boundary. The rock is mainly garnetiferous hornblende-feldspar gneisses that locally, according to Tremblay, shows pillow and fragmental structures. A narrow band of similar rock occurs just to the northeast of the main band and is separated from it by highly contorted metasediments. West of the hornblende gneiss, metamorphosed subgreywacke with many narrow interbeds of hornblende-rich rocks are found. The latter rock consists of hornblende, biotite, about 20 per cent plagioclase and quartz and garnet. It is thought to represent a metamorphosed limy sediment. A series of greywacke shales and argillites occur east of the volcanic band. Near their contact with the hornblende gneiss, the sediments contain narrow bands of hornblende-rich rock suggesting that the band of hornblende-plagioclase gneiss may be in part sedimentary in origin. The sediments have been metamorphosed to quartz, mica feldspar schist and nodular schist. The nodules are commonly cordierite and more rarely andalusite metacrysts. Wiwchar (1957) divides the sediments east or southeast of the volcanic band in the following way. A narrow band of black argillite, now a biotite-rich schist with some andalusite and abundant pyrrhotite, occurs along the east contact of the band of volcanic rock. Farther east is a series of thinly-bedded greywacke shales with interbeds of argillite. These rocks are now biotite schist with the amount of biotite varying depending on the original composition of the sediments. Some bands contain nodules or metacrysts of cordierite. Nodular quartz-mica schist with no argillite occurs east of the above rocks. These rocks were originally greywacke-shales. The gold-bearing quartz veins occur in the thinly bedded greywacke-shales and argillites near the northeast end of the band of volcanic rocks.

These rocks trend in a general way northeasterly and dips are commonly steep to the northwest. In detail, however, the sediments have been complexly folded. In the general area, the most obvious folds trend northeast to east of north. They plunge steeply at angles over 70 degrees to the northwest. These folds are thought to be imposed on the limbs of older folds that originally trended east of north. The property is traversed by several faults, most of which are of small displacement and of no importance. The Discovery Fault, however, cuts the ore zone at a depth of about 375 feet. The trace of the fault on the surface is a few hundred feet north of the shaft and it strikes at about 65 degrees and has an average dip to the southeast of 22 degrees. It is a thrust fault with a throw of about 80 feet on which the hanging wall has moved about 220 feet north relative to the footwall.

Most of the ore has been developed in the North zone and No. 4 zone. On surface the North zone occurs in the nose and along the limbs of a fold, the axial trace of which strikes about north (Figs. 6, 7). Down the plunge of the fold the axial trace strikes more east of north. The fold plunges steeply to the north and rakes steeply to the west, however, at depth, for some distance below the tenth level the plunge and rake is less steep, in the order of 50 degrees. In this area, the width and length of the ore zone increases. With depth the east limb shortens and most of the ore occurs in the west limb below the 1,100-foot level. The structure occurs in a band of thinly bedded greywacke and argillite that is intensely drag folded and crumpled along the limbs of the main fold. Quartz occurs in veins and lenses along the zone. Contacts with the wall-rocks are sharp and biotite is commonly developed in a narrow zone along the veins. In places biotite also occurs in the quartz in bands which probably represent unreplaced remnants of wall-rock. Locally

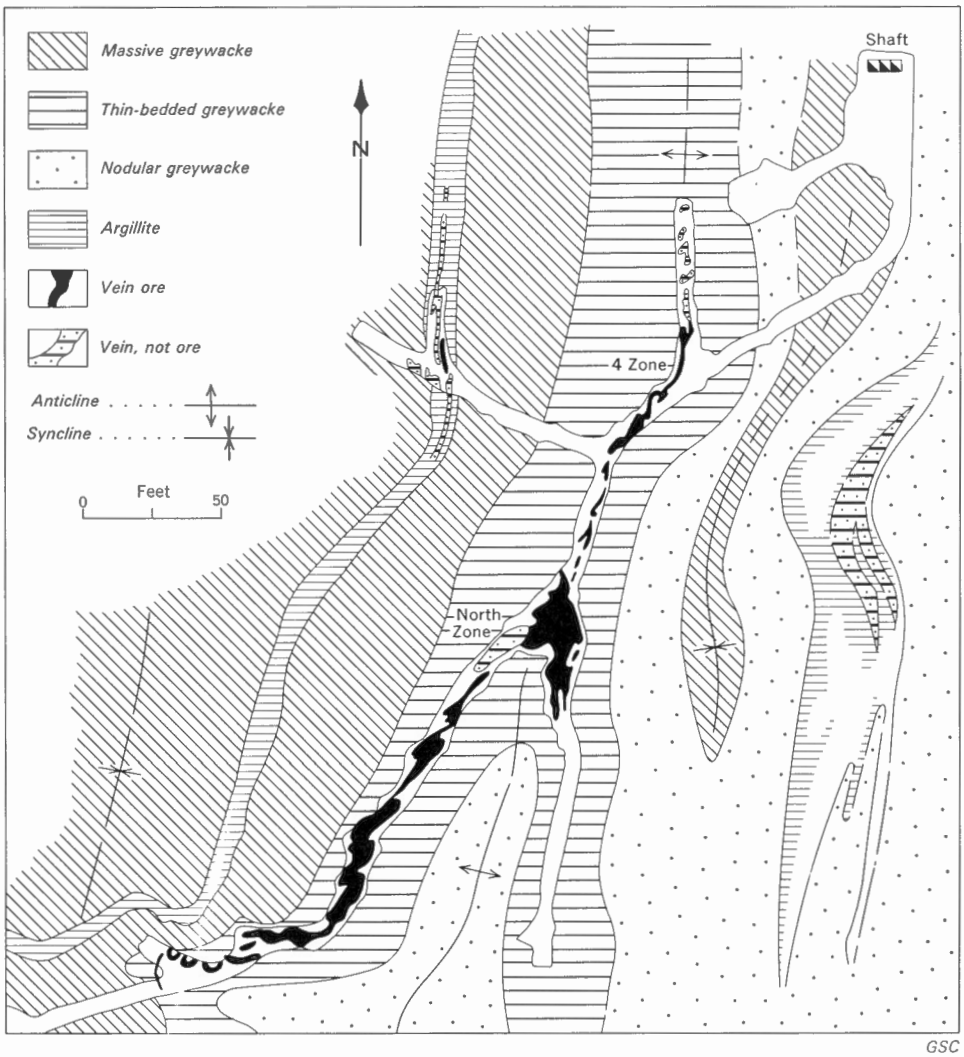

Figure 6. Geological plan, 950 foot level, showing high-grade pocket at junction of No. 4 zone and North zone, Consolidated Discovery Yellowknife mine. (after Wiwchar, 1957)

biotite orientation is parallel to the foliation in the wall-rocks and some are oriented so that it is apparent that quartz lenses occur as replacements of drag folds and crumples in single beds in the sediments. Gold, pyrrhotite, pyrite, oligoclase, actinolite, muscovite, and less commonly sphalerite, chalcopyrite, galena and andalusite occur in the quartz veins. Metallic minerals form less than 1 per cent of the veins and commonly occur in fractures in the quartz or with concentrations of biotite or actinolite. Quartz is white to medium grey to dark grey or black in colour. Gold is commonly coarse and is found in fractures, along small slips, and with the sulphides. Limits of the ore shoots are sharp and very little vein material of marginal grade is

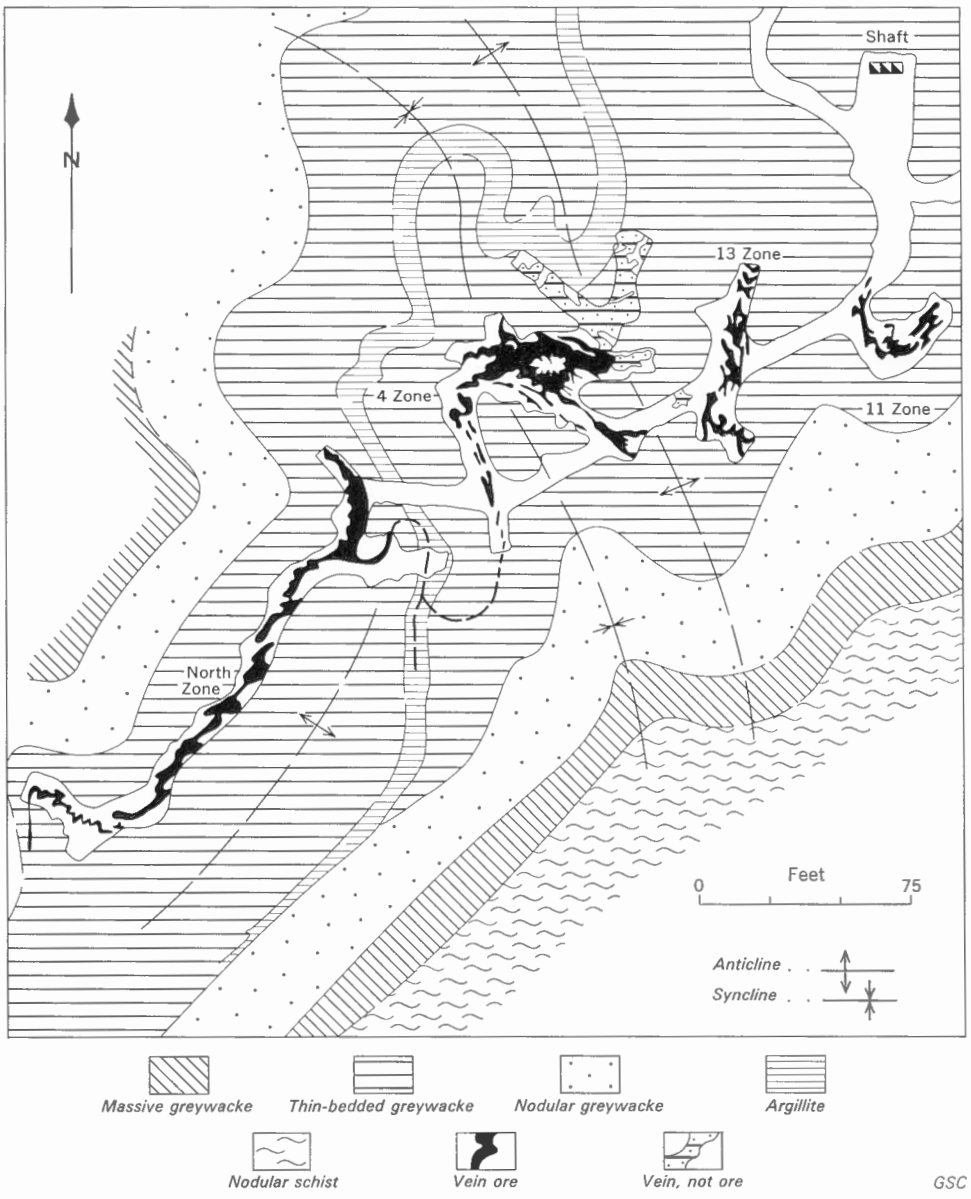

Figure 7. Geological plan, 1,400 foot level, Consolidated Discovery Yellowknife mine. (after Wiwchar, 1957)

found. There is no obvious difference between barren and gold-bearing quartz except that barren material sometimes appears less intensely fractured.

The No. 4 zone extends downward from the 800-foot level. Its position relative to the North zone varies down its dip. According to Wiwchar (1957) the dip of the zone changes from 65 degrees west on the 800-foot level to 75 degrees east down the vein. The reversal of dip results in a junction

with the North zone on the 950-foot and 1,250-foot levels. On the upper levels the vein occurs in a graphitic argillite but below the 950-foot level it tends to follow drag folds and crumple structures in the argillite. The vein has been traced at least to the 2,150-foot level. The No. 4 zone is similar mineralogically to the North zone.

Several other similar but small ore zones such as the Nos. 11 and 13 zones have been located and developed on the lower levels. In 1958 the "16 Vein" was located on the 1,700-foot level about 500 feet south of the main mine workings. Initial work indicated ore grading about 1 ounce per ton over mining widths.

From a few hundred feet below surface to at least the 2,750-foot level a quartz mass of variable shape and size occurs just west of the shaft and north and east of the ore zones. Ore shoots have not been located in this quartz body. On some levels, the quartz appears to be localized in the nose of a large fold but evidence for this is not conclusive.

The West zone lies in and near the northern tip of the main belt of volcanic rocks about 450 feet southwest of the North zone. It consists of an area of dark green hornblende-plagioclase gneiss cut by numerous north-trending veins, lenses and irregularly shaped bodies of quartz. Quartz appears to have gradational contacts with the wall-rocks and is mineralized with pyrite, pyrrhotite, chalcopyrite, sphalerite and feldspar. The percentage of sulphides appears to be greater than in the North zone. This zone has been explored in the upper levels by drilling and drifts but no ore has been developed.

In summary, then, gold-bearing quartz veins are localized in or by complex folds and related structures. The structural controls are not precisely known, however, nor are the controls of gold distribution within the quartz veins well known.

Ormsby Mines, Limited (11)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-P-4; Tremblay, 1952; Lord, 1951.

Ormsby Mines, Limited was incorporated in 1954 to take over the holdings of LaSalle Yellowknife Gold Mines, Limited and Oro Yellowknife Gold Mines, Limited. The company is controlled by Consolidated Discovery Yellowknife Mines, Limited. The 30 claims, formerly held by the old companies, but now owned by Ormsby Mines, comprise the Oro group, Bruce No. 1-8, and Avis No. 3-6. These claims are southwest of and adjoin the property of Consolidated Discovery Yellowknife Mines, Limited.

The history of the property and outline of development work are described in detail by Tremblay (1952) and Lord (1951). In summary, on the LaSalle ground between the years 1944 and 1950, 9,742 feet of standard and about 6,000 feet of X-ray diamond drilling were completed. A total of 60 holes were drilled. In addition, about 60 trenches were excavated and the claims were mapped geologically. Most of this work was concentrated on 8 narrow short quartz veins in or near the contacts of a mass of metamorphosed basic volcanic rock in a small area just northwest of the northwest end of Winter Lake. On the Oro ground development work consisted of geological mapping and prospecting and excavation of about 28 trenches on various

quartz veins. Most of the trenches were cut across bands of black argillite that contain short veins, lenses and pods of sparsely mineralized quartz.

In 1954 Ormsby Mines, Limited did several thousand feet of drilling on the Oro claims on various quartz veins but no significant ore sections were outlined. In the same year the Bruce and Avis claims were mapped geologically and the old showings resampled and in 1955 and 1956 a considerable amount of drilling was completed on the showings. Altogether over 20 holes were drilled. Some cut the quartz veins at a depth of about 400 feet and 2 long holes were drilled to test the veins at the 800-foot horizon. Several holes were drilled to test the area around the southwest end of the band of volcanic rocks that outcrop on the Ormsby and Discovery properties. Also in 1955-56 a drift on the 950-foot level of the Discovery Mine was driven southwest to the Discovery-Ormsby boundary. A few long flat holes were drilled from the end of the drift to the west and southwest to test the sedimentary and volcanic rocks at the north end of the property. No significant zones were discovered.

The Bruce and Avis claims are underlain by large and small lenticular bodies of basic volcanic rocks intercalated in sedimentary rocks. According to Tremblay (1952) the volcanic rocks are now andesine-amphibole gneiss that in places is mineralized with pyrite, pyrrhotite and arsenopyrite. The rocks strike northeast and dip steeply to the northwest.

The following description of the surface showings is by Tremblay:

"Quartz veins and stringers are numerous on this property. Most of them trend between north and north 40 degrees east; others, however, strike about northwest and north 65 degrees east. As these are also the common directions for joint fractures on the property and in the adjoining sedimentary strata, it seems probable that these structures are joints and guided the vein-bearing solutions. Most of the veins dip vertically to steeply in either direction or westerly at angles of 40 to 55 degrees. Some are almost flat for short distances. Most of the veins are short and narrow, generally less than 2 feet wide, but some have been traced for 100 feet or more. The quartz is commonly milky white, but in places, particularly in the best gold-bearing veins found on this property, it is light to dark grey or black and well fractured. It may or may not be sparsely mineralized with pyrite, pyrrhotite, and arsenopyrite; and some of the veins carry a little white feldspar along their margins or here and there throughout the quartz. The grey to black quartz appears to carry small amounts of biotite and amphibole, which are believed to represent partly digested material from the wall-rock. The contacts of the quartz veins or stringers with the wall-rock are generally sharp, and the wall-rocks themselves are commonly massive and only slightly altered.

"Most of the work on the LaSalle property has been concentrated in a small area, about 1,700 feet long, in a northeasterly direction, by 600 feet wide, lying northwest of the northwest end of Winter Lake, either along the shore of the lake or along, and a few hundred feet northwest of, the southeastern contact of the main volcanic mass. There, at least eight quartz veins were tested by trenching and diamond drilling, and so far as known have provided the best assays on the property. Thus, the No. 5 vein has been traced for 92 feet and averages, as reported, 0.787 ounce gold a

ton across an average width of 1.37 feet. In December 1947, it was reported that the No. 4 vein had been traced for 125 feet and averaged 0.889 ounce gold a ton across an average width of 1.02 feet. Much surface stripping was also done along the northwestern contact of the main volcanic mass about 1,000 feet northwest of the northwest end of Winter Lake. There, several wide milky quartz veins were exposed and sampled, but apparently contain very little gold. At least five rock trenches were excavated and several drill-holes were put down at the northeastern end of, and particularly close to, the northwestern contact of the main volcanic mass. There the trenches are in rusty, mineralized, basic, volcanic rocks and across narrow, short quartz stringers. Encouraging gold assays are reported from these trenches."

The drilling done by Ormsby Mines, Limited intersected the veins in the main zone at the 400-foot level and 800-foot level. It is not known if individual veins extend to these depths but narrow quartz veins were encountered down dip from the surface outcrops and it seems likely that the vein system persists to the 800-foot level. Gold values and distribution were similar to those found on surface. A number of core intersections that assayed between 0.4 and 1.0 ounce of gold per ton over widths of a foot or less were obtained. It was estimated on the basis of all the work done that there is about 100,000 tons of material with an average grade of about 0.3 ounce per ton in the main zone.

Other Gold Properties in the Giauque Lake Area (12)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-P-4; Tremblay, 1952.

Between 1945 and 1948 a number of companies held ground in the Giauque Lake area near the property of Consolidated Discovery Yellowknife Mines, Limited. Gold showings were discovered on most properties and a considerable number of these were explored by trenching and diamond drilling. The main zone on the property of Viking Yellowknife Gold Mines, Limited was explored underground on one level, the 150-foot level, by 400 feet of drifting and crosscutting. Entry was made with a small inclined exploration shaft. All of these properties have been inactive since about 1949. They are described in detail by Tremblay and are, therefore, only listed here under the old company names and claim names, where possible.

Goldpac Yellowknife Mines, Limited	BDD group
Wolfpack Yellowknife Mines, Limited	AB group
Circle Yellowknife Mines, Limited	Tri and Wallie groups
Northland Mines (1940), Limited	Lucky Nos. 1-8
Centrix Yellowknife Mines, Limited	FB group
Beauregard Yellowknife Mines, Limited	SB group
Typhoon Yellowknife Mines, Limited	Joan and GPS groups
Viking Yellowknife Gold Mines, Limited	Arlene, Ola, BBB, KAM, DEI groups
Greenlee Mines, Limited	Pool group

Some of these claims have lapsed and some companies are now defunct or have been reorganized. The properties and showings are located on a map (Map 1017A) published by Tremblay (1952).

AL Group (13)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-7.

The AL group of 9 claims is located about 3 miles east of the northeast end of Campbell Lake at latitude 62°22'42", longitude 112°47'20". The property is about 50 miles east of Yellowknife. The claims were staked in 1957 by Mr. A. Stevens and associates and in 1958 optioned to Beneventum Mining Company, Limited. In 1958 the gold showings were explored with trenches and X-ray diamond drilling. The showings were tested by drilling to a maximum depth of 50 feet. It was reported that the No. 1 vein assayed 3.7 ounces of gold per ton over a width of 1 foot along a length of 230 feet. Early in 1959 underground exploration was started. A small inclined prospect shaft was sunk to a depth of just over 125 feet. Drifting on the 125-foot level was begun but in the summer of 1959 the property was closed down. The author did not examine the showings and has no detailed information about them.

Chick Group (14)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-14.

The Chick group of claims held by Beneventum Mining Company Limited is located at Mitchell Lake, southwest of Gordon Lake, and about 36 miles northeast of Yellowknife. The group consists of 21 Chick claims and 7 claims named Benem C. The claims were acquired in 1956, and in 1957 two gold-bearing veins were tested with trenches and by about 2,000 feet of diamond drilling. A small tonnage of ore was put through a portable mill and a few ounces of gold were produced. The property has been inactive since 1957.

The claims are underlain by greywacke and shale of the Yellowknife Group. These rocks are metamorphosed to fine-grained biotite schist that locally carries porphyroblasts of cordierite. Around the showings, the rocks strike northwest and dip steeply to the northeast. Examination of Henderson's (1941) map of the area suggests that the rocks are involved in westerly-trending folds.

Two gold showings occur on the property. The No. 1 zone, on Chick No. 1 claim, consists of a quartz vein that has been traced for about 200 feet and in most places is about 2 feet wide. It is a curving vein with the strike varying between 315 and 330 degrees. The dip is generally steep to the northeast. The vein occurs in bands of dark slate in what may be a bedding shear. One short section of the vein, 15 feet in length, and about 10 feet wide occurs in the nose of a small drag fold. The quartz is light grey and sparsely mineralized with pyrite and arsenopyrite. Gold occurs in fractures

in quartz commonly near sulphides. High gold assays were obtained from samples from the wide part of the vein and significant gold assays from sections of drill core were also concentrated in this part of the vein.

The second vein or No. 2 showing is about 160 feet long and has an average width of 2 feet. It is located on the Chick No. 2 claim. The vein strikes at 310 degrees and dips steeply to the northeast. In other respects it is similar to the No. 1 vein. A chip sample cut across the widest part of the vein, a width of 4 feet, assayed 0.5 ounce of gold per ton.

Bud Group (15)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-14.

The Bud group of 6 claims is located at the southwest end of Gordon Lake about 45 miles northeast of Yellowknife. The claims were staked in 1952 by Alex Mitchell and associates. A gold-bearing quartz vein has been partly developed on surface by a number of trenches.

The claims are underlain by greywacke-shale and argillite of the Yellowknife Group. These rocks are steeply dipping and trend about northwest. According to Henderson (1941) they are tightly folded into northwest-trending, steeply plunging folds. Henderson's map shows seven such folds on the property.

A quartz vein occurs in sheared material along the edge of a draw. The shearing is parallel to the trend of the fold axes and may be intense axial plane shearing. The vein, which strikes at about 325 degrees and dips steeply is about 400 feet long and up to 6 feet wide. In places the zone consists of a network of quartz stringers and veinlets. The quartz is dark grey, fine grained and massive. Pyrite, arsenopyrite and minor galena and chalcopyrite occur in small fractures in the quartz and in the wall-rocks near the quartz veins. Visible gold was observed in several places.

Treacy Group (16)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-14.

The Treacy group of 9 claims is located on the southwest shore of Gordon Lake at Knight Bay, about 46 miles northeast of Yellowknife. The claims were staked in 1946 by Mr. Alex Mitchell for Boreas Mines, Limited. Gold showings on the property have been developed by 12 trenches and 7 short diamond-drill holes. No work has been done on the property since 1952.

The following description of the geology and showings is from an unpublished report by A. B. Irwin:

> "The Treacy group is underlain by greywacke and slate of the Yellowknife group, with bedding trending about north 60° west. The beds, which are isoclinally folded at steep angles, are cut by quartz veins, some of which are mineralized. There are five known gold showings on the Treacy group, the two most important being the East and West zones and the No. 3 vein.

"The East and West zones on the AM 1 mineral claim, discovered in 1951, trend northwesterly across a small point of land on Knight Bay, converging from 60 feet to 30 feet apart. These zones occur near the axis of a fold and show as irregular lenses and veins of quartz in sheared and fractured sediments for a length of 160 feet, with both ends open. The quartz is fractured, grey to blue in colour, and is mineralized with pyrite, arsenopyrite, galena, sphalerite and occasional flecks of visible gold.

"The No. 3 vein on the Treacy 7 claim, discovered in 1947, is located about 1,400 feet southwest of the East and West zones. It outcrops for a length of 150 feet, striking southeasterly into muskeg. Gold-bearing quartz appears on a point of land on strike with this vein about 800 feet to the southeast and again on a reef in the lake at an intermediate location. This occurrence is similar to the East and West zones.

"The East and West zones have been explored by 6 longitudinal pits, and the No. 3 vein by 5 trenches. Below is a table showing assay results of chip samples taken by Mitchell in 1950 and 1951.

Trench	Width	Assay	Trench	Width	Assay
East zone 1	60"	0.30	No. 3 vein 1	64"	0.28
East zone 2	60"	22.00	No. 3 vein 2	60"	1.97
East zone 3	36"	9.00	No. 3 vein 3	62"	0.28
West zone 3	72"	6.00	No. 3 vein 5	84"	1.32

"Seven holes spaced at irregular intervals along the strike of No. 3 vein were drilled in 1950, from which vein and mineralized wallrock intersections, ranging in width from 13 inches to 69 inches, were selected for assay. Results showed erratic values, generally lower than those above.

"A chip sample taken across 36 inches in Trench 1 of the East zone assayed 6.94 ozs. gold per ton. At the time of his visit most of the other vein exposures were obscured by water or mud."

Tin Group (17)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-9.

The Tin group of 13 claims is on the south shore of Prosperous Lake. The property is about 8 miles northeast of Yellowknife. The claims were staked by Mr. Tom Cassidy years ago and in 1955 were optioned to Tarbell Mines Limited. This company completed a substantial diamond-drill program in 1955 and then dropped the option. No further work has been done on the property.

The claims are underlain by metamorphosed sediments of the Yellowknife Group. The rocks are grey, fine-grained biotite schist, locally garnetiferous but probably the metamorphosed equivalents of greywacke-shale. They are folded into northwest-trending folds. The fold in which the showing occurs plunges 40 degrees to the northwest.

The showings occur on Tin No. 10 and consist of a quartz vein and associated lenses and pods of quartz in the nose of a syncline. The quartz is white to grey and sparsely mineralized with pyrrhotite, pyrite and locally sphalerite. The best values on surface, from 0.5 to 0.7 ounce per ton of gold, came from the quartz in the nose of the fold. A number of sections across the fold structure were drilled off with 3 to 5 holes per section. The sections were spaced at 100- and 200-foot intervals. The quartz vein was encountered down the plunge of the fold as far as it was tested, that is over a length of about 700 feet from the surface showings. However, according to the company's annual report for 1955 the indicated grade of the vein was well below economic limits.

Manta Group (18)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-7.

The Manta group of 8 claims is about 4 1/2 miles northeast of Campbell Lake about 45 miles east of Yellowknife. The claims were staked by J. Stevens of Yellowknife in 1957. In 1958 two X-ray drillholes were drilled into a northwest-trending valley thought to mark the position of a fault.

The claims are underlain by greywacke and shale of the Yellowknife Group which are metamorphosed to biotite-bearing rocks that are very slightly schistose. These rocks are folded along northeast-trending axis and then refolded about northwest-trending axis. Shear zones occur in bedding plane faults and along the axial planes of folds. Quartz veins are mainly localized in these zones, but on this property the veins carry little gold. The two drillholes were located in a northwest-trending valley near Leader Lake. Sheared rock containing quartz veins or veinlets was intersected but gold values were low.

Camlaren Mines, Limited (19)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-14; Lord, 1951, pp. 89-91.

Camlaren Mines, Limited was organized in 1937 to develop claims near the east side of Gordon Lake about 7 miles from its south end. The showings are on islands covered by the claims which are about 50 miles northeast of Yellowknife. In the years 1937 to 1939 about 15,000 feet of diamond drilling was completed, a shaft was sunk on the Hump vein, and about 2,200 feet of drifting and cross-cutting was done on the 200- and 350-foot levels. A second shaft was sunk on the "31" vein to a depth of 220 feet and about 300 feet of drifting was completed. About 13,000 tons of ore were outlined on the Hump vein with an uncut grade of 0.86 ounce gold per ton. For descriptions of the development and geology of the property the reader is referred to Lord (1951).

In 1958, Consolidated Northland Mines, Limited was granted an option to carry out some exploration work and during the summer of 1958 the

area around the Hump vein was mapped in great detail emphasis being placed on structural information which might suggest a new interpretation. The surface showings were resampled and using data from the previous work the ore reserves and grade were recalculated. This work indicated reserves of 15,000 tons with a grade of 0.9 ounce per ton. The geological mapping confirmed the earlier interpretations, that is, that the vein is localized in the nose of an anticlinal fold which plunges northeasterly at about 50 degrees. The orebody, therefore, forms a cylindrical mass in the fold. No evidence was found to suggest an enlargement of the mass at depth.

Ruth Group (20)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-7; Lord, 1951.

The Ruth group of 14 claims is 4 miles west of Francois Lake and about 60 miles east of Yellowknife. The property is held by Cominco, Limited. In the early 1940s a shaft was sunk, a 25-ton mill installed and gold was produced for a short time in 1942. At that time the mill operated for 12 days; 186 tons of ore were treated and 152.45 ounces of gold and 23.14 ounces of silver were recovered. For a detailed description of the early history and geology of the gold deposit the reader is referred to Lord (1951).

In 1958 the Ruth Mine was leased to Vancouver interests who in turn subleased it to a group in Uranium City. The plan was to mine the ore blocked out by the former operators and to attempt to develop new ore for further mining. During the winter of 1959 work was begun to put the property back into production at the rate of 25 tons a day. A short airstrip was built near the mine site to allow oil and other bulk supplies to be flown in by a Bristol freighter. The mill was put into working order and work began on deicing and dewatering the mine. In the spring of 1959 ore from a stockpile was started through the mill and a small amount of gold was produced. When the property closed in August of 1959 apparently for lack of funds no ore had been produced from the underground workings.

June Group (21)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-7; Lord, 1951, pp. 191-2.

The June group of claims is located about 47 miles east of Yellowknife and 4 miles north-northeast of the northeast end of Campbell Lake. The claims were staked for Consolidated Mining and Smelting Company of Canada (now Cominco, Ltd.) in 1939 to cover several gold showings. In that year some trenching and stripping was completed and in 1941 some diamond drilling was done. In 1955 the claims were returned to the prospectors who made the discoveries and in the following year the claims were optioned to Canadian Exploration Limited. This latter company completed a small drilling program on the property and then dropped the option.

For descriptions of the geology and showings the reader is referred to Lord (1951, pp. 191-2).

R Group (22)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-14.

The R group of 6 claims is located about 4 miles east of north of Dome Lake and about 1/2 mile east of the Cameron River at 62°49'N, 113°41'W. The claims are about 45 miles northeast of Yellowknife, and were staked in 1958 by C. Vaydik and A. Raymond for Canadian Exploration Limited. The group was turned back to the prospectors at the end of the season. The ground was formerly held by Prospect Street Syndicate but the R claims do not cover that company's main showings as described by Lord (1951, p. 245).

The claims are underlain by volcanic rocks of the Yellowknife Group and consist of metamorphosed andesite, dacite and basalts with some tuff and agglomerate bands. Pillow structures are common. These rocks strike north and northeast and face west. Dips are near-vertical. Just east of the claims these rocks are cut by granodiorites and related rocks. They are also cut by fine-grained diorites and by small bodies of rhyolite porphyry.

The showings occur in a shear zone that trends slightly east of north about parallel to the strike of the lavas. The shear, which is marked by a valley up to 200 feet wide, can be traced for about 1 1/2 miles. Rocks on both sides of the valley are intensely sheared and have a rusty weathered surface. Samples of unweathered rock contain minor amounts of pyrite and pyrrhotite. Small quartz veins, lenses and pods are erratically distributed in the sheared rock. Pyrite occurs in small amounts in the quartz. Grab samples of quartz contain traces of gold, and gold can be panned from the rusted schistose material. No work has been done to test the unexposed central parts of the shear zone.

Indigo Consolidated Gold Mines, Limited (23)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-B-6; Lord, 1951.

Indigo Consolidated Gold Mines, Limited was organized in 1949 to take over the property of Progress Diversified Minerals Limited. The property consisted of Arseno Nos. 1-3, and PA Nos. 1-15 claims on Leta Arm, a bay on the north side of Indin Lake about 130 miles north-northwest of Yellowknife. Indigo Consolidated has since been reorganized to Nationwide Minerals Limited. The history, development and geology of the property has been described in detail by Lord under the heading of Diversified Mining Interests (Canada), Limited.

Indigo Consolidated, in 1950 and 1951 deepened the shaft to 500 feet and developed two levels on the 325- and 475-foot horizons. Over 2,400 feet of drifting and crosscutting was done on the new levels. About 8,300 feet of diamond drilling was completed underground during this period. Four shoots were outlined on the 475-foot level with an aggregate length of about 300 feet and width of about 5 feet. The average gold content of these sections was about 0.5 ounce per ton. The property was closed in July of 1951 and has been inactive since.

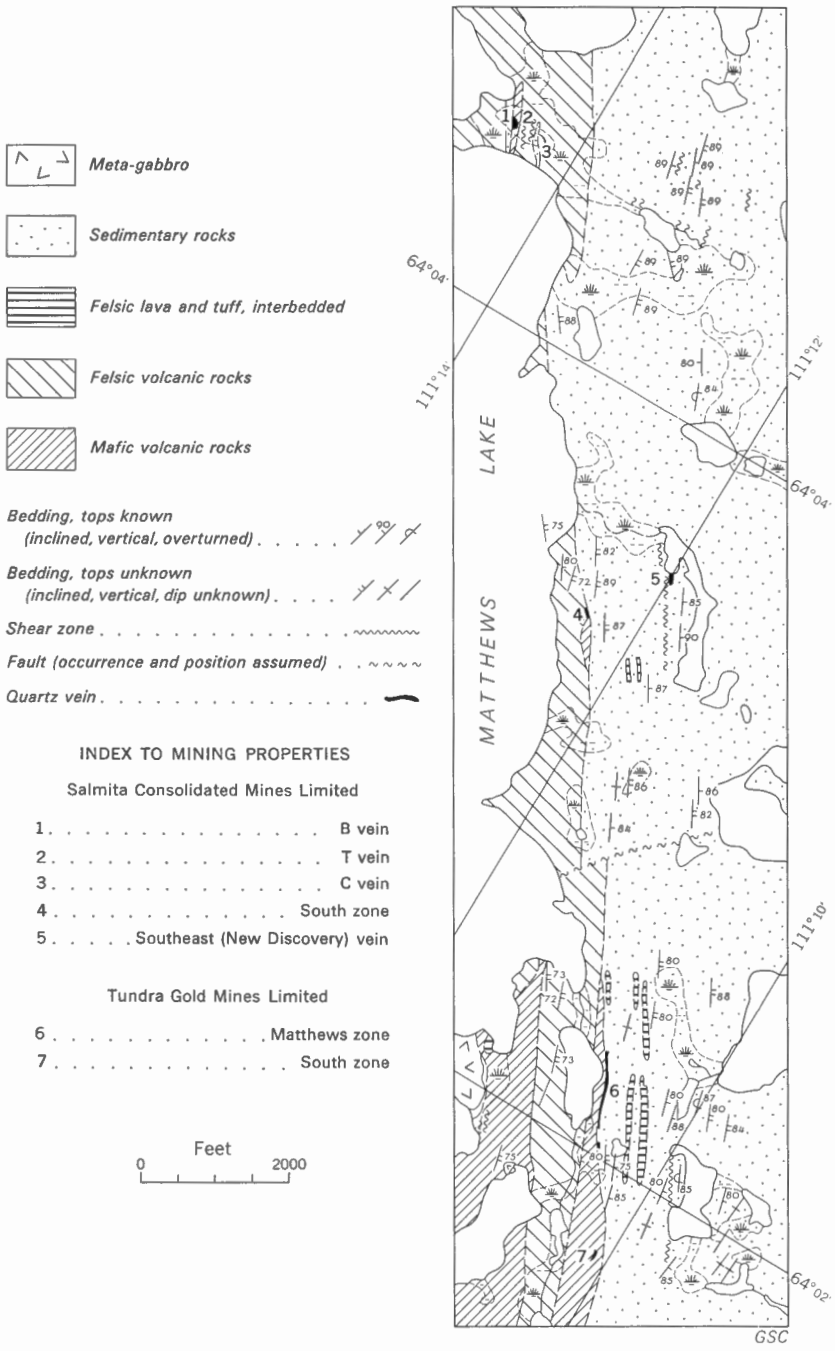

Figure 8. Map showing location of main gold deposits east of south end of Matthews Lake. (modified from Moore, 1956)

Tundra Gold Mines, Limited (24)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 76-D-3; Lord, 1951; Moore, 1956; Byrne, 1959.

Introduction

In 1956 Taurcanis Mines, Limited was formed by reorganizing the company structure of Bulldog Yellowknife Gold Mines, Limited, and in 1963 the company was reorganized to Tundra Gold Mines, Limited. In late 1956 a group of companies, including Consolidated Discovery Yellowknife Mines, Limited, New Dickenson Mines, Limited, Trans-American Mining Corporation and Brewis and White Limited combined to provide funds for the underground development of gold-quartz veins on the property of the old company.

The property consists of 54 mineral claims that include JESA 1-6, REP 1-12, MAD 1-18, and WIN 1-18. The group lies at the south end of Matthews Lake (see Fig. 8) between MacKay and Courageous Lakes about 150 miles northeast of Yellowknife.

History and Development

The main gold showing on the property was discovered and staked by Jack Matthews in 1945. The property was later optioned to Trans-American Mining Corporation and a new company, Bulldog Yellowknife Gold Mines, Limited, was formed to explore the gold showings.

The main showing, known as the Matthews vein was, in subsequent years, explored on surface and by drilling for a length of about 3,000 feet. The vein was opened by rock trenches for a length of 1,500 feet and over the years was tested by some 16,000 feet of drilling to a maximum depth of 450 feet. Most of the intersections, however, cut the vein at depths of less than 300 feet. A second zone, known as the South zone and which outcrops on claim REP No. 2 some 1,400 feet south of the Matthews vein, was also developed by trenches and by about 3,000 feet of drilling. In 1951 it was decided to explore the Matthews vein underground and in 1952 a three-compartment shaft was collared. A headframe, powerhouse, garage, and a hoist building were constructed. Late in 1952 the operation was closed down and no further work was done until 1957 shortly after the new company, Taurcanis Mines, Limited, was formed.

In 1957 the shaft was sunk to a depth of 364 feet and two levels were established at depths of 175 and 325 feet. A total of 811 feet of drifting and crosscutting was done on the first level and 2,790 feet on the second level in years 1957 and 1958. A raise was driven from the bottom level through the ore zone to surface. About 2,800 feet of drilling was completed underground in this period to test the vein at roughly the 475- and 600-foot horizons. During this time the camp was closed for the winter months. In 1959 the shaft was deepened to 665 feet and two levels were run at 475 and 625 feet. Most of the development work on the new levels was concentrated on the bottom level.

Camp

Buildings to house the mining plant, shaft, and warehouses have been winterized so that a year round operation is possible. A steel-frame, 2-story building, 200 feet by 32 feet, was started in 1959. It is designed to house and feed all personnel and provides engineering and accounting offices as well as warehousing and heating facilities for the whole operation.

An airstrip has been constructed on an esker about 8 miles from the camp. The strip is about 4,000 feet long and 125 feet wide. It can handle fully loaded Bristol aircraft all the year round. The cost of the strip was $35,000.

Geology

The geology of the property and showings have been described by Lord (under Jeja No. 2 claim, p. 185), Moore (under Bulldog Yellowknife Gold Mines, Ltd., p. 43) and Byrne (1959).

The claims are underlain by basic volcanic rocks and sedimentary rocks of the Yellowknife Group. The volcanic rocks consist of metamorphosed basic lavas, fragmental rocks and dacites or rhyolites. The sedimentary rocks are metagreywacke and slates. The lavas dip steeply to the east, strike slightly west of north, and are thought to face east. The sediments are closely folded about west of north-trending axes and may be folded a second time about northeast-trending axes. These rocks are cut by granitic intrusions both east and west of the property.

A fairly persistent shear zone occurs in the sediments close to the contact with the volcanic rocks. This zone trends at about 345 degrees and dips about 75 degrees to the east. Several parallel and less persistent shear zones occur in the sediments east of this zone.

The Matthews vein occurs in the above mentioned shear zone near the sedimentary-volcanic contact. The vein has been traced on the surface for 1,500 feet and by drilling for 3,000 feet. It varies in width from a few inches to about 6 feet. The vein swells or narrows sharply over short distances to form more or less lenticular bodies. In part the vein consists of a number of stringers in the enclosing schist. Quartz may be dark blue or light grey to white. The light coloured quartz commonly contains a light green mineral that may be actinolite. The dark blue quartz on the upper levels tends to be more abundant on the hanging-wall side of the vein. The quartz contains something less than 5 per cent sulphides that include arsenopyrite, pyrrhotite, galena, scheelite and ferberite (Moore, 1956). Tourmaline is present. Gold on surface appeared to be most abundant on the hanging-wall side of the vein. Where visible it is fine and occurs in clusters or streaks in fractures in the quartz. Both drilling and underground work indicate that gold ore occurs in the vein in shoots which plunge steeply in a northerly direction. The precise control that localizes these shoots is unknown but according to Byrne (1959) they "may be the result of the Matthews Vein shear tending to follow a somewhat straighter course than the nearby volcanic-sedimentary contact, but the vein may also represent a system of shear planes at a small angle".

The South vein has been described by Moore (1956, p. 43) as follows:

"Series of veinlets from the main vein at places extending into the wall-rock that also locally contains small lenses of vein quartz. The foot-wall for 20 feet west of the vein is thin-banded, buff weathering fragmental volcanic rock and slate. The fragmental rocks probably are a part of a ropy zone exposed at points 200 and 400 feet south of the vein and which extends discontinuously the length of the area mapped. Felsic volcanic rocks outcrop 50 feet west of the vein and their schistosity strikes about north 25 degrees west and dips about 85 degrees northeasterly. The beds and cleavage of the slate east of the vein strike parallel with these structures west of the vein and also dip steeply easterly.

"The quartz of the vein is a bluish white to grey, sugary to coarse-grained type containing a few fragments of slate, scattered crystals of arsenopyrite up to 2 mm. long, tourmaline, and visible gold. The slate adjacent to the quartz carries a few grains of arsenopyrite, pyrite, and tourmaline. The vein zone has been explored by a series of diamond drill-holes for a length of 500 feet."

Surface drilling indicated 5 shoots with a total length of 613 feet, average width of 3.6 feet, and cut grade of 1.1 ounces of gold per ton. This ore was located above the 350-foot horizon. According to the Progress Report dated November, 1960, issued by the company, work up to that time indicated the presence of 151,200 tons of ore grading 0.85 ounces per ton cut grade above the 650-foot horizon.

Salmita Consolidated Mines, Limited (25)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 76-D-3; Lord, 1951, pp. 254-257; Moore, 1956, pp. 41-43.

Salmita Consolidated Mines, Limited, which was reorganized from Salmita Northwest Mines, Limited owns 37 claims consisting of Salerno 1-18, Tough 1-6, Rough 1-6, Luff 1-4 and LT 1-3. The property is on the east side of Matthews Lake which lies between MacKay and Courageous Lakes about 150 miles northeast of Yellowknife. The property is adjacent to and north of Taurcanis Mines, Limited. The early history and development of the property is described by Lord (1951).

During the years between 1945 when the claims were staked and 1953 when the property closed down, the following work was completed. The four main zones were trenched and sampled, the property was mapped geologically and the main showings tested with about 90 diamond-drill holes. In 1951, a 2-compartment shaft was sunk in the North zone and a level established at 125 feet. The B vein was explored by a drift for a length of about 100 feet. In 1952 a building to house a 100-ton gravity mill was partly constructed and much of the equipment for the mill and a small mining plant was shipped to the property on a tractor train over a winter road. Several other buildings, including a warehouse and garage, were also built at this time. Very little work has been done since the property was closed in 1953.

The geology of the property has been described by Lord (1951) and Moore (1956). The claims are underlain by volcanic and sedimentary rocks

of the Yellowknife Group that strike north-northwest and are vertical or dip steeply to the east. These rocks are intruded by a large granitic mass a few miles west of the property and small masses of granite occur in the sediments to the east. The gold deposits occur in either volcanic or sedimentary rock near the contact between these rock types. In general, gold occurs in quartz in persistent veins or in a series of veinlets and lenses in shear zones. Quartz is white, light grey, or black. Metallic minerals rarely exceed 5 per cent of the vein material and include pyrrhotite, arsenopyrite, scheelite, ferberite, pyrite, galena, sphalerite and chalcopyrite. Tourmaline and carbonate commonly occur in the veins.

The four main showings found on the property are known as the North, South, Southwest or New Discovery vein and the Olsen zones. The North zone consists of 6 veins: The B, T, A, C, E and F, of which the B and T veins are the most promising. All of these zones except the Olsen have been described by Lord (1951) and Moore (1956).

The Olsen showing is about 1,700 feet southeast of the shaft on Tough 4 claim. The zone consists of a number of narrow quartz veins and lenses in sheared and brecciated slate. Veins and shear planes strike west of north and dip steeply. The zone has been traced over a length of about 300 feet. It has been tested with 10 drillholes. A number of gold intersections were cut but values were low and their distribution erratic.

In 1950, 4,500 feet of diamond drilling was concentrated on the B vein in the North zone. A block of ore 340 feet long and 4.5 feet average width extending from surface to 150 feet vertical depth was estimated to contain 19,500 tons of an average grade of 0.48 ounce per ton. Sampling of the B vein on the 125-foot level returned an average of 0.70 ounce of gold per ton over a width of 5.5 feet for a length of 61 feet along the vein.

Don Group (26)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 76-D-3.

The Don group of 24 claims is located in the Matthews Lake area about 150 miles northeast of Yellowknife. The claims adjoin the property of Taurcanis Mines, Limited to the south. The Don group was staked in 1957 for North Goldcrest Mines, Limited but was previously held by Homer Yellowknife Mines, Limited. The showings are described by Lord (1951); at that time the showings were covered by the Jeja No. 8 and Rima No. 5 claims. A considerable amount of surface work and some drilling was done in the early 1950s by Homer Yellowknife Mines, Limited. In 1958 North Goldcrest re-examined and sampled the old showings, did some geological mapping and completed about 7,800 feet of diamond drilling.

The geology of the area has been described by Moore (1956). The claims are underlain by rocks of the Yellowknife Group, massive basic lavas, pillowed lavas, basic fragmental rocks and massive acidic lavas that are overlain conformably by greywacke and shales. All rocks are cut by granitic rocks and diabase dykes. The volcanic and sedimentary rocks strike about north and are involved in north-trending folds. They may also be folded in northeasterly-trending crossfolds.

The showings are located in metamorphosed fragmental volcanic rocks just east of the contact with the sedimentary rocks. The mineralized zone is at about the same stratigraphic level as those on the Taurcanis property. The main showings occur just south of a small lake locally known as Saucer Lake about 2,800 feet south of the Taurcanis boundary. Some quartz veins are also found between Saucer Lake and the northern boundary along the contact. Lord (1951, p. 188) describes the showings as follows:

> "The southern three trenches... lie at 100-foot intervals along a line trending north 10 degrees east. They expose rust-stained rock, in part dark green or black, and banded amphibolite that strikes about north and dips 75 to 85 degrees east. Lenticular bodies of quartz as much as 1 foot wide, occur in the amphibolite, and some of the rock near the quartz contains tourmaline and much arsenopyrite. Fine-grained quartz-mica schist, slate, and phyllite outcrop about 200 feet east of the trenches.
>
> "The northern four trenches... form a line that trends about north 15 degrees east for a length of about 800 feet. The exposed rocks are probably altered tuffs; they are dark green and brown, banded amphibolites that strike about north 20 degrees east and dip easterly at 80 degrees. Sedimentary rocks outcrop about 300 feet east of the trenches. In and near the trenches the amphibolites contain abundant disseminated arsenopyrite, smaller amounts of pyrrhotite, pyrite, and chalcopyrite(?) and, adjacent to quartz veins, tourmaline. The most northerly trench is on the south shore of a small lake, and the two nearest trenches are 500 and 600 feet south of it. These three trenches expose irregular quartz bodies intimately mixed with mineralized, rusty amphibolite. From south to north, they were estimated to expose 70 per cent of quartz across a width of 24 feet, 75 per cent quartz across two sections with a total width of 9.5 feet, and 75 per cent quartz across a width of 10 feet. The quartz is coarse grained and white to dark grey. At the lake shore it contains a very little pyrite, arsenopyrite, visible gold, and scheelite. It is doubtful if comparable amounts of quartz occur between these trenches."

In 1958 the showings and zone along the contact between the volcanic and sedimentary rocks were tested by drilling for a distance of about 4,000 feet south of the Taurcanis boundary. Thirty-six holes totaling 7,800 feet were drilled, generally at 100-foot intervals, but in some sections at 50-foot intervals. About 15 of these holes were located to test the surface showings of quartz north of Saucer Lake. Narrow widths of quartz containing low values of gold were intersected. Just south of Saucer Lake narrow widths of fairly good grade gold-bearing quartz were cut. Assays of samples from the old trenches correlated well with those from drill core.

Other Occurrences in the Matthews Lake Area (27)

Following are descriptions of several showings by Moore (1956, pp. 44-45). The showings are located on maps included with the above report. The property of Payne Yellowknife Gold Mines, Limited is also described by Lord (1951).

Newnorth Gold Mines Limited

"A group of thirty-six unsurveyed mineral claims in the northernmost part of the Courageous-Matthews Lakes area was prospected by Newnorth Gold Mines Limited. A number of shear zones from a few inches to 8 feet in width were stripped and trenched. The shear zones are in mafic volcanic rocks and meta-gabbro and contain quartz veins in some of which gold, arseno-pyrite, and pyrite occur. Matheson (1945) reports one vein averaged 1.44 ounces of gold a ton across an average width of 2 feet for a length of about 110 feet.

TMK Group

"This group of nine mineral claims in the northern part of the Courageous-Matthews Lakes area was optioned to Frobisher Exploration Limited in 1945. The claims include an area about 3/4 mile along the strike of the contact between the volcanic rocks on the west and the sedimentary rocks on the east. One showing explored is in massive, mafic volcanic rock and consists of a shear zone from 1 foot to 2 feet wide followed by lenticular veinlets of white and blue to black vein quartz. This deposit contains visible gold, arsenopyrite, and chalcopyrite. Matheson (1945) reported this vein as averaging 1.98 ounces of gold a ton across an average width of 20 inches for a length of 115 feet.

Kennedy Showings

"These showings are about 2 miles east of the northeast bay of Courageous Lake and consist of veins and stringers of pink and milky to grey quartz most of which are less than 3 inches wide but a few up to 1 foot wide. The quartz veins and stringers occur in moderately to highly sheared zones both in slate and greywacke. Such zones at some places are marked by a gossan. The beds dip steeply and some veinlets parallel these; in some places the veins dip as low as 70 degrees and cross the dip of the beds but parallel their strike; and at other places the veins follow fractures that cross both the strike and dip of the beds. Gold is visible in the veins, along the cross-fractures, and also is reported to occur in veins parallel to the strike of the beds. Other minerals noted in these veins include arsenopyrite, pyrite, chalcopyrite, galena, and ankerite. Veinlets of a pinkish, apparently barren quartz, cut the gold-bearing quartz.

Payne Yellowknife Gold Mines Limited

"This company completed stripping, trenching, and diamond drilling to explore deposits in the sedimentary rocks about Courageous Lake. One deposit situated about 1,500 feet north of the point of intersection of latitude 64° 11' and longitude 111° 17' is in slate forming a part of a series of alternating bands of slate, greywacke, and felsic rock. The deposit is a network of quartz veinlets of variable thickness up to 6 inches along a zone 3 feet wide at places. This zone dips approximately vertical and crosses

the beds of slate that dip 80 degrees. Gold and arsenopyrite are visible, most of the arsenopyrite occurring as scattered crystals in the slate up to 6 inches away from the quartz veins. Other deposits explored by this company include quartz veins and shear zones that are capped by gossan.

Copper Occurrences

"About 1 1/2 miles west from the south end of Matthews Lake a grab sample taken from an area of about 3 square feet of gossan assayed 5 per cent copper and 0.01 ounce of gold a ton. Bedrock of this part of the area is mafic volcanic rocks but the gossan zone contains some feldspar porphyry. Veinlets of quartz in a gossan zone 5 feet wide beside the small lake 1,000 feet north-northwesterly from the intersection of latitude 64° 02' and longitude 111° 15' contains small amounts of pyrite, pyrrhotite, and chalcopyrite. At about 2,700 feet north-northwesterly from the intersection of latitude 64° 02' and longitude 111° 15' a gossan averaging at least 10 feet wide and more than 60 feet long consists of 75 per cent or more of sugary, vuggy quartz containing scattered bits of pyrite, pyrrhotite, chalcopyrite, and galena. These three showings probably are along the same zone of gossan.

Molybdenum Occurrences

"Near the northeast bay of MacKay Lake at a point about 300 feet north of the intersection of latitude 64° 01' and longitude 111° 14' veinlets of quartz in mafic volcanic rocks are estimated to contain about 4 per cent molybdenite."

BB Group (28)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-M-2; De Geoffroy, 1953; Moffat, 1952.

The BB group of 33 claims is about 2 1/4 miles southeast of the south end of Indian Mountain Lake at about 63° 02'N, 110° 56'W. The property is 8 miles north of McLeod Bay, East Arm of Great Slave Lake, and about 115 miles northeast of Yellowknife. The claims are now held by Indian Mountain Metal Mines, Limited.

History and Development

The BB claims were staked in 1948 on base metal showings discovered by Gordon Wonnacott and Joe Harriman who were in the employ of James McAvoy. The property was optioned to Hollinger Consolidated Gold Mines, Limited later that year. The company relinquished their option late in 1949. During this period, 15,825 feet of diamond drilling were completed in addition to surface trenching and some geological mapping. As a result of this work it was calculated that 271,000 tons of ore averaging 15.68 per cent zinc, 1.67 per cent lead, and 5.21 ounces of silver per ton were indicated

down to the 400-foot horizon. The ore was found in a lenticular shoot about 300 feet in length. One of two deep vertical drillholes drilled in 1949 intersected a 39-foot width of ore at about the 800-foot horizon that assayed 6.90 per cent zinc, 0.16 per cent lead and 4.14 ounces of silver per ton.

In 1951 a company, Joe Indian Mountain Mines, Limited, was formed to develop the property. This company was reorganized in 1953 and called Indian Mountain Metal Mines, Limited. In 1952 a second development program was completed which included further prospecting of the claims, detailed geological mapping in the vicinity of the main showings and a little over 7,000 feet of diamond drilling of the main showing. Ore reserves indicated by this and the previous work were calculated to be 923,850 tons averaging 10.30 per cent zinc, 0.85 per cent lead and 3.45 ounces of silver per ton down to the 650-foot horizon.

The property was closed in 1953 and no further work was done until 1957, when about 5,500 feet of drilling was completed on a mineralized zone 1,500 feet west of the main zone that had not been previously developed. As a result of this work, an estimated 69,915 tons of ore averaging 6.15 per cent zinc, 1.4 per cent lead, and 5.3 ounces of silver per ton were developed down to the 250-foot horizon.

Geology

The claims are underlain by metamorphosed volcanic and sedimentary rocks of the Yellowknife Group. These rocks are cut by granitic rocks and pegmatite. Much of the following description is summarized from an unpublished geological report by G. de Geoffroy. Only a few small areas on the claims are underlain by dark green, fine-grained basic metavolcanic rocks that commonly display compositional banding. Essential minerals are dark green amphibole and plagioclase usually of andesine composition. Quartz, biotite and iron ore occur in minor amounts. Metasediments consist of quartzite and biotite schist with a few limy interbeds. The chief variation in the non-limy rocks is the amount of biotite and muscovite that occurs with the quartz and plagioclase. Locally the rocks are garnetiferous and spotted schists containing porphyroblasts of cordierite and locally sheaves of sillimanite occur along with garnets. The rocks probably represent the metamorphosed equivalents of subgreywacke, greywacke and shales. The limy horizons consist of calcite along with diopside, green hornblende, garnet, plagioclase and epidote. Bands of hornblende-, quartz-, and plagioclase-bearing rocks probably were also originally impure limy sediments. These rocks are intruded by granitic rocks that contain biotite, muscovite, microcline, plagioclase and quartz and are fine to medium grained and gneissic to massive. Contacts of the granites with hornblendic rocks are sharp but are gradational with metasediments, particularly with biotite-rich phases. A short distance off the property the rocks are cut by granodiorites that may be older than the granite described above. Numerous pegmatites occur in the sediments and are thought to be related to the two-mica granites. These dykes and associated veins of glassy quartz occur along bedding or foliation planes, in drag folds and along axial plane cleavages. They consist essentially of quartz and microcline and albite and contain variable but minor amounts of biotite, muscovite, tourmaline and garnet. Many dykes contain noticeable amounts of pyrite, pyrrhotite, chalcopyrite, sphalerite and less commonly

molybdenite. The sediments are intensely folded into west of north to north-trending folds that are warped, in places sharply, along northeast-trending axes. The latter flexures appear to plunge down the limbs of the older folds.

These rocks are cut by steep-dipping faults that strike in a northeasterly direction and are generally steep dipping. Where known, horizontal displacement on these faults is small. The rocks in the mineralized zone are cut by a fault that strikes at 110 degrees and dips steeply to the north. It appears to have cut the ore zone below the 650-foot horizon and to have displaced the north block to the east about 150 feet and about 120 feet downward.

The main ore zone known as the BB zone occurs on mineral claim BB No. 3. The BB zone is located in a band of mineralized sediments that has been traced over a length of 2,600 feet and has a width of up to 300 feet. This mineralization is localized in a sharp flexure in the sediments, that has the shape of a modified 's'. At a small lake, locally known as Kennedy Lake, at the west end of the zone, the beds strike southeasterly and then curve to an easterly trend. Finally the beds curve sharply to the southeast. The BB zone is localized in the crest or area of maximum curvature of this latter flexure. The zone strikes about southeasterly and dips to the northeast at about 50 degrees, is generally conformable to the bedding in the enclosing sediments and is about 350 feet long and up to 50 feet wide. The sediments in and near the zone appear to be sheared and locally, mica, is developed. Movement along the beds is thought to have occurred during folding. Pegmatites and quartz veins occur parallel to the beds or shearing in the mineralized zone. The location of sulphides is apparently controlled by folding. Also, according to G. de Geoffroy, the mineralized zone occurs in a definite horizon in the stratigraphic sequence. From east to west across the zone the rocks vary from quartzite with limy and amphibole-bearing horizons, to quartzite with visible quartz eyes, to garnet-biotite schist to biotite schist. Pyrite and pyrrhotite are found in the quartzite with limy horizons as blobs and lenses of fine to coarse grains along bedding or schistosity planes. Sphalerite and pyrite with minor galena and chalcopyrite occur just below the horizon of quartzite with large quartz eyes. Lenses of massive sulphides occur just west of this quartzite horizon and grade to a zone of disseminated sulphides farther west from the quartzite marker horizon. Length of individual lenses of high grade ore is rarely over 200 feet but they are remarkably persistent down dip, having been traced by drilling to a depth of at least 600 feet. The lenses vary in width from 1 to 18 feet. The ore in the high grade lenses consists of bands of sulphides comprising pyrite cubes or blobs in a fine-grained mass of sphalerite alternating with bands of coarse-grained pyrite and bands of fine-grained sphalerite. Galena, a minor constituent, occurs as small grains in sphalerite. Farther from the quartzite marker horizon, sphalerite, pyrite and pyrrhotite occur as blobs, lenses and seams along the planes of bedding or schistosity. Pegmatites in the mineralized zone contain sulphides.

Pyrite and pyrrhotite with minor ore minerals are found along the strike of the BB zone to the southeast for several hundred feet and in the opposite direction along the modified 'S'-shaped zone to Kennedy Lake. Near Kennedy Lake about 1,500 feet west of the BB zone, a second small body of ore has been outlined. This ore also is localized where the beds curve from an easterly to a northwesterly strike. The less pronounced curvature of this flexure may account for the smallness of the ore zone. Ore occurs at the same horizon as in the BB zone.

Gem and Dawn Groups (29)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-M-2.

The 12 Gem claims and 8 Dawn claims make up a group about 1 mile east of the central part of Indian Mountain Lake, about 120 miles north of east of Yellowknife. The Dawn claims were staked in 1957 and the other claims in 1958. The property was optioned to Mount Wright Iron Mines Company Limited in 1958 and in the winter of 1959 this company drilled 39 holes on 3 showings on the Dawn No. 1, and Gem No. 7 and 8 claims. The total footage drilled was about 6,000 feet. An EM survey was done around the showings in the spring of 1958. No further work was done in 1959 on the property. The ground covered by these claims has been staked by other interests at various times since 1948 when base metal mineralization was discovered in the region.

The claims are underlain by metamorphosed basic lavas and greywackes of the Yellowknife Group. Granitic rocks cut these rocks west of the property, and many small masses of granitic rocks occur within the rocks of the Yellowknife Group in the area. The older rocks are folded into northeasterly-trending folds. They may also be affected by crossfolds along northwest-trending axis.

The author has not examined the showings and knows little about their geology. Mineralization occurs in sheared rocks that may be shear zones related to faulting or to folds. The zones trend in a northerly direction and consist of pyrite, pyrrhotite, chalcopyrite, sphalerite and locally arsenopyrite disseminated along shear planes as blobs or seams. The main showing occurs on the south part of mineral claim Gem No. 8. Mineralization has been traced by drilling over a length of about 250 feet and width of 3 to 6 feet. Copper values in samples of drill core range between 0.5 and about 4 per cent over the above widths. Drillholes along the extension of the zone failed to intersect significant mineralization. A second showing occurs about 1,600 feet to the north and a little to the west on Gem No. 7. Similar mineralization and copper content were tested by drilling over a length of about 100 feet. In the showing on mineral claim Dawn No. 1, the mineralization is similar to that described above but the proportions of sulphides differ, in that sphalerite is more abundant than chalcopyrite. Samples of drill core assay less than 1 per cent per ton of copper and between 1 and 5 per cent of zinc per ton over widths of about 4 feet. The zone, traced by drilling over a length of about 100 feet, strikes in a northerly direction.

Steed Group (30)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-M-2.

The Steed group of 36 claims was held by Nordain Exploration Limited. The group is located about 12 miles west of south of the outlet of Benjamin Lake at about 63° 00'N, 110° 48'W. In 1956 the company flew an area around these claims with an airborne EM. An anomaly was outlined by this survey and was later examined on the ground but lack of outcrop made it

impossible to determine the cause of the conductor. Ground EM work at this time verified the results of the airborne work and in 1958, 6 holes with a total footage of 2,100 feet were drilled to test the conductor. Significant sulphides were not intersected but graphite was identified in drill core. Graphite, therefore, probably accounts for the conductor. No further work was done on the claims.

The claims are underlain by a greywacke-shale assemblage of the Yellowknife Group which has been metamorphosed to biotite schist and knotted schist. These rocks are cut by small bodies of granitic rock; large masses of granitic rocks occur to both the east and west. The rocks are cut by diabase dykes. Foliation and bedding in these rocks strike east of north and dip to the east at about 60-70 degrees and fold axes trend in a northerly direction. Apparently shearing on outcrops near the conductor suggests the presence of a strike fault close to the conductor. There is a possibility that the shearing may be axial plane cleavage.

Bill Group (31)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet; Henderson, 1941.

The Bill group of claims is located about 3/4 mile north of Hearne Channel, Great Slave Lake about 5 miles east and a little south of the mouth of the Francois River at 62°04'N, 112°47'W. The property is about 50 miles southeast of Yellowknife. The claims were staked in 1956 by W. Bellis. A few trenches were excavated on a mineralized zone in that year, and a geological map of the property was prepared in the following year. No further work was done and the claims have since lapsed.

The claims are underlain by a complex of basic rocks and by granitic rocks. The basic rocks are part of a large mass described by Henderson (1941d) as a "complex of gabbro, diorite and anorthosite, all of which are probably differentiation products of the same parent magma". In the small part of the intrusion observed by the author the above rock types plus a more basic rock approaching the composition of a pyroxenite were seen. In several places the rock was banded with mafic-rich bands alternating with feldspathic bands. Such bands vary in width up to 4 inches. These rocks are cut by dykes of fine- to coarse-grained granite that consist mostly of very pink feldspar and quartz.

The showing occurs just north and a little east of a small lake that is about halfway along the south contact of the basic intrusion. It consists of a rusty weathering zone about 1,500 feet long and up to 500 feet wide that strikes in an easterly direction. Sulphides consisting of pyrrhotite, pyrite and minor chalcopyrite are disseminated as small grains in the gabbroic rock in amounts varying from a few scattered grains to about 5 per cent. The control of the variation is unknown but in banded rocks the mafic-rich bands seem to be richer in sulphides. Fractures that commonly strike north, northeast and east also occur in this zone and brecciation is visible along some fractures. Sulphides occur in some of these fractures. Grab samples from this zone return assays of nickel and copper in the order of 0.1 per cent.

Cavalier Group (32)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-N-1.

The Cavalier group of 10 claims is about 10 miles south of Walmsley Lake (about 63° 12'N, 108° 42'W) or about 190 miles east-northeast of Yellowknife. The mineralization was discovered and reported by members of a field party of the Geological Survey of Canada (Folinsbee, 1952). In 1958 the claims were optioned from Dr. Paul Bevan by North Goldcrest Mines Limited. At that time additional claims were staked by this and associated companies to cover much of the volcanic-sedimentary belt in which the original find is located. In the summer of 1958, the ground was mapped geologically, mineralized zones were sampled carefully and about 3,800 feet of diamond drilling was completed. In the spring of 1959 about 50 line miles of ground EM survey was done on the Cavalier and surrounding claims. No further work was done in 1959.

The claims are underlain by hornblende gneiss that probably is the metamorphosed equivalent of basic volcanic rocks, but which may be in part of sedimentary origin. In conformable contact with the hornblendic rocks are biotite gneisses and schists that are probably metamorphosed greywacke-shale. These rocks, which are correlated with the Yellowknife Group, are intruded by biotite granodiorites and by northeasterly trending dykes of diabase. The hornblendic and metasedimentary rocks are folded into a syncline in which the sediments form the core. The trace of the axis trends northeast and the structure plunges to the northeast. A study of the regional geological map (Folinsbee, 1952) suggests the possibility of refolding along north- to northwest-trending axes.

The main mineralized zone, A-1 zone, occurs on the Cavalier claims in hornblendic rocks very near the contact with metasediments. It begins near the nose of the fold and strikes about northeast roughly parallel to the contact and has been traced on the surface for about one mile. Sulphides, consisting of pyrite and pyrrhotite with smaller amounts of erratically distributed chalcopyrite and sphalerite, occur as lenses and pods commonly along foliation planes. In places shearing is evident and sulphides are disseminated in the shear planes. The amount of sulphide varies considerably; sections of massive sulphides occur in several places in the central part of the zone. The average width of significantly mineralized material may be about 15 feet. This zone was tested with 11 drillholes and near its southwest end a section about 300 feet long containing significant amounts of chalcopyrite and sphalerite in the pyrite and pyrrhotite was outlined. Individual sections of this part of the zone contained some copper and zinc but the writer has no figures of overall average grade. The precious metal content of assayed sections is low, usually less than 0.1 ounce per ton of gold and 1 ounce of silver. Five other zones on the Cavalier group and in the northeast-trending belt of hornblendic rock on nearby groups of claims were examined in detail and drilled. These zones were similar to the A-1 zone but seemed to contain less chalcopyrite and sphalerite. Other gossan zones are known to occur in this belt of rocks but they were not examined in detail.

XLX Group (33)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-10, 85-I-16.

The XLX groups of 41 claims are located on the northwest shore of Turnback Lake on Beaulieu River about 58 miles east-northeast of Yellowknife. The claims were staked for Cominco Limited in 1951 in several separate groups around the old XL and OK claims which were held by Westfield Mining Company. Showings on the latter claims are described by Lord (1951, pp. 298-300).

After staking the claims the company prospected them in detail and completed a magnetometer survey of parts of the claims. An anomaly, outlined in Turnback Lake just off the shore, was drilled in the winter of 1952. A mineralized zone containing pyrrhotite as the abundant sulphide was cut by the drillholes; only minor amounts of copper-lead-zinc were found in the zone. In 1953 the claims were mapped geologically and more magnetometer work was done. Many small mineralized zones were carefully sampled. In 1954 a ground EM survey was completed on the claims and about 6 significant conductors were found and in 1955, 13 holes were drilled to test these anomalies. Sulphides were intersected in all the conductors and significant but low copper lead-zinc values were found in three of the conductors. Assays for copper and lead are commonly less than 1 per cent while those for zinc are somewhat higher. The company still holds the ground.

The showings occur in metamorphosed sediments of the Yellowknife Group. The sediments are located along the eastern contact of a north-northeast-trending granitic mass. The strata strike about 30 degrees east of north and dip to the southeast at about 70 degrees. They were probably originally greywacke and shale but have been altered to biotite gneiss which is locally garnetiferous. Bands of hornblende gneiss which consist of green hornblende, plagioclase and locally garnet and biotite occur in the biotite gneisses. Associated with these hornblendic rocks are narrow bands of white crystalline limestone containing some garnet and possibly vesuvianite. Diopside is commonly developed in the limestones and as it increases in amount the rock becomes light green in colour. Pegmatites cut or replace all the above rocks.

Disseminated and massive sulphides occur in amphibole gneiss and in associated lime-silicate rocks and crystalline limestones. Only minor mineralization is found in the biotite gneisses and little or no sulphides occur in the granitic gneisses or in pegmatites. The mineralized zones that are exposed are marked by gossans. Mineralized zones are tabular and the amount of sulphides in individual zones varies from disseminations of a few per cent to massive sulphides. Across the strike, bands of almost massive sulphides are separated by bands of rock containing disseminated sulphides. These changes also occur along the strike of individual bands. Such zones vary greatly in size, the largest being over 1,000 feet long and up to 100 feet wide. Sulphides consist essentially of pyrrhotite, with lesser amounts of pyrite, galena, chalcopyrite, sphalerite with some arsenopyrite and molybdenite. The host rocks are not altered in the mineralized zone but consist of the same metamorphic assemblages as in the barren rocks.

Some of the showings on the XLX claims are extensions of the zone on the XL claims described by Lord (1951, pp. 298-300). Lord gives the

results of the sampling of the XL portion of the zone in which three sections were outlined with lengths from 100 feet to 370 feet and widths from 5 to 12 feet that available data suggested contained about 2 per cent copper, 1 to 2 per cent lead and 5 to 8 per cent zinc. In general similar showings on the XLX claims contain lesser amounts of these three metals in about the same proportions. Distribution of these metals in any one mineralized zone tends to be erratic.

Ross Group (34)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-11; Lord, 1951.

The Ross group of 11 claims is at the southeast end of Victory Lake about 45 miles east-northeast of Yellowknife. The claims were staked for Cominco, Limited in 1953. During the summer of that year, the claims were mapped geologically and ground electro-magnetic survey was done. In 1956, 9 diamond-drill holes were completed to test the showings and a conductor outlined by the EM survey. The conductor was over and along the extensions of the surface showings. Mineralization was intersected in most holes but significant values of lead-zinc were encountered in only one hole. No work has been done on the property in recent years.

The Ross group covers ground that was staked initially in 1937 as the Ruth group. A description of the ground is given by Henderson (1939a, pp. 13, 14) as follows:

> "The claims include a point of land extending into Victory Lake that is underlain by sediments and a narrow belt of volcanic rocks. A heavily mineralized shear zone occurs along the northeast contact of the lavas with the sediments. The sediments are fine grained, knotted quartz-mica schist. The volcanic rocks are green weathering andesites and light grey, buff weathering, fine grained, banded rhyolites, which in places contain small phenocrysts of quartz and feldspar. Some of the rhyolite may be intrusive. Aplitic dykes, probably related to the small granitic body to the southeast, occur near the southeastern end of the claims. A fine-grained, light weathering, banded rock, which is probably a rhyolite flow, has been altered to sericite schist along a contact with sediments, and the schist is heavily impregnated in places with pyrite, chalcopyrite and pyrrhotite. A number of veins or lenses of bluish quartz, heavily mineralized in places with galena, pyrite, chalcopyrite and some arsenopyrite and sphalerite, lie in the shear zone."

McCrea River Gossan (35)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-P-11.

The McCrea River gossan was discovered in 1956 by W. Bellis and J. Harriman who were working independently of each other. Altogether about

70 claims, consisting of the Bob, Bill, X-ray, Sunray and Ann groups were staked by the two prospectors to cover the gossan zone. A few pits were blasted to expose fresh material in parts of the zone. A couple of X-ray drillholes were drilled into the mineralized zone by J. Harriman. No further work was done and by 1958 the claims had lapsed.

The claims are just east of the right angle bend in the McCrea River at about 63° 33'N, 113° 15'W and are about 85 miles north-northeast of Yellowknife.

The claims are underlain by granitic gneisses that contain many inclusions or bands of highly metamorphosed sedimentary rock consisting now of biotite gneiss, locally garnetiferous, and hornblende gneiss. Foliation in these rocks trends northwesterly and generally dips steeply. The gossan itself is, for the most part, enclosed by fine-grained, grey weathering biotite schist derived from a greywacke-shale sequence, but at its southeast end, near Ames Lake, the wallrocks are hornblende gneisses.

The gossan is formed by weathering of sulphides, comprising pyrrhotite and some pyrite, disseminated in the gneisses. Massive sulphides occur in small bodies in the zone. The width of the zone varies between a few feet and 50 feet, and it has been traced along its strike for roughly six miles from just north of Ames Lake, northwest across the McCrea River to an unnamed lake 1 1/2 miles north of the river. The zone strikes northwest and seems to be conformable to the foliation. Sulphides occur as blobs or lenses in or along foliation planes in the rocks. The most abundant sulphide is pyrrhotite but pyrite is also found and in several places minor amounts of chalcopyrite have been observed. Most assays of grab samples give low values for copper and traces of nickel. Where unweathered material can be observed, there is little evidence of alteration of the country rock in the mineralized zone.

Liz Group (36)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-M-11; Henderson, 1944.

The Liz group of 20 claims, located at 63° 33'N, 111° 10'W, lies along a chain of small lakes about 3/4 mile southeast of the southeast shore of Camsell Lake. The property is about 125 miles northeast of Yellowknife. E. Boffa and associates staked 9 claims during the summer of 1957 and optioned them to Cominco Limited in 1958. An additional 11 claims were staked for the company in the spring of 1958.

During the summer of 1958, the claims were mapped geologically and carefully prospected; EM and magnetometer surveys were completed over the mineralized zones. Significant anomalies thus outlined were tested by 3 short diamond-drill holes whose total footage was about 700 feet. No further work was done on the ground in 1959.

The claims are underlain by basic volcanic rocks and sedimentary rocks of the Yellowknife Group which are intruded by gabbro and anorthosite. These rocks are cut by granitic rocks that outcrop a short distance southeast of the claims. The volcanic rocks consist of dark weathering hornblendic rocks and light weathering rhyolites and tuffaceous rocks. A series of metasedimentary rocks of greywacke and shale composition is structurally

conformable with and probably overlies the volcanic rocks. The strata strike northeast and dip steeply to both the northwest and southeast. The rocks are metamorphosed so that the basic volcanic rocks now consist of hornblende and plagioclase and in places form hornblende-plagioclase gneiss; the sedimentary rocks are quartz-biotite schist or gneiss. The anorthosite that intrudes the metavolcanic rocks is a light coloured rock consisting of blocky grains of basic plagioclase up to 1 inch long with minor amounts of hornblende and chlorite. It grades, in places, to a gabbro containing plagioclase and hornblende in about equal proportions. Gabbro dykes or sills also cut the metavolcanic rocks. These rocks are cut by a pinkish, medium-grained, equigranular and gneissic granodiorite.

The showings are located on Liz 3, 5, 9, 12 and 13 claims. The original showings on claims Liz 3 and 5 consisted of frost heaved mineralized boulders in a muskeg, about 3/4 mile southeast of Camsell Lake just north of Liz Lake. Two additional zones were outlined nearby that consist of sulphides and quartz localized in northeast-striking, steep-dipping shear zones in metavolcanic rocks near and parallel to gabbro contacts. Sulphides, consisting of pyrrhotite with pyrite and some chalcopyrite, partially replace the sheared basic rocks so that mineralized zones contain up to about 50 per cent sulphides. Quartz veins or pods also occur in the shear zones, apparently in sections mineralized with sulphides. The quartz is white to grey and contains pyrrhotite, pyrite and chalcopyrite in irregularly shaped fractures. Grab samples from boulders are reported to contain from 0.15 to 3.4 per cent copper.

A third mineralized zone, which is on Liz claims 9, 12, 13, consists of fine-grained pyrrhotite, magnetite and some pyrite disseminated along a northeast-trending, steep-dipping shear zone in metavolcanic rock. Mineralized sections occur as closely spaced lenses separated by barren schist, and vary in width up to 20 feet and in length up to 2,000 feet. Minor amounts of sulphides are disseminated along the shear zone over greater lengths.

Three drillholes were completed to test anomalies outlined on the Discovery zone and sulphides and mineralized quartz were cut in widths up to about 8 feet.

Zero Group (37)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-A-7; Fraser, 1958.

The Zero group of 18 claims is located at 64° 17'N, 112° 33'W or about 15 miles southeast of the east end of Winter Lake and about 138 miles northeast of Yellowknife. These claims were staked during the summer of 1957 for Canex Aerial Exploration Limited, a subsidiary of Canadian Exploration Limited, to cover a zone of sulphide mineralization discovered by their prospectors. In 1957, several trenches were located on the zone and a fairly detailed sampling program was completed. The property was turned back to prospectors in 1958.

The claims are along the eastern margin and near the south end of a belt of metamorphosed volcanic and sedimentary rocks of the Yellowknife Group which extends north to Point Lake. The claims are underlain by fine-grained hornblende gneiss that, locally, contains structures resembling

pillow remnants and, therefore, in part at least, represent metamorphosed volcanic rocks. These rocks contain a few narrow bands of biotite schist. The rocks are cut by fine- to medium-grained, pink to grey, granitic gneisses of varying composition that contain many inclusions of hornblende gneiss. The rocks strike east of north and dip steeply and are probably on the east limb of a major syncline trending north to north-northeast. From the air, strike variations can be seen which suggest that minor folds are associated with the major structure and that the whole belt may be cross-folded along the northwest axes.

The showings occur in north-northeast striking, steep dipping, shear zones in hornblende gneiss. Rocks in the zone have been chloritized and locally a chlorite schist is developed. Mineralization consists of pyrrhotite with some pyrite and minor chalcopyrite. Sulphides, which occur over a width varying between 5 to 35 feet over a length of about 3,000 feet, are disseminated along shear planes and in the central portion of wide sections of the zone are essentially massive. Massive sections grade through a zone of disseminated sulphides to barren rock, both across and along the strike. Fine-grained pyrrhotite is most abundant and pyrite occurs as blobs in the pyrrhotite and forms about 15 per cent of the massive sulphides; it is less abundant in sections of disseminated sulphides. Chalcopyrite is rare. In sections of massive sulphides, quartz occurs as lenses and as evenly distributed round blobs about 1/4 inch in diameter. A quartz vein about 15 feet wide is found along the west contact of the zone over part of its length. Pyrite and pyrrhotite occur in fractures in the quartz and form less than 5 per cent of the vein material. Assays of samples from the zone indicate traces of nickel, copper, zinc and very minor amounts of gold. Samples from the quartz vein contain traces of gold.

Harriman Claims (38)

Reference: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-H-3.

The Harriman claims are about 1 mile south of the central part of Point Lake and about 195 miles north of Yellowknife. During the summer of 1957, J. Harriman and associates staked a large number of claims which included the Bug, Busy, and Big groups to cover several mineralized shear zones. A total of about 200 claims were recorded but all except the above mentioned groups were allowed to lapse after the first year. In 1957 the claims were mapped geologically and in 1958 the ground was optioned to Cominco, Limited. This company performed some work on the ground during the summer of 1958 but the author has no knowledge of the nature of the work.

The claims are underlain by hornblendic rock and biotite schist which form part of the Yellowknife Group and are the metamorphosed equivalents of sedimentary rocks and possibly basic volcanic rocks. The rocks are intruded by dykes and irregularly shaped bodies of gabbro and granitic rocks. The metasediments are part of a north-trending belt of rocks of the Yellowknife Group but in the area covered by the claims the rocks strike in

an easterly direction and dip steeply. Examination of air photos suggests that these rocks are locally folded along east-striking axes. All the rocks are cut by shear zones which strike east and northeast.

Sulphide mineralization occurs in two shear zones. The main showings are found in an east-striking shear which, where observed, dips to the north at angles varying between 30 and 70 degrees. This shear zone can be traced for about 4 miles and varies in width up to 200 feet. The author observed sheared rocks along both walls of the draw which marks the position of the shear zone for a length of 1 1/4 miles. The sheared rock is graphitic; shear planes are highly contorted and thrown into complex drag folds. Sulphides, consisting of pyrrhotite with some chalcopyrite, occur along shear planes as blobs and short narrow lenses. In places, quartz is found with the sulphides. Sulphides and quartz are commonly concentrated along crests of small folds in the sheared rock. Mineralization is reported to occur along the whole length of the shear zone. Grab samples which were assayed contained less than 1 per cent nickel and up to 4 per cent copper. The second shear, which trends east of north and contains sulphide mineralization, is similar to the above described zone in all respects.

National Lithium Corporation (39)

The National Lithium Corporation was formed in 1956 to take over the claims of Geolex Exploration and Development Limited, General Lithium Corporation Limited, and Kix Minerals Limited. The company in 1956 held 414 claims in various groups in a number of localities in the area east of Yellowknife. Most of these claims were staked in 1955 to cover lithium-bearing pegmatite dykes. Some 300 dykes were reported to occur on the claims of which roughly 50 dykes were known to contain some spodumene. In 1955 and 1956, seven dykes or groups of dykes were tested with a few drill-holes. A total 15 holes were drilled on a group of dykes on the Bighill property at Bighill Lake. Eleven holes were drilled into 5 other dykes on various other properties. A total of 8,894 feet of drilling was completed. About 100 trenches with an aggregate length of 2,500 feet and volume of 798 cubic yards were excavated on a number of dykes on various properties.

In 1957 further drilling, trenching and sampling was done by National Lithium Corporation, mostly on the Bighill property. The author does not know of the results of this work. No further work has been done and many of the claims have since lapsed.

Until 1957 not enough work had been done on any of the dykes to calculate the lithium content of any significant tonnage in any of the dykes. The work did suggest, however, that substantial tonnages of material in a number of dykes containing from 1 to 1.5 per cent lithium oxide might be outlined with further development work.

Pegmatites in the Yellowknife-Beaulieu River area have been described by Jolliffe (1944a), Fortier (1947a), Rowe (1952), Hutchinson (1955) and the lithium-bearing dykes by Mulligan (1965). The author examined only a few of the many dykes held by National Lithium and can add little to previous descriptions.

National Lithium's holdings in 1956 are listed below:

(1) From General Lithium Corporation Limited

Bighill Lake Area	Grant Numbers
UM 1 and 2	79974 and 79975
UM 30 to 36 incl.	92096 to 92101 incl & 91769
Murphy 1 to 12 incl.	92128 to 92139 incl.
Murphy 15 to 18 incl.	95773 to 95776 incl.
CCD 1 to 18 incl.	91937 to 91954 incl.
Pat 1 to 18 incl.	91843 to 91860 incl.
Fay 1 to 18 incl.	93199 to 93216 incl.
Li 11 and 12	91955 and 91956 incl.
Hill 1 to 4 incl.	79970 to 79973 incl.
Hill 1 to 8 incl.	91641, 92089 to 92095 incl.
Li 33, 44, 55, 66, 77 & 88	91642 to 91647 incl.
Upland Lake Area	
Tim 1 to 8 incl.	92102 to 92109 incl.
Hidden Lake Area	
UM 1 and 2	91566 and 91567
UM 9	91867
Jim 1 to 6 incl.	91574 to 91579 incl.
Bill 1 to 6 incl.	91568 to 91573 incl.
Lit 1 to 9 incl.	79813 to 79821 incl.
UM 10 to 24 incl.	91868 to 91882 incl.
UM 3 to 8 incl.	91861 to 91866 incl.

(2) From Kix Minerals Limited

Hidden Lake Area	
JM 1 to 14 incl.	93659 to 93672 incl.

(3) From Geolex Exploration & Development Limited

Bighill Lake Area	
Mint 1 to 12 incl.	92244 to 92256 incl.
Mearl 1 to 12 incl.	92232 to 92243 incl.
UM 1 to 36 incl.	91073 to 91108 incl.
Hidden Lake Area	
ED 1 to 6 incl.	92158 to 92163 incl.
UM 25 to 56 incl. & fraction	91109 to 91141 incl.
Lots 1 to 36 incl.	91142 to 91177 incl.
Day 1 to 36 incl.	91036 to 91071 incl.

(3) From Geolex Exploration & Development Limited (cont'd)

Blaisdell Lake Area	Grant Numbers
Cota 1 to 3 incl.	73775 to 73777 incl.
Cota 4 to 21 incl.	90735 to 90752 incl.
Upland Lake Area	
Geo 3	90795
Geo 4 and 5	90796 and 90797
Geoex 1 to 15 incl.	91305 to 91319 incl.
Buckham Lake Area	
Geo 1 and 2	90793 and 90794
MacKay Lake Area	
Kay 1 to 36 incl.	98734 to 98769 incl. (restaked numbers)

Hutchinson outlined a regional zonation of pegmatites outward from a mass of granitic rock in the Ross Lake area. Spodumene pegmatites occurred in the zone farthest from the granite. The pegmatites examined on several properties of National Lithium Corporation appear to be similar to the spodumene pegmatites described by Hutchinson. The dykes generally consist of grey plagioclase, a variable amount of buff feldspar, quartz and minor muscovite. Greyish green spodumene occurs in elongate platy crystals in the central parts of the dykes in amounts up to 25 per cent of the rock. Except for a fine-grained border zone of variable width the dykes examined are not obviously zoned. The distribution of spodumene in any one dyke is usually erratic and other rare element minerals are uncommon. The dykes occur in knotted schists that are metamorphosed greywacke-shale of the Yellowknife Group. The pegmatites commonly occur near the boundary between knotted schists and less metamorphosed metasediments that do not contain porphyroblasts. The dykes sometimes are parallel to the foliation in the enclosing rocks but more commonly are crosscutting. The relationship of these latter fractures to the regional structure is unknown. The dykes are steep dipping and generally tubular in shape but in detail tend to pinch and swell. Commonly dykes occur in groups consisting of 4 or 5 roughly parallel and closely spaced dykes. The pegmatites vary in length up to about 4,000 feet and width up to about 50 feet.

Ann Group (40)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-6.

The Ann group of 6 claims was staked in 1955 by Miss Ann Driscoll for W. Bellis who staked a number of adjoining claims and sold them to Alscope Explorations Limited. The property eventually consisted of 47 claims that include the Ann, Bill, Kim, Spod, LL, and Dyke claims. The

Ann claims are located on the south shore of Reid Lake about 2 miles from its west end. In 1955 and 1956 the company cut 18 trenches on a lithium-bearing pegmatite dyke on the Ann claims and completed about 3,000 feet of diamond drilling on the dyke. No further work has been done on the property.

The claims are underlain by knotted biotite schists that are metamorphosed greywacke-shales of the Yellowknife Group. These rocks are intruded by granitic rocks that outcrop a short distance south of Reid Lake. Bedding, marked by compositional banding, and schistosity strike at about 130 degrees and dip steeply. In detail the foliation planes are contorted.

The lithium-bearing pegmatite occurs on the Ann claims just south of the shore of Reid Lake. It strikes at about 130 degrees, roughly parallel to the strike of the foliation in the metasediments, and dips steeply. In detail the dyke curves slightly and locally sharp changes in its strike reflect flexures in the enclosing metasediments. The dyke has been traced for about 4,000 feet and averages about 40 feet in width. The pegmatite consists of grey plagioclase and milky to grey quartz with a variable amount of pink feldspar. Books of muscovite are erratically distributed in the rock. Zoning in the pegmatite, if present, is not obvious on the surface exposures. Greenish grey spodumene occurs in the pegmatite as platy crystals with maximum diameters of up to 10 inches. This mineral was observed in 9 trenches examined and also between the trenches but the amount present varies considerably. It tends to occur in patches separated by nearly barren rock. Amblygonite was observed in several places in the dyke and is reported to be widespread. High lithium assays from material containing little spodumene tends to confirm the presence of significant amounts of amblygonite.

The dyke was tested by 3,000 feet of drilling to a maximum depth of about 150 feet. Although not enough work was done to calculate accurately tonnage or grade, assays of drill core and samples from the trenches suggested that substantial tonnages of material containing about 1.5 per cent lithium oxide might be present.

Jo Group (41)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-8.

The Jo group of 8 claims is at the east end of a small lake, locally known as Tanko Lake, about 4 miles southeast of Francois Lake. The pegmatite that forms the main showing is at 62° 25'18"N, 112° 11'18"W. The property is 70 miles east of Yellowknife. The lithium-bearing pegmatite was discovered and staked in 1955 by W. Bellis and associates. Three small trenches were excavated at that time and to the author's knowledge no further work has been done. The claims have since lapsed.

The claims are underlain by knotted biotite schists that are metamorphosed greywacke-shales of the Yellowknife Group. Near the pegmatite dyke the rocks strike in a northerly direction and dip steeply. Spodumene occurs in an easterly-trending steep-dipping pegmatite that has been traced over a length of 1,500 to 2,000 feet. The dyke is up to 60 feet wide but averages about 20 feet and consists of very coarse grey plagioclase with a variable amount of pink feldspar and quartz. Muscovite and possibly phylogopite

are erratically distributed in the dyke in small books or clusters of books along feldspar grain boundaries. The dyke is not obviously zoned.

Grey-green spodumene is visible on the weathered surface over the 600 feet examined by the author. It occurs in blade or tabular crystals about one inch thick but 4 to 15 inches wide and 6 to 18 inches long. In places these crystals appear to be oriented parallel to the walls of the dyke. The dyke has not been carefully sampled to determine the lithium content or distribution.

Moose and Best Bet Groups (42)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-I-1; Rowe, 1952; Lord, 1951.

Boreal Rare Metals, Limited held the Moose group of 32 claims and the Best Bet group of 2 claims but they are now held by Beauport Holdings, Limited. The Moose claims are on the north shore of Hearne Channel, Great Slave Lake, about 72 miles east-southeast of Yellowknife and the Best Bet group is about 4 1/2 miles northwest of the camp on the Moose claims. The Moose No. 2 dyke, the main showing, is at 62°10'42"N, 112°13'24"W and the Best Bet dyke is at 62°13'42"N, 112°17'12"W.

History and Development

The Moose dyke was discovered and staked in 1943 by G.D. DeStaffany and A. Greathouse. The claims were held by DeStaffany Tantalum Beryllium Mines, Limited which was later reorganized to Boreal Rare Metals, Limited. The Best Bet dyke was staked in 1944 and later acquired by its present owners. By 1946 a small gravity mill with capacity of 20 tons per day, designed to obtain a concentrate of columbite-tantalite was erected at the south end of Moose No. 2 dyke on the shore of Great Slave Lake. According to Lord (1951), the mill ran during September and October of 1947, and treated 3,800 pounds of ore from the Best Bet dyke and 30 tons from the Moose No. 2 dyke. About 1,200 pounds of concentrate were produced. In 1948, the mill produced 1,400 pounds of concentrate from ore from the Best Bet dyke. Ore was mined from open cuts in the pegmatites.

In 1953 the mill was enlarged to 100 tons per day capacity and considerably improved. After crushing and grinding in a jaw crusher and rod mill the ore was sized and directed to 5 wiffle tables. The concentrate from the tables was dried and bagged. Fractions thought to be high in lithium-bearing minerals were stored on the property. Production of columbite-tantalite concentrates was started in December, 1953. The mill was shut down in June, 1954. During this period, ore was treated at the rate of 40-90 tons per day and concentrates were shipped to the company's refinery in Cap de la Madelaine, Quebec. Until March 1, 1954, 3,220 tons of ore was milled and a further 1,600 tons of ore stockpiled. Ore was mined from open cuts in both dykes. In January, 1955 the mill was destroyed by fire.

During the summer of 1955, the Moose No. 2 dyke was tested by 20 drillholes to a depth of about 150 feet over a length of about 1,400 feet. The Best Bet dyke was tested with 9 drillholes over a length of 300 feet down to a depth of 300 feet. During this time the emphasis was on exploration for lithium.

In May, 1956, the company was placed in bankruptcy. No further work has been done on the property.

Geology

The claims are underlain for the most part by nodular quartz-mica schist derived from greywacke-shales of the Yellowknife Group. These rocks are intensely folded but the details of the structure have not been worked out in this area. Near the Moose dyke beds strike northeast and dip steeply southeast. These rocks are cut by granodiorite the largest mass of which, is an elongate body that strikes northeasterly and occurs between the Best Bet and Moose dykes.

The Moose No. 2 and Best Bet dykes have been described in detail by Rowe (1952) as follows:

> "This 'dyke' (Moose dyke) comprises five pegmatite exposures that may comprise parts of one or more pegmatite bodies... The south section is composed of two pegmatite bodies, each about 100 feet long, that may represent faulted parts of one dyke. Both bodies are similarly zoned although the north body contains a spodumene assemblage in addition to those featured in the south body. Because several quartz masses are exposed, it is assumed that they represent a discontinuous core. The border zone is composed of fine-grained quartz-plagioclase-muscovite; the quartz and plagioclase are grey and the muscovite is pale green. Fine-grained, irregular patches of the wall-zone assemblage occur in places in the border zone. The wall zone is medium-grained cleavelandite-quartz-muscovite, which becomes coarser in texture toward the first intermediate zone. In it the quartz is usually grey, but may be white; the muscovite is pale green; and the cleavelandite varies from grey to pink to red, becoming redder in colour towards the first intermediate zone. Coarse-grained, blocky perthite-quartz comprises the first intermediate zone. The perthite varies in colour from salmon to brick-red and is subhedral to euhedral; the quartz is white, and occurs interstitial to the perthite or as veinlets cutting it. Perthite-spodumene with minor quartz occurs in the north body, and apparently represents a second intermediate zone. The perthite is brick-red whereas the spodumene is green. Subhedral to euhedral beryl, pale yellow to green in colour, was found in cleavelandite-quartz-muscovite near the perthite-quartz boundary, in perthite-quartz, and in perthite-spodumene. Columbite-tantalite, in single and radiating plates, was found, associated with beryl, in perthite in the perthite-spodumene assemblage, and in cleavelandite of the cleavelandite-quartz-muscovite assemblage...
>
> ..."The central section of the Moose No. 2 dyke is composed of two pegmatite exposures separated by overburden, and may represent one body. The largest exposure is 180 feet long and has a

maximum width of 100 feet on the surface. Both of these exposed masses are similarly zoned and will be discussed together. The outer mineral assemblage in each is quartz-plagioclase-muscovite, as in the south section, but is represented only in a few places. Cleavelandite-quartz, similar to that of the south section, occurs in places along the west side of the larger pegmatite mass. The adjacent assemblage, inward from the walls, is perthite-quartz-cleavelandite, in which coarse, pale pink perthite crystals occur in a medium-grained groundmass of quartz-cleavelandite. This is the most abundant assemblage in the central section. The innermost assemblage exposed in this section is perthite-spodumene-quartz-cleavelandite, in which the spodumene is coarse grained and fresh. Broken rock and splinters of spodumene obscure much of the larger mass, which dips between 55 and 65 degrees west. The wall-rock is sheared in places parallel with the pegmatite-wall-rock contact.

"The north section (See Figure 2A) is a lenticular pegmatite body 515 feet long and 145 feet in maximum width as exposed. It is covered at its south end by muskeg. The body strikes north and dips 60 to 75 degrees west. A border zone of fine-grained quartz-plagioclase-muscovite and a wall zone of cleavelandite-quartz are exposed in places along the west side of the body. The core is, apparently, orange to red microcline, and is very coarse. Assemblages between the wall zone and the core comprise quartz-cleavelandite-spodumene±amblygonite, quartz-cleavelandite, and microcline-quartz-cleavelandite. They probably represent intermediate zones, but, as much of the pegmatite body is covered by broken rock, their relationship one to another is not clear. In these assemblages, the microcline, spodumene, and amblygonite are very coarse; the amblygonite occurs chiefly towards the south end of the body, but isolated crystals are found at the outer margins of the microcline masses. Small masses of fine-grained muscovite-quartz-plagioclase-columbite-tantalite occur in places, and appear to be replacement bodies. Beryl was found in the cleavelandite-quartz assemblage at the south end of the exposed pegmatite and in microcline near the north end. Columbite-tantalite occurs as blocky crystals in muscovite-quartz-plagioclase and as plates in microcline in the large pit near the north end of the body. An examination of the tailings at the mill suggests that the bulk of the ore milled was muscovite-quartz-plagioclase-columbite-tantalite.

"The percentage of spodumene in the spodumene-bearing assemblage of the north section of the Moose No. 2 dyke was estimated by laying a tape measure across the spodumene-bearing assemblages at intervals and measuring the spodumene intercepted. Corrections were made for differences in specific gravity, and the percentage of spodumene by weight was calculated. On the basis of the spodumene-bearing rock exposed at the surface, and with very little interpretation, it was calculated that a minimum of 6,039 tons of spodumene-bearing rock is available to a depth of 10 feet. Because spodumene constitutes 24 per cent by weight of the spodumene-bearing material, this tonnage can be expected to yield about 1,450 tons of spodumene. The spodumene is of hand-cobbing size...

...."On the Best Bet No. 1 claim, an open-cut 40 feet long, 15 feet wide, and 10 feet deep, has been excavated diagonally across the pegmatite sill, which strikes north 35 degrees east and dips 75 degrees northwest. The sill is about 285 feet long and has a maximum width of 35 feet, but averages about 25 feet. The pegmatite is well zoned, but the internal structure is complicated, and detailed mapping is required before an accurate description can be made. The description of the pegmatite must, therefore, be regarded as preliminary. The zonal mineral assemblages from the walls inward are: fine-grained quartz-plagioclase±muscovite, fine-grained quartz-cleavelandite-muscovite, medium-grained quartz-cleavelandite± muscovite, quartz-amblygonite-spodumene, and perthite. Small masses of fine-grained, yellowish green muscovite-columbite-tantalite, that may be replacement bodies, occur in places in the quartz-amblygonite-spodumene assemblage. Platy columbite-tantalite occurs in perthite and altered spodumene, and in cleavelandite. The spodumene near the outer margins of the spodumene-bearing assemblage is altered or intergrown with quartz in places. Towards the centre of the sill, the spodumene crystals are very coarse, the largest being 14 feet long and 2 1/2 feet wide. Pale yellowish green, subhedral beryl occurs in places in quartz-cleavelandite ±muscovite. The largest crystal observed was 4 inches in diameter perpendicular to the long axis of the crystal.

"It has been estimated (Lord, 1951, p. 121) that a medial zone, which is 115 feet long and averages 12 feet in width, is 50 per cent amblygonite, and probably contains 66 tons of amblygonite for each foot of depth. An area near the north end of the sill, 45 feet long and 25 feet wide, shows 19 per cent spodumene and 12 per cent amblygonite. This material contains 12 1/2 tons of spodumene and 7 1/2 tons of amblygonite for each foot of depth.

"A chip sample of muscovite-columbite-tantalite, analysed by the Bureau of Mines, Ottawa, contained: tin, 3.72 per cent; tantalum pentoxide, 3.56 per cent; and columbium pentoxide, 0.09 per cent."

Gail Group (93)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-P-1.

The Gail group of claims, 67°03'N, 112°06'W, is about forty miles northeast of the northeast part of Takiywak Lake and 320 miles north-northeast of Yellowknife. The claims were staked on a long gossan zone by E. Boffa and associates for Briken Explorers, Limited in 1957. The claims were allowed to lapse the following year.

This property was not examined by the author and the following information is from L. White, geologist for Briken Explorers[1]. The gossans mark the location of sulphide mineralization in metamorphosed greywacke-shales and hornblendic rocks of the Yellowknife Group. These rocks are cut

[1] White, L., personal communication.

by granitic gneiss. The mineralized zone occurs near and is parallel to a northwest-striking, vertically dipping shear zone. Pyrite and pyrrhotite are disseminated in the sheared rocks; sections of massive sulphides occur in the central part of the zone. Minor chalcopyrite is erratically distributed in the sulphides, particularly in the massive sections. The zone averages twenty feet in width but in places is up to seventy-five feet wide. The gossans and presumably the sulphide zone can be traced for about ten miles. About six miles of the zone was staked and all of it prospected for copper-rich sections. Such sections were not found.

Kennarctic Explorations, Limited (94)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 76-M-7, 76-M-10.

During an aerial exploration program in the summer of 1955 Kennarctic Explorations, Limited discovered a copper showing in the Bathurst Inlet area. The High Lake group of 35 claims was staked during the winter of 1956 on the showing and later in the year two adjoining groups called the Sierra and Nan were staked to give a total of 73 claims in the block. The claims are located at about 67°25'N, 110°49'W or about 85 miles west-northwest of the settlement of Bathurst Inlet and 330 miles northeast of Yellowknife.

During the summer of 1956 about 12,000 feet of diamond drilling was completed on the showings. The area around the showings was also mapped geologically. In the latter part of 1956 the company, being the successful bidder, was granted the James River Reservation by the then Department of Northern Affairs and National Resources for a period of 3 years. Thus exclusive prospecting rights were received for the area bounded by latitudes 67°00' and 67°40' and longitudes 110°45' and 111°15'. The total area of the reservation was 620 square miles. All claims within the area staked prior to September, 1956, were excluded from the reservation. During the summer of 1957 the area was covered by airborne EM and magnetometer surveys and mapped geologically at 1 inch to 1/2 mile. The reservation was prospected on the ground, all anomalies were checked and explained and all significant gossans or mineralized zones were examined and sampled. One diamond-drill hole was drilled on the reservation to test an anomaly outlined by the airborne surveying. At the same time about 11,000 feet of drilling was completed on the main showings on the High Lake group of claims. More geological mapping and some ground EM surveying was done on these showings. The reservation was dropped in 1957. In 1958 the Wes group of 20 claims and Nor group of 6 claims were staked to cover anomalies outlined by the airborne work a few miles north of the High Lake claims. In 1959 a few diamond-drill holes were drilled to test these anomalies.

The group of claims and the reservation are underlain by acidic volcanic rocks, pyroclastics, sediments of the Yellowknife Group and granitic rocks. The volcanic rocks are part of a belt which extends from about the Hood River almsot to the Arctic Coast. These rocks include rhyolite and dacites and their porphyritic equivalents with intercalated tuff, breccia, and agglomerate. The rhyolites are light to dark grey, very fine grained rocks composed of quartz and feldspar with a minor amount of small biotite flakes.

Flow structures are sometimes visible. The dacites are fine grained, light green rocks containing quartz and feldspar with biotite and hornblende. In porphyritic varieties quartz and/or feldspar form phenocrysts.

Sedimentary rocks are found along the east side of the reservation but not on the claims at High Lake. The rocks are shales, slates, and greywacke. The volcanic and sedimentary rocks are cut by granitic rocks of variable composition; biotite and biotite-hornblende granodiorite and diorite are the most common rock types. Along the contact between these rocks and volcanic rocks, a zone of mixed rocks occurs which in places is miles in width. In this zone the granitic rocks are gneissic and of variable composition and partially replaced masses of volcanic rocks are common. All the above rocks are cut by diabase or gabbro dykes and sills. The dykes are numerous and vary in width up to 150 feet. Most of them strike at about 330 degrees but some strike about east.

Rocks older than the granitic masses are metamorphosed in varying degrees. Many of the volcanic rocks have been partially altered to chlorite-sericite- carbonate-bearing schists along shear zones which in part may be related to folding. Some of these zones seem to occur around the noses of folds.

The older rocks are folded about axes which strike east of north in the south and west of north in the north. Folds plunge both to the north and south. These relations suggest the presence of crossfolding in the area. The rocks are cut by faults which trend north and northeast. One major fault or system of faults with a northerly trend and some related subsidiary faults occurs just east of High Lake. The volcanic rocks are commonly sheared; some shearing around the noses of folds and along axial planes of folds is probably related to the folding whereas other zones which tend to be cross-cutting are probably related to faulting.

In the work on the concession something more than 60 mineralized zones were found, examined, and sampled. All are capped by gossans and many were discovered from the air. Pyrite with some pyrrhotite and occasional chalcopyrite has two types of occurrence. In one, the sulphides are disseminated in volcanic flows or pyroclastic rocks. Some flows contain up to about 5 per cent sulphides. Some sulphides also are disseminated in sheared volcanic rock. The second type of occurrence is pyrite and minor amounts of the other sulphide disseminated in white, fine-grained quartz in shear zones. Minor amounts of sphalerite and galena occur in some zones. Of the zones discovered only a few contained significant amounts of copper, and none warranted testing by drilling.

The original discoveries in the area were not included in the concession but occur on the High Lake group of claims. Considerable work, including detailed geological mapping, ground, EM surveys and about 23,000 feet of diamond drilling, has been done on these showings. The showings are just west of the southern part of High Lake which is at 67° 23'N, 110° 50'W.

The rocks around the showings are steep dipping, north striking rhyolites or dacites which are locally sheared and altered to chlorite or sericite and carbonate with some associated silicification. These rocks are cut by granitic rocks that are of diorite composition near the showings. Two steeply dipping gabbro dykes that strike about west of north are found near the showings. Details of the folding in the immediate vicinity of the showings are unknown to the author. A steeply dipping, north-trending fault that can be traced for about 8 miles is located about 1/2 mile east of the showings.

Three zones, A, B and C, are located near the Kennarctic camp near the southwest end of High Lake. The C zone, just south of the camp, consists of a northeast-trending carbonate zone having a vertical dip. The shear zone, which contains the carbonate, seems to cut across the strike of the volcanic rocks. The sheared rocks become replaced with carbonate and in certain sections with carbonate and quartz. Sulphides are disseminated in the zone of carbonate-quartz in fractures and veinlets; a few short sections up to 5 feet in width of massive chalcopyrite or chalcopyrite and sphalerite occur in the central part of the mineralized sections. The mineralized zone is about 1,000 feet long and varies in width up to 20 feet and is known to have a substantial vertical extent. Besides chalcopyrite and sphalerite, pyrite with minor pyrrhotite and arsenopyrite occur throughout the zone. Pyrite is probably the most abundant sulphide.

The A and B zones are found just west and north of the camp. The A zone strikes northeast and dips 50 degrees to the northwest; the B zone trends west of north and dips northeast. The dip is about 50 degrees in each case. These zones may join and actually form one large structure. At depth the dips of both zones steepen sharply and apparently the sulphide content decreases. The zones consist of chloritized sheared volcanic rock and in their central parts chlorite schist. Sulphides, which consist of pyrite, chalcopyrite and some pyrrhotite, are disseminated in the chlorite schist. Massive sulphides occur locally in central portions of the mineralized sections. The A zone contains significant mineralization over a length of about 1,000 feet; the B zone is about 500 feet long.

Substantial tonnages of material of significant grade have been outlined which according to company reports (Northern Miner, March 30, 1967, p. 5) comprise 5,206,856 tons that contain 3.53 per cent copper, 2.46 per cent zinc, 0.023 ounce per ton gold and minor silver and lead.

Low Lake Property (95)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 76-M-7.

The Low Lake property is located at about 67° 18'N, 110° 56'W. It is 70 miles northwest of the settlement of Bathurst Inlet and 360 miles northeast of Yellowknife. The property consists of about 50 claims in groups called L, J and D plus the H, K and M groups situated a few miles to the south and southwest. The claims were staked in 1956 for Pickle Crow Gold Mines, Limited to cover a number of gossan zones. In 1957 Panamerican Ventures, Limited (since reorganized to Westfield Minerals Ltd.) and Northfield Mines Incorporated agreed to finance and manage an exploration program on these and other holdings belonging to Pickle Crow Gold Mines.

During the summer of 1957, the claims were mapped geologically and 11 gossans or mineralized zones were tested by diamond drilling and with a Packsack drill. Fourteen diamond-drill holes averaging 170 feet in length were concentrated in 6 different zones. The total footage was 2,500. About 30 holes on 5 zones were drilled with a Packsack drill for a total length of approximately 500 feet. None of the mineralized zones were intersected much below a vertical depth of about 150 feet.

The claims are located in a belt of volcanic rocks which include dacites, rhyolites and agglomerates, and tuffs. Some volcanic rocks are porphyritic with feldspar forming the phenocrysts. This belt is north-trending and extends almost to the Arctic Coast and for an unknown distance to the south. East of the claims a series of shales and sandstones are in contact with the volcanic rocks. All of these rocks are cut by granitic rocks; some are diorite but the large masses approach granodiorite in composition. All rocks are cut by gabbro dykes which commonly strike at about 330 degrees. The volcanic and sedimentary rocks are metamorphosed and folded. The rocks on the property generally strike in a northerly direction and dip steeply. Lack of marker horizons makes it difficult to unravel the structure but there is some evidence that the rocks are tightly folded in north-trending folds, some of which may plunge to the north. About 2 miles east of the L and J groups of claims is a long, north-striking, steeply dipping fault which has been traced for at least 8 miles along its strike. The rocks are cut by steeply dipping, shear zones or faults which trend northeast and to a lesser extent north and northwest. It is in these shears which may be in part related to movement occurring during the folding of the rocks, that the mineralization occurs.

A large number of mineralized zones were found on the Low Lake property. These consist of disseminated and massive sulphides in the above mentioned shear zones. Most strike northeast and are steeply dipping. Sulphides are disseminated along shear planes or in zones of brecciation in the faults. Massive sulphides occur in the central portion of the larger zones. Pyrite is the common sulphide but pyrrhotite is always present; minor amounts of chalcopyrite occur in the other sulphides. The mineralized zones vary in length up to 4,000 feet and in width up to about 15 feet. A second type of occurrence consists of white, fine-grained quartz in veins in the faults; the quartz contains about 10 per cent pyrite which occurs as fine grains.

Chill Group (96)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 76-M-7.

The Chill group of claims, 67° 28'N, 110° 50'W, is about 70 miles northwest of the settlement of Bathurst Inlet and approximately 360 miles north-northeast of Yellowknife. The 12 claims of this group were staked for Triana Exploration Company during the summer of 1956 and in 1957 the ground was mapped geologically and promising areas were surveyed with portable EM equipment. About 20 trenches or pits were located on mineralized zones to facilitate sampling.

The claims are in the same belt of metavolcanic rocks in which the deposits of Kennarctic Explorations, Limited and showings of Panamerican Ventures are found. The belt has been traced north almost to the Arctic Coast and extends south for an unknown distance. Sedimentary rocks occur in contact with the volcanic rocks to the east of the claims and these are intruded by granitic rocks of variable composition. The youngest rocks in the area are diabase or gabbro dykes. The claims are underlain by metavolcanic rocks of intermediate to acidic composition which contain bands of fragmented

rocks. In certain zones, these have been altered to chlorite and sericite schists. They are cut by masses of porphyritic granitic rock that appear to be related to a large mass of granodiorite which outcrops west of the claims. Diabase dykes are numerous on the property and tend to strike north to northwest. The volcanic rocks seem to occur in a northeast-striking syncline which plunges to the north. The chlorite schist tends to be concentrated along the west limb of this fold.

Mineralization, consisting chiefly of pyrite with some chalcopyrite, occurs in linear zones of chlorite schist. Sulphides are disseminated along shear planes; in the central portions of mineralized zones lenses of massive sulphides occur. EM surveys using portable equipment outline belts of weak crossovers over the best sulphide zones. Many sampled sections returned low copper values, and a few sections, moderate values.

DEPOSITS IN APHEBIAN ROCKS IN THE BEAR PROVINCE

Rayrock Mines, Limited (43)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

Introduction

The Rayrock property (63° 26'54"N, 116° 32'18"W) is located in the Marion River area at Sherman Lake about 100 miles northwest of Yellowknife. The company holds under lease the following 13 mineral claims: Gamma 1, Beta 1-8, UR 2, EM 1-2, and FG 1.

History

Uranium was first found in the area in 1934 by a party of the Geological Survey of Canada and the showing was again investigated by A. W. Jolliffe in 1944. The first discovery of uranium on or very near the Rayrock property was made in 1948 and claims were staked by A. V. Giauque and associates but were allowed to lapse. In 1951, the Beta claims were restaked by R. J. Stevens and B. Bolduc and in the following year were optioned to Lodge Uranium Mines. In 1953, a joint agreement was entered into by Lodge Uranium Mines and American Yellowknife Mines, Limited to finance further exploration of the property. Later control of the property was purchased by the latter company and its name was changed to Rayrock Mines, Limited.

The initial work of prospecting, geiger counter surveys and geological mapping resulted in the discovery of a number of showings that were developed by trenching. In the spring of 1954, the best showings were tested by about 3,000 feet of drilling. A second drill program later in that year outlined ore in the No. 6 zone. Altogether about 12,600 feet of surface drilling was done before production was achieved. In 1955, underground development of the ore was initiated and in the following year it was decided to put

the mine into production. A contract for the sale of uranium oxide valued at $15,792,000 was awarded to the company. A mill and treatment plant of 150 tons per day capacity was constructed and the first concentrates of uranium were produced in June, 1957. Despite intensive underground exploration, ore reserves were depleted in 1959 and the mine closed on July 31 of that year having delivered roughly a third of its contract.

Development

Underground development of the ore zones began in 1955 by construction of an adit into the side of a 300 foot ridge that is adjacent to the Marion River fault. Total length of the adit is 890 feet. The No. 1 zone is cut at 725 feet from the portal at a depth of 300 feet below its surface outcrops. The No. 6 zone was cut at 800 feet. Three raises were driven in the No. 6 zone, one of them to surface and a sublevel was developed 100 feet above the adit level. A 350-foot internal shaft was collared 800 feet from the adit portal and 3 levels, at 375, 500 and 625 feet, were established to further develop the No. 6 zone. In 1958 this shaft was deepened 380 feet and levels developed at 750, 875, and 1,000 feet below surface. Approximately 26,000 feet of underground drilling was completed before the mine closed. The mining method used was a modified form of cut-and-fill and open stoping. Much selective mining was necessary because of the irregular nature of the orebodies. Mine development waste was used for backfill.

Mine and camp buildings

A number of the mine buildings are of steel construction and include Steelox, Soule and Butler type buildings. Such buildings house the mine dry, machine shop, powerhouse, carpenter shop, electrical shop and cold warehouse. About 9,500 square feet of steel buildings were erected, insulated, partitioned and furnished for a cost of $6.00 per square foot. In addition to the above buildings, a large office-warehouse building was constructed along with the usual mine buildings such as powder magazine, boiler house, compressor house, etc. Three two-story bunk houses to accommodate 100 men, a staff house for 14 men and 9 residences to house 12 families have been erected. The cookhouse is equipped for 125 men.

Power is delivered from the Snare hydro-power plant by a 18.3 mile transmission line. Two diesel-electric generating units with a capacity of 400 horsepower are kept as standby units.

Production, Reserves and Costs

In 1956 reserves were estimated at 111,200 tons containing 0.375% U_3O_8. In the fiscal year ending in October, 1958 the only full year of production, a total of 42,765 tons of ore of an average value of $67.30 a ton were broken. Production of uranium precipitates in this year was valued at $2,620,363. Operating costs were $43.71 per ton of ore or $6.52 per pound of uranium oxide. Milling costs were about $3.15 per pound of uranium oxide recovered. During this period an average of 110 tons per day were treated

in the mill and recovery averages 96.9 per cent (Company Annual Report, 1958). The mine was closed in July, 1959. About 70,000 tons were mined. The total value of production to the end of April, 1959 was about $4,200,000 (Northern Miner, May 7, 1959, p. 16).

Geology

The most prominent geologic feature on the property is the Marion River fault. The claims east of this fault are for the most part underlain by gneissic granodiorite that contains large phenocrysts or porphyroblasts of plagioclase and microcline up to 2 inches long along with quartz, small grains of feldspar, biotite and hornblende. The gneissosity in these rocks is steep dipping and trends in a northerly direction. West of the fault the property is underlain by a complex of metamorphosed sediments, granitized sediments and gneissic granodiorite that is commonly even grained. The sediments, consisting of dolomites and related skarn rocks and white to pink quartzites, are part of the Snare Group. The sediments and gneissosity in the granitic gneisses strike northwest and dip vertically or steeply to the northeast. The Marion River fault strikes northeast and dips steeply to the southeast. Total horizontal movement along this fault may be about 6 miles (McGlynn, 1957) and the northwest side is thought to have moved down and to the northeast. A number of short subsidiary faults are parallel to or curve off the main fault to strike in an easterly direction. Such structures seem more numerous on the northwest side of the fault and where the main fault changes slightly in direction. Rocks along the main fault and its subsidiary faults are crushed, mylonitized and sometimes stained with hematite. Along its length on the Rayrock property the Marion River fault and one of its subsidiaries contain large quartz stockworks that consist of several generations of quartz that replace and fill fractures in the rocks along the fault. The main stockwork on the property is up to 200 feet wide.

Ten or eleven radioactive zones were discovered on the property but all of the ore was mined out of the Nos. 6 and 1 zones. The No. 6 zone provided most of the ore. The No. 1 zone occurs a few hundred feet west of the main fault in a south of west striking subsidiary fault that dips to the northwest at about 70 degrees. Pitchblende occurs in fractures in the brecciated, hematite-stained granodiorite in which the zone occurs. The best sections occur where the fracturing is most intense. Only one short ore shoot was mined in this zone.

The No. 6 zone is in a quartz stockwork in a fault that is an offshoot of the main fault and stockwork. The zone strikes at about 35 degrees and dips 65 degrees to the east. The ore-bearing section is about 900 feet west of the main fault. The stockwork varies in width from 10 to 40 feet and consists of grey or greenish quartz that is fractured, brecciated and veined by late white quartz. Veining relationships indicate at least three ages of quartz. The stockwork is separated from the brecciated granitic host rock by a zone of highly siliceous, fine-grained rock containing epidote and hematite and varying in colour from earthy red to brown to green depending on the relative amounts of the above minerals. This zone is between 5 and 30 feet wide. The granite of the wallrocks is medium grained and comprises flesh coloured feldspar, quartz, biotite, and possibly hornblende. Near the stockwork it is crushed and stained red with hematite.

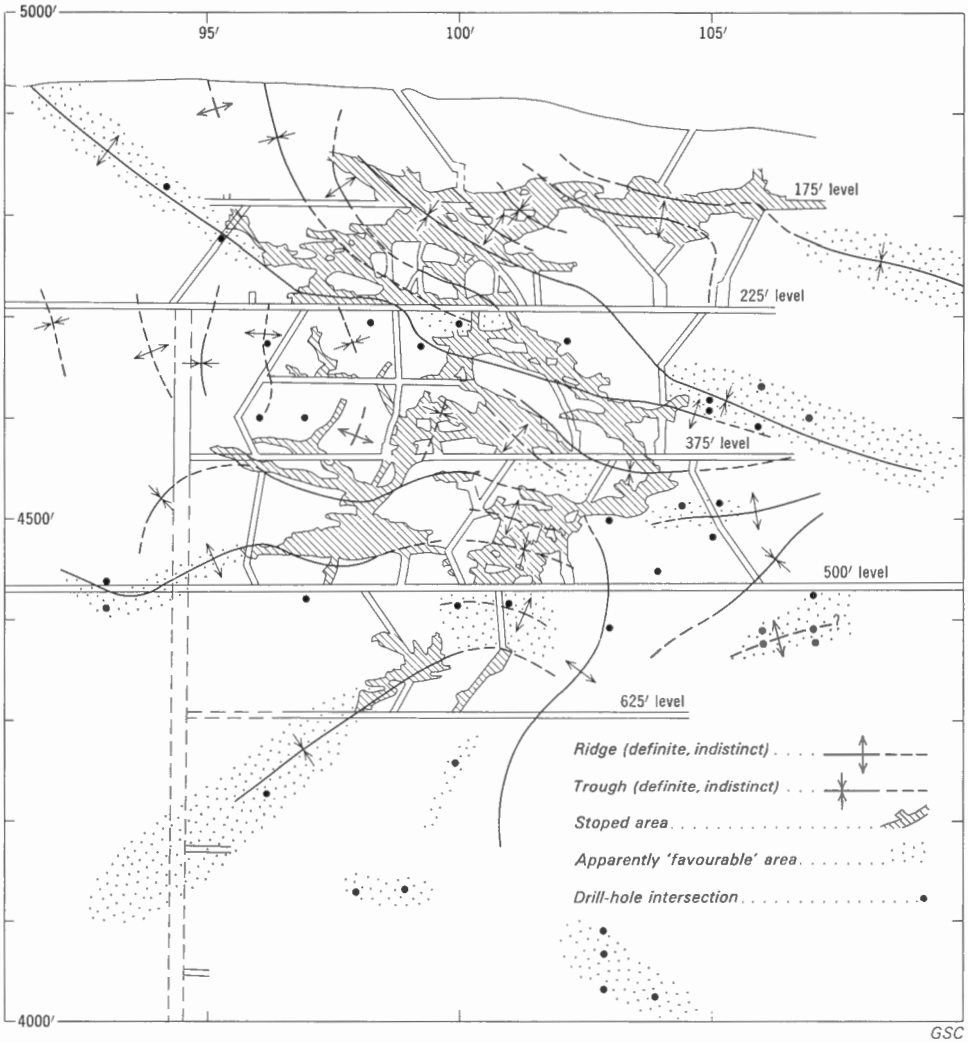

Figure 9. Longitudinal section, Rayrock Mine, showing folds in footwall of the quartz core. (modified from company information and published by permission of Rayrock Mines Ltd.)

Pitchblende occurs in veins in fractures in the stockwork and bounding siliceous rock. The fractures strike both parallel to the vein and across it at varying orientations. Most fractures are steep dipping. Ore shoots occur where fracturing is intense. Ore shoots averaged about 8 feet in width with lengths about 150 feet and heights of 20 to 40 feet. Their distribution is erratic. The stockwork is fractured and mineralized over a length of about 500 feet. During the mining operation the stockwork was contoured from a reference plane. A series of ' rolls ' caused by slight dip changes were discovered (Fig. 9) which tended to plunge to the northeast. Fracturing and, therefore, ore shoots tended to concentrate near the crest of these rolls.

The frequency of these rather subtle structures decrease with depth. These dip changes seem to be at least one of the factors in localizing fracturing within the large structure.

The mineralogy is simple, consisting of pitchblende intimately associated with hematite in hematite-stained quartz. The pitchblende is fine grained and may have been crushed by slight movements after deposition. Minor amounts of specular hematite, pyrite and chalcopyrite are found locally in the ore zones.

Almost all the ore was mined from above the 625-foot level with the bulk of it occurring between the 500-foot and 125-foot levels. The erratic distribution and small size of many of the shoots resulted in high cost mining and development.

CA Group (44)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

The CA group of 7 claims is about 1 1/4 miles west and a little south of the camp of Rayrock Mines, Limited. The property is about 100 miles northeast of Yellowknife. The claims were acquired in 1955 by New Alger Mines, Limited and in the same year were mapped geologically and surveyed systematically with geiger counters. Nine holes were drilled to test a uranium showing located on the property. No further work has been done.

The claims are underlain by granitic rocks of varying composition and structure. The most abundant type is an equigranular, fine-grained, slightly gneissic rock containing flesh coloured plagioclase and microcline in varying proportions and quartz and biotite. Also present is a porphyroblastic gneiss similar to the above rock in composition but with (porphyroblasts) of feldspar. The gneissosity in these rocks strikes northwest and dips steeply. They are cut by several narrow, short, steeply dipping basic dykes that have an easterly strike. The Marion River fault outcrops just to the east of the claims. Subsidiary faults that curve off the main fault, strike east, dip steeply and cut the rocks on this property. Along these faults the rocks are brecciated and crushed.

Radioactivity is found in a fracture zone on the contact of a basic dyke and granite. A fault subsidiary to the Marion River fault is located a short distance from the dyke and is roughly parallel to it. The fracture zone consists of braiding fractures along the dyke contact with a number of short cross fractures. Pitchblende is scattered in the fractures commonly at fracture intersections along with hematite and quartz. The radioactive zone on surface is only about 40 feet long but is up to 4 feet wide. In the 9 holes drilled to test the zone, significant mineralization was intersected in one hole in which one 18-inch section gave assays of 0.5% U_3O_8.

GS Group (45)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

The GS group of 12 claims is located in the Marion River area about 2 miles northeast of the camp of Rayrock Mines, Limited at about 63° 28'N, 116° 30'W or about 100 miles northwest of Yellowknife. The claims were

staked in 1953 and acquired by Starlight Mines, Limited. Several uranium showings were located in 1953 and in 1956 one of these was tested by about 3,000 feet of drilling. No further work was done on the property.

The group straddles the Marion River fault, which strikes about northeast and dips steeply to the southeast. Quartz stockworks occur in the southwest part of this fault on the property. Southwest of the fault the rocks are gneissic granodiorites that contain porphyroblasts of plagioclase and microcline. Northwest of the fault, the rock is mainly gneissic granodiorite that contains narrow bands of white to pink quartzite. The gneissosity strikes northwest and dips vertically.

The main showing, the No. 3 zone, is roughly 800 feet northwest of the Marion River fault near the boundary of GS Nos. 2 and 6 claims. Mineralization occurs in a northeast-trending fracture zone that dips steeply to the southeast towards the Marion River fault. The fracture zone is narrow and has been traced on surface over a distance of 500 feet. It consists of a series of branching northeast-striking fractures with short cross fractures. Some of these are filled with narrow quartz veins. Pitchblende is erratically distributed along the fractures commonly at the intersections of fractures. Radioactivity is confined to a section about 150 feet in length. Chip samples across narrow widths along the zone vary in uranium content from trace to about one per cent. The fracture zone was intersected in most drillholes; the deepest hole cut it at about 200 feet down dip. Radioactivity was encountered on several holes over narrow widths.

TT Group (46)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

The TT group of 12 claims is in the Marion River area about 2 1/2 miles northwest of the campsite of Rayrock Mines, Limited or about 105 miles northwest of Yellowknife. The claims were acquired by New Alger Mines, Limited in 1955 and during that summer the property was mapped geologically and a geiger survey was completed. No significant uranium finds were made but a showing of cobalt mineralization was discovered but not developed.

The claims are underlain by quartzite, dolomite and argillite of the Snare Group. These rocks strike northwest and dip to the northeast at between 50 and 70 degrees. The sediments are metamorphosed and cut by granitic rocks of various compositions. Faults, striking northeast and dipping steeply, cut the sedimentary rocks and are probably related to the Marion River fault which outcrops to the east on the property of Rayrock Mines, Limited. On this property such faults have very little horizontal displacement; contacts are displaced only a few feet.

The cobalt showing is in a narrow gabbro dyke in the quartzites about 3/8 mile northeast of a narrow northwest-trending lake in the southwest part of the property. The dyke strikes northwest and is fractured with the main fractures striking parallel to the dyke. Fractures contain cobaltite and grey arsenosulphides with minor pyrrhotite and pyrite. The mineralized zone is less than 100 feet long and only a few feet wide. Assays of grab samples indicate several per cent of cobalt and minor amounts of nickel.

MK Group (47)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

The MK group of 14 claims is located on the Marian River about 2 miles southwest of the camp of Rayrock Mines, Limited at about 63°26'N, 16°36'W or about 100 miles northwest of Yellowknife. Riverridge Mines, Limited acquired the ground in 1955 and in that year completed a detailed scintillometer survey of the property. The mineral occurrences discovered were trenched and sampled. In the latter part of 1955 the showings were tested by 26 diamond-drill holes with a total footage of about 6,000 feet. No further work has been done on the property.

The claims are underlain by granitic rocks of various compositions. East of the Marian River fault, over which the claims lie, porphyritic or porphyroblastic gneissic granodiorite is the dominant rock type. West of the fault even grained, gneissic granodiorite is found. The foliation in the rocks east of the fault strikes about northwest and dips steeply, whereas west of the fault the strike is north of west. Near the fault and its subsidiary breaks, these rocks have been crushed and bands of mylonite are common; these rocks are very fine grained, and brick red in colour. The Marian River fault strikes northeast and dips steeply to the southeast. On the property, two subsidiary faults that branch off the main fault to the west, roughly parallel the fault. A narrow, 20-foot, quartz stockwork occurs in one of these breaks. Several short westerly trending cross faults occur between the main and subsidiary faults (McGlynn, 1957).

Four radioactive zones are located between the Marian River fault and its parallel subsidiaries on MK claims 5 and 8. No. 3 zone, which was considered the most promising, is about 400 feet northwest of the Marian River fault near the quartz stockwork in the most easterly of the subsidiary faults. Mineralization occurs in a fracture zone that strikes at 35 degrees and dips almost vertically. The zone is about 70 feet long, up to 5 feet wide, and consists of principal fractures with numerous short cross fractures that give a braided effect. Rock between the fractures is crushed and stained with hematite. Quartz veins occur in some fractures. Pitchblende forms in the fractures commonly at fracture intersections and is erratically distributed. Sampling results indicate a grade of about 0.5 per cent U_3O_8 over a width of 4 feet in a section of the zone 50 feet long. A short distance southwest of this zone and slightly off its strike is the No. 4 zone. This fracture zone strikes at 35 degrees, dips vertically, is about 80 feet long and contains two short radioactive sections with a total length of about 20 feet. In other respects it is similar to the No. 3 zone. The No. 2 zone is about 100 feet southeast of the No. 3 and is short and narrow. The main fractures strike at 80 degrees and dip 70 degrees to the north. The No. 1 zone occurs a short distance to the southwest of No. 2. It strikes at 30 degrees, dips steeply, is about 80 feet long and narrow. Pitchblende is erratically distributed along the zone commonly at fracture intersections.

Drillholes were located at about 50-foot centres along the zones. The area between Nos. 2 and 3 zones was tested by drilling. Several holes were extended to known faults. The fracture zones were intersected by most holes but radioactive sections were scattered and narrow.

Rex Group (48)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

The Rex group of 19 claims is 11 miles southwest of Rayrock Mines, Limited in the Marian River area (63°20'N, 116°47'W) and is about 100 miles northwest of Yellowknife. The claims were staked for Consolidated Northland Mines, Limited in 1956. During the summer of 1957, the company did a scintillometer survey of the property and completed 2,300 feet of diamond drilling. Eighteen holes were drilled to test the main showing and several promising structures but no further work was done.

The claims lie astride the Marian River fault and are underlain by granitic rocks of various compositions and textures. East of the fault, at the north end of the property, buff weathering, gneissic granodiorite outcrops. These rocks contain large phenocrysts or porphyroblasts of grey to flesh coloured plagioclase and/or pink microcline. Quartz, biotite and chloritic hornblende are other essential minerals. Buff weathering, faintly gneissic, even grained granodiorite underlies the remaining part of the property. The granitic rocks are crushed and mylonitized in a broad band along the Marian River fault zone. Locally the crushed rocks are stained with hematite. The Marian River fault strikes northeast and dips steeply to the southeast. On the property a large number of short subsidiary faults and fracture zones curve off the main fault. "Giant" quartz veins occur in the fault and in one of the longer subsidiary faults at the north end of the fault.

The main showing is about 500 feet west of the main fault on a high ridge of rock near the boundary of Rex claims Nos. 3 and 4. Mineralization occurs in a fracture zone that strikes at 20 degrees and dips steeply to the west. Near the south end of this fracture, a second fracture curves off with a strike of 65 degrees and a dip of 40 degrees south. The first fracture is about 75 feet long and the latter is about 50 feet long. Short, parallel and cross fractures are associated with the main fractures. Some are filled with hematite-stained quartz and others with a dark soft chloritic material. Pitchblende is erratically distributed in the zone, commonly at fracture intersections. This zone was tested with 12 drillholes, but although the fracture system was cut it was not extended much and very little significant radioactivity was found. Six other drillholes tested a second less promising surface showing and some promising structures with negative results.

TXG and Marian Showings (49)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

The TXG and Marian showings are located in the Marian River area about 100 miles northwest of Yellowknife, the TXG showings being at 63°23'5"N, 116°40'W and the Marian showing at 63°24'N, 116°39'W. These showings were staked in 1952 by W. Rossing and H. Giauque and were optioned to the firm of Nesbitt Thompson, Limited. In 1953 the company mapped the ground

geologically, conducted geiger counter surveys, and completed roughly 1,100 feet of diamond drilling on two showings. The company dropped its option and the claims eventually lapsed.

The rocks near both showings are granitic gneisses that contain inclusions of quartzite and more basic rock that appears to be rich in epidote. The granitic gneisses may be even grained or contain small porphyroblasts of plagioclase or microcline. Other essential minerals are biotite, hornblende and quartz. Gneissosity strikes about northwest and dips steeply. Irregularly-shaped or elongate masses of brick red or pink mylonite occur in the gneisses and are related to the Marian River fault that occurs just west of the property. Several east- and north-northeast-trending subsidiary faults curve off the main fault. A wide quartz stockwork is localized in this part of the Marian River fault.

The TXG showing occurs about 1,800 feet southeast of the Marian River fault. Mineralization occurs in a fracture zone that strikes 25 degrees and dips steeply. The zone is about 150 feet long and consists of a number of fractures and numerous short cross-fractures. Some fractures are filled with hematite-stained quartz and locally epidote. Pitchblende is erratically distributed in the zone at fracture intersections and in fractures at the contacts of inclusions of dark epidote-rich rock that occurs in the granitic gneiss. A few grains of chalcopyrite were also observed. This zone was tested by three drillholes. The fracture system was intersected but only one short radioactive section was cut. It assayed 1.10 per cent U_3O_8 over a core length of 1.5 feet.

The second showing is near the boundary of Marian No. 3 and No. 4, about 500 feet southeast of the main fault. It is about 3/4 mile northwest of the TXG showing. Mineralization occurs in a fracture zone that strikes at 80 degrees and dips steeply to the north. Fractures having this strike are cut by numerous short cross-fractures giving a braided effect. The rocks are stained with hematite and a few hematite-stained quartz veins were observed. Pitchblende or uranium stain is scattered along the zone, commonly at fracture intersections over a length of about 150 feet.

Vic Group (50)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

The Vic group of 42 claims is about 2 1/4 miles southwest of Rayrock Mines, Limited and about 100 miles northwest of Yellowknife. The claims were acquired by Yellowknife Uranium Corporation in 1954 and in 1955 they were mapped geologically and a geiger grid survey was completed. A small showing was located and opened up with two small trenches. No further work was done and the claims lapsed.

The claims near the showings are underlain by porphyritic or porphyroblastic gneiss of about a granodiorite in composition. The gneissosity strikes northwest and dips steeply. This rock is cut by a steep-dipping, north-northeast-trending fault (McGlynn, 1957) along which the gneiss is crushed, brecciated and fractured. The showing which is on Vic 4 and 5 is near this fault. Mineralization occurs in short fractures that are subparallel to and may curve into the fault. The mineralized fracture zone is about 60

feet long and 1 foot wide. Pitchblende with hematite and quartz were found in the fractures on surface. At the bottom of the trenches (about 5 feet deep) the fracture zone was weak and no pitchblende was found. Fergusonite-formanite (columbates and tantalates of rare-earth elements, containing some uranium) was found in tiny fractures in the gneiss near the main fracture. The uranium content of samples from the trenches is low.

Ted Group (51)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-7.

The Ted group of 12 claims (about 63° 30'N, 116° 36'W) is located along the south arm of Treasure Lake about 3 1/2 miles northwest of Rayrock Mines, Limited and 105 miles northwest of Yellowknife. The claims were acquired in 1954 by New Athons Mines, Limited and in 1955 a number of holes were drilled to test two uranium showings known to exist on the property. No further work was done and the claims have since lapsed.

The claims are underlain by faintly gneissic granodiorite, granitic gneisses that contain many inclusions of quartzite, and by small masses of pink quartzite. Foliation in these rocks and quartzite bands strike northwest and dip steeply. The rocks are cut by a northeast-trending fault that occurs along the west shore of the south arm of Treasure Lake. Horizontal movement on this fault is thought to be about 2,000 feet with the west side moving up and to the northeast. Three subsidiary faults curve off this fault and strike westerly.

Two showings occur on the property on claims Ted Nos. 1 and 2. The author did not examine them but uranium mineralization is reported to occur in fracture zones and to be erratically distributed. The zones are just west of the main fault and may be related to the subsidiary faults. One zone on the Ted No. 2 strikes northeast parallel to the main fault and dips steeply. The second zone on Ted No. 1 strikes about west; it is just north of a west-trending subsidiary fault. The zone is about 200 feet long. Significant mineralization was not cut in the drillholes although the fracture systems were intersected.

Teza Group (52)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-10.

The Teza group of 12 claims is located about 7 miles northwest of Rayrock Mines, Limited and about 4 1/2 miles northeast of the northeast end of Rabbit Lake. The property is about 107 miles northwest of Yellowknife. The claims were originally staked for Consolidated Mining and Smelting Company (Cominco) by D. Bagan and C. Brock and in 1953, were turned over to the prospectors by the company. In 1957 development work consisted of 2 large trenches and several small pits.

The claims are underlain by sedimentary rocks of the Snare Group and by granitic gneiss. The sedimentary rocks consist of red, thick bedded quartzites which strike northwest and dip steeply generally to the southwest. The granitic gneiss is a pink, medium grained rock that contains many inclusions of altered quartzite and which in part at least formed by replacement of the sedimentary rocks. These rocks are cut by a steep-dipping, northeast-trending fault which is one of a series of such faults that cut this belt of Snare sedimentary rocks in the area. About 500 feet northwest of the fault is a northeast-striking quartz stockwork. The stockwork is up to 50 feet wide where observed on the property and consists of at least two generations of quartz introduced into a fracture zone in the older rocks. The rocks between the fault and quartz stockwork are fractured; these fractures commonly strike at 60 and 90 degrees and are steep dipping. Those striking at 60 degrees are the most persistent and are, of course, oblique to the main fault.

The uranium mineralization occurs in a fracture zone that consists of two closely spaced, slightly en echelon fractures striking at 60 degrees and dipping steeply. Short cross fractures, many of which strike at 90 degrees are found along the zone. This fracture zone is between the fault and the quartz stockwork. The zone is mineralized over a length of about 60 feet and a width of about 4 feet. Pitchblende is visible in many fractures and uranium mineralization is concentrated at fracture intersections. Quartz and hematite are the only associated minerals. A few areas of low radioactivity are found in the fractured rock between the fault and stockwork.

Will Group (53)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-10.

The Will group of 6 claims and 2 fractions is located at 63° 22'N, 116° 33'W or about 12 miles north of Rayrock Mines, Limited and 105 miles northwest of Yellowknife. The claims were staked in 1953 by Nuclear Exploration Syndicate and were optioned to Iso Uranium Mines, Limited in 1955. In July, 1955 the latter company drilled 9 holes to test the uranium showing. The option was dropped in 1955 and the claims have since lapsed.

The showings are in the northwest end of a giant quartz vein or quartz stockwork which occurs in granitic rocks that underlie all the claims. For the most part these rocks are buff weathering, faintly to strongly gneissic, medium- to coarse-grained, with phenocrysts of grey to flesh coloured plagioclase and/or pink toned microcline that vary in size up to 2 inches. The ratio of plagioclase and microcline varies considerably; other essential minerals are quartz, biotite and hornblende. Near the stockwork along the south contact, the granitic rock is brecciated, silicified, stained red with hematite and cut by many small quartz veins. Such alteration is much less evident on the north side of the stockwork. There is evidence that a fault separates the stockwork from the granitic rock along the north contact. The stockwork is about 3 miles long and 100 feet wide and lies in a fault zone that

is several miles longer than the stockwork. Subsidiary, rather short, faults that curve off or are parallel to the main fault are common on the property. The stockwork consists of milk white quartz cut by veins of later white quartz and clear quartz. Seams of hematite are common.

Uranium mineralization is in fractures near the northwest end of the giant quartz vein. The mineralized fractures strike at about 120 degrees, dip vertically and occur along a weak fracture zone which is about 500 feet long. Mineralization consisting of yellow uranium oxide and minor chalcopyrite and hematite occur in three sections of more intense fracturing within the zone where fractures parallel to the zone and cross-fractures are numerous and closely spaced. Mineralization in these sections occurs over widths of about 1 foot; two of the mineralized sections are about 20 feet long while the third is about 40 feet long. In the latter section, the fractures are curved and the best mineralization occurs in the fractures in the area of maximum curvature suggesting that slight movement along these curved surfaces in part controls the localization of the mineralization.

Nine holes were drilled to test the zone at a vertical depth of about 100 feet. No mineralization was found and the fracturing at depth was very weak.

Giauque Discovery (54)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-15.

The Giauque discovery (63° 57'N, 116° 33'W) is on the northeast shore of the northwest arm of Saddle Lake 110 miles northwest of Yellowknife. The discovery was made by Fred Giauque in 1955 and a group of claims that have since lapsed were staked.

Rocks near the showing are granitized sedimentary gneiss and granitic gneiss. The granitic gneiss consists of flesh coloured plagioclase, variable amounts of pink microcline, quartz, and biotite, and commonly contains porphyroblasts of plagioclase less than 1 inch in diameter aligned parallel to the foliation. Small lenses of dark green hornblendic rock are scattered in the gneisses. The gneissosity strikes about northwest and dips steeply. According to Lord (1942a), a northwest-trending fault is found about 1/2 mile east of the showing.

Mineralization occurs in a fracture zone which strikes about 110 degrees and dips steeply. The zone consists of a number of short en echelon fractures and a series of short cross-fractures. The zone can be traced for 120 feet and is open at one end; it is up to 5 feet wide. Hematite and quartz fill some fractures and rocks between fractures are stained red with hematite. Radioactive minerals are scattered along the fractures. Fracture intersections and small areas of intense closely spaced fracturing localize most of the mineralization. Significant mineralization is also concentrated where basic remnants or lenses are cut by fractures. Such mineralized sections are up to 4 feet long and a few inches wide; about 5 such sections were found in the zone.

Mum Group (55)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-2.

The Mum group of 16 claims, 63° 14'N, 116° 53'W, is about 17 miles southwest of Rayrock Mines, Limited and 95 miles northeast of Yellowknife. The claims were staked in 1954 by E. Boffa and L. Peckham to cover a uranium showing. A few trenches were put in to expose the mineralization at the time of staking. In 1955 the property was optioned to Mentor Exploration and Development Company, Limited and during the summer of that year 10 holes were drilled to test the showings. No further work has been done on the claims and the company has dropped its option.

The showings occur in a quartz stockwork or giant quartz vein that is in a fault in granitic rock of Precambrian age. Paleozoic rocks of Ordovician age outcrop around the hill formed by the stockwork and underlie most of the claims. The Paleozoic-Precambrian contact is about a mile to the north and northeast. Granitic rocks outcrop along the hillsides; they have been partially crushed due to movement along the fault. Along the northwest contact of the stockwork the granitic rock is silicified and cut by quartz veins. Such alteration is not evident on the southeast side as the stockwork is in fault contact with granite. The fault, which strikes northeast and dips steeply, is thought to be part of the Marian River fault which outcrops to the northeast in the Precambrian terrain (McGlynn, 1956). The giant quartz vein consists of several generations of quartz which have been introduced in the fault zone to form a stockwork of quartz veins. Movement on the fault continued after quartz deposition.

Mineralization occurs in the stockwork in a fracture zone in the quartz. The persistent fractures trend roughly parallel to the stockwork and dip steeply to the northwest. Short cross-fractures are common along the zone. Pitchblende is erratically distributed along the fractures usually occurring at fracture intersections. Hematite and, near the surface, yellow uranium stain, is also common. On the surface, uranium mineralization is scattered in the zone over a length of about 200 feet.

The zone was tested with 10 drillholes. Significant radioactivity was encountered in 4 holes but widths were narrow and the distribution erratic. In some holes, the fracture system was not detected.

Sun Group (56)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-1.

The Sun group of 10 claims, about 4 miles north of the north end of Marian Lake (63° 07'N, 116° 20'W) is about 80 miles west-northwest of Yellowknife. The claims were staked in the summer of 1954 by Hubie and Bruce Giauque. Shortly after, the property was optioned to Consolidated Northland Mines, Limited and the claims are now (1969) owned by this company.

In 1954 a drilling program was initiated and by the following spring, about 15,000 feet of drilling was completed. In the summer of 1955 a road was built from Marian Lake and a mining plant was shipped from Yellowknife by barge and road. A 2-compartment shaft was sunk late in 1955 to a depth of 270 feet. Levels were established at 120 and 240 feet. One drift on the first level and three on the second were driven to develop radioactive zones. Also about 1,500 feet of diamond drilling was completed from the first level. In July of 1956, the compressor and hoist buildings were destroyed by fire; the camp was closed down later in the summer and no further development has since taken place.

The claims are underlain by granitic rocks of various compositions. A common type is a gneissic, fine- to medium-grained, pinkish rock consisting of quartz, pink to flesh coloured feldspar and biotite. Locally the rock contains phenocrysts of feldspar. Just east of the stockwork in which the showings occur, the rocks are more basic and consist of hornblende, feldspar, biotite, and more quartz. Gneissosity strikes north to north-northeast and dips steeply.

The showings occur in a quartz stockwork that is in a fault locally known as the Chico fault. The stockwork is exposed over a length of about 1,500 feet and is up to 200 feet wide but the fault is known to be more than a mile long. The structure strikes 35 degrees and dips 60 degrees to the northwest. The west contact of the stockwork is a fault that is marked underground by about 2 feet of gouge and crushed rock. The stockwork consists of fine-grained, white fractured quartz. Later quartz occurs in these fractures as veins and lenses and fragments of silicified granitic rock occur in the quartz. The rocks along the east boundary of the vein are silicified and cut by many quartz stringers. Two north-northeast-striking, curving faults occur just east of the stockwork in the silicified veined rocks. These faults also dip to the west at 60 degrees. Rocks near these faults are crushed, brecciated and hematite stained.

On the surface mineralization occurs in fracture zones in the stockwork. Most of the zones are located near the west contact in the central part of the vein. The most persistent strike at 70 degrees and dip steeply to the north. A second set strikes at 350 degrees and sometimes are curved along their length to an orientation of 220 degrees. Close to the Chico fault, fractures strike at 35 degrees and dip west to the fault. Pitchblende is rather erratically disseminated in these fracture zones along with hematite. The best grade occurs where fracturing is most intense, that is, in areas containing many closely spaced fractures and at fracture intersections.

Underground two main ore shoots were outlined. The No. 1 zone occurs in the quartz stockwork about 50 feet east of the Chico fault. It consists of a series of fractures the most persistent of which strike at about 70 degrees. Pitchblende occurs in fractures and the best ore occurs where they are most numerous. On the first level, the shoot is about 70 feet long and 6 feet wide and is 190 feet east of the shaft and on the second level it is 45 feet long and about 9 feet wide and 130 feet east of the shaft. The overall grade of the shoot is in the order of 0.2 per cent U_3O_8. The second zone occurs just east of the stockwork in the silicified stringer zone. Radioactive minerals occur in a quartz breccia zone in a fault that strikes at about 30 degrees and dips west at 55 degrees. This fault may be one of the faults that are

found on surface east of the stockwork. Pitchblende occurs in fractures in the zone and has an erratic distribution. This zone was only opened up in the second level.

MIC Group (57)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-1.

The MIC group of 9 claims is about 8 miles north of the north end of Marian Lake, about 4 miles north of the property of Consolidated Northland Mines, Limited, or about 80 miles northwest of Yellowknife. The claims which were staked in 1954 were reported to belong to J. G. Wheeler of Toronto. Development work completed at the time of the author's visit to the property in 1957 consisted of 4 trenches. In 1957 the claims were allowed to lapse.

The claims are underlain by granitic rocks which are faintly gneissic, and commonly contain plagioclase phenocrysts. Much of the rock is granodiorite, which is cut by small bodies of pegmatite and pink granite. The granitic rocks contain altered, irregularly shaped basic inclusions which are hornblende-rich and commonly contain perceptible amounts of epidote. A northerly-trending, steeply dipping fault, locally known as the Northland fault, has been traced to the property from the Consolidated Northland property. Subsidiary northeast-trending faults are commonly found along the main fault.

The showings are located on the MIC No. 1 claim and consist of uranium mineralization in fractures in granitic rock which are porphyritic near the showings and contain a number of rather large basic inclusions or remnants. In the three outcrops in which the uranium mineralization occurs, the rocks are an earthy red colour in contrast to the pink to grey colour of the normal granitic porphyry in the area. The colour is probably caused by hematite deposited along minute, closely spaced fractures.

Fractures commonly strike at 110, 140, 120, 90 and 170 degrees and are all steep dipping. Pitchblende occurs in the fractures usually associated with minor amounts of quartz and hematite. High grade sections commonly occur at fracture intersections and are, therefore, short and discontinuous. Individual mineralized fractures are up to 3 inches wide. These mineralized sections are scattered over the three red coloured outcrops and in several places, the rock between the fractures gives a high background reading on a geiger counter. A grab sample of this material is reported to run 0.14 per cent (chemical) U_3O_8 per ton and it seems possible that in these areas some pitchblende was deposited along minute fractures. There is some evidence that a fault strikes northeast near these outcrops; topographic evidence suggests that this possible fault could continue northeast to the Northland fault. The fractures which localize the mineralization may then be related to this possible fault.

A Group (58)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-1.

The A group of 9 claims, 7 miles north of the mouth of the Marian River or about 3 1/4 miles north of the campsite of Consolidated Northland Mines, Limited uranium property, is about 80 miles northwest of Yellowknife. The claims were staked by C. Vaydik and J. Torpe in 1954. In 1955 the ground was prospected and a uranium occurrence was discovered on claim A 6. In 1957 the claims were optioned to a group based in Calgary, who financed a drilling program. A thousand feet of drilling was completed. The option was dropped but the claims are still in good standing.

The claims are underlain by granitic rocks of various compositions and textures that are cut by narrow vertically dipping gabbro dykes. The most abundant rock type is a pink weathering porphyroblastic gneiss containing feldspar (probably both plagioclase and microcline in varying amounts) quartz, biotite and possibly amphibole. The feldspar porphyroblasts vary in length from 1/2 inch to 3 inches and in width from 1/8 inch to 2 inches. The larger porphyroblasts occur in very gneissic rocks. Bands of partially granitized biotite-rich or hornblendic metasediments are common in these gneisses. A second type of granitic rock is a buff weathering, even grained, faintly gneissic rock containing flesh coloured plagioclase, biotite, microcline and quartz. Gneissosity in these rocks strikes at 340 to 350 degrees and dips steeply.

The showing occurs on claim A No. 6 on an outcrop of granitic rock that is partly even grained and partly porphyroblastic. The rocks are cut by fractures that commonly strike at 340-350, 300 and 30 degrees and dip steeply. Fractures striking at 340 degrees are the most abundant and longest. Fracturing is most intense along the west side of the outcrop where strong shearing and brecciation is locally evident. A long draw that borders this outcrop on the west side and extends for about 1/2 mile along strike may mark the position of a fault related to the fracturing. The outcrop is about 200 feet long and up to 50 feet wide; it is elongated in the direction 340 degrees. The granitic rock is an earthy red colour on weathered and fresh surfaces.

Quartz and hematite occur along sections of some of the main fractures. Pitchblende is scattered in the fractures with the best mineralized sections occurring at fracture intersections. About six areas of high radioactivity are found on the outcrop. Geiger counter readings of slightly better than background are found along some of the other fractures. No radioactivity occurs in the sheared rock along the west edge of the outcrop. When the showing was drilled, holes were directed at right angles to the major fracture directions. No radioactive sections were cut although the fracture system persisted to the depth tested - about 100 feet.

JW Group (59)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-1.

The JW group of 9 claims is about 8 miles east of north of the mouth of the Marian River, about 4 miles north-northeast of the camp of Consolidated Northland Mines, Limited or about 80 miles west-northwest of Yellowknife. The claims were staked in 1955 for Iso Uranium Mines, Limited when the company's prospectors discovered several small radioactive mineral occurrences but have since been allowed to lapse. The showings were opened up with a series of trenches.

The claims are underlain by a variety of granitic rocks. The most common type is a pink to buff weathering, faintly gneissic, even grained granite containing flesh-coloured plagioclase, pink potash feldspar, biotite and quartz. In this rock are irregularly shaped masses of fine-grained, grey weathering gneissic granitic rock consisting of grey to greenish tinted plagioclase, quartz and minor biotite. Irregularly shaped bodies of pegmatite occur within the granitic rocks and grade into them. The pegmatites consist of flesh coloured and pink feldspar, quartz that often occurs in feldspar as intergrowths and minor amounts of chlorite which occurs as books or irregularly shaped patches. Some pegmatites have a very thin coating of yellow radioactive stain on the weathered surface; fresh surfaces of such rocks are not radioactive. Three north-trending lineaments occur on the property. There is "giant" quartz just south of the property in one of the lineaments. Brecciation, mylonitization and local shearing of the rocks along this lineament indicates that it marks the location of a fault and the other lineaments are also thought to mark faults.

The showings occur in granitic rocks in or near pegmatitic phases. Three separate small showings have been discovered. Mineralization is localized in fracture zones with a strike of about 120 degrees and a steep dip. These zones consist of strong fractures striking at 120 degrees with shorter fractures striking at 350 and 55 degrees. Dips of individual fractures vary from 70 to 90 degrees. Radioactive minerals are erratically distributed in the fractures with the best concentrations being at fracture intersections. In the best section significant geiger counter reaction was found over a length of 30 feet. The overall length of this mineralized zone is 100 feet. In addition to radioactive mineralization some fractures are filled with a black chloritic material whereas others contain hematite-stained quartz. Although grab samples returned high assays, careful sampling in the trenches indicated a low uranium content in the zones over reasonable lengths and widths.

Lea Group (60)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-1.

The Lea group of 18 claims is about 5 miles east of Marion River, about 9 miles west of north of the north end of Marian Lake, or about 80 miles west-northwest of Yellowknife. The claims were staked in 1954 and

optioned to Yellowknife Uranium Corporation in 1955 during which year six holes were drilled to test the showings to a vertical depth of about 150 feet but the option was dropped and the claims have since lapsed.

Nearby rocks consist of granitized sediments and granitic gneisses of varying composition in which porphyritic or porphyroblastic types predominate. Foliation trends in a northerly direction and dips steeply. The rocks are cut by two steep-dipping faults which strike north-northwest. There are quartz stockworks in each of these faults and smaller faults curve off the main structures. The stockwork in the east part of the property is about 3/4 mile long and that to the west is about 1/2 mile long. Granitic rocks near the faults are crushed and locally stained with hematite and commonly contain narrow veinlets or lenses of quartz.

Mineralization occurs in a fracture zone in the quartz stockwork and silicified brecciated granite at the south end of the most westerly stockwork. The fracture zone is up to 5 feet wide, strikes parallel to the stockwork and is steep dipping. The mineralized section is about 100 feet long. Mineralization consists of bornite, chalcopyrite, pitchblende, quartz and hematite. Bornite is erratically distributed in short, narrow lenses and pods in fractures in the zone. Individual lenses are up to 10 feet long. Small amounts of chalcopyrite are commonly associated with the bornite. Pitchblende is scattered in the zone and is usually localized at fracture intersections. It seems least abundant where bornite occurs. Quartz stained with hematite occurs in fractures along the length of the zone.

The drillholes intersected the fracture zone but radioactive intersections were few, narrow and low grade. Bornite was intersected in most holes and in one hole a width of 1 foot was cut. However, sampling indicates that the copper content in the zone as a whole is low.

Dit Group (61)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-2.

The Dit group of 18 claims is on the Marian River about 12 miles northwest of the point where the river flows into Marian Lake or about 85 miles west-northwest of Yellowknife. The claims were staked by E. Boffa, L. Peckham, and Bill MacDonald in 1954, and in 1955 were optioned to Yellowknife Uranium Corporation. During the summer of 1955 more than twelve holes were drilled involving more than 3,000 feet of drilling. The option was dropped in 1955 and the claims have since lapsed.

The claims are underlain by granitized sediments and granitic gneisses that are commonly porphyroblastic. The foliation strikes in a northerly direction and dips steeply. These rocks are cut by a north-northwest-trending, steep-dipping fault that contains a quartz stockwork. The stockwork is about 1 1/2 miles long but the fault can be traced for a longer distance. Although the stockwork is in the fault zone, late movement on the fault has resulted in a fault contact on the west side of the stockwork. Subsidiary faults curve off or are parallel to the main structure.

The showings occur on Dit No. 6 along the east contact of a quartz vein that curves off the east side of the main stockwork. Mineralization occurs in a well-defined fracture zone that trends at about 340 degrees

parallel to the strike of the quartz vein. The fracture zone consists of steeply dipping fractures that strike 340 degrees and cross-fractures at 110 degrees. The mineralized section of the zone is about 200 feet long and up to 4 feet wide. Pitchblende is erratically distributed in this section in zones of intense fracturing and cross fracturing. The best concentrations of radioactivity occur at fracture intersections. One section, about 30 feet long, contains high grade material. Quartz and hematite are the gangue minerals.

By drilling it was found that the high grade section extended down dip to a depth of about 35 feet. The fracture zone with associated hematite-stained rocks extended down to a depth of at least 100 feet and over a considerable strike length but no significant values were intersected. A few holes were drilled into other parts of the main fault and quartz stockwork and related minor faults with negative results.

JSW, AAW, ABW Groups (62)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-13.

The JSW, AAW, ABW groups of 116 claims are just south of Russell Lake about 8 miles east-northeast of Rae and 54 miles west-northwest of Yellowknife. These claims were acquired by Yellowknife Uranium Corporation in 1955 and geological and geiger grid surveys were completed that year. Apparently a few small occurrences of uranium were discovered on the JSW claims but the author has no information about them. The claims are underlain by granitic rocks of various compositions. No further work was performed and the claims were allowed to lapse.

UP Group (63)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-13.

The UP group of 18 claims, just east of the south central part of Russell Lake (62° 58'N, 115° 37'W) is about 52 miles west-northwest of Yellowknife. The claims were staked in 1955 by E. Boffa, L. Peckham and associates to cover a uranium discovery. Little or no work was done on the ground after the initial prospecting and the claims have since lapsed.

The claims are underlain by grey quartzites and argillites with a few beds of dolomite and skarn rocks. These rocks are similar to those of the Snare Group described by Lord (1942a). The sediments strike at about 40 degrees and dip steeply.

Radioactivity is found in the sediments in a fracture zone that strikes at 340 degrees and dips nearly vertically. The zone consists of closely spaced or in places, a single fracture cut by short cross-fractures. Brecciation of the country rock over a width of one foot is visible along sections of the fracture. The rocks along the fractures, particularly the brecciated rocks are stained with hematite. Lenses, pods and narrow branching veins of hematite-stained quartz are scattered in the fractures. The zone occurs on two outcrops separated by about 500 feet of overburden, and the total

length of the fracture system is about 1,500 feet. Radioactivity is erratically distributed in the fractures commonly in or near quartz veinlets or in brecciated rock where hematite stain is marked. Individual mineralized sections are very small and geiger counter reaction is rarely high. About 5 short mineralized sections were observed along the structure.

CX Group (64)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-1.

The CX group of 19 claims, about 2 miles south of the west end of Slemon Lake (63° 10'N, 116° 12'W) is about 75 miles west-northwest of Yellowknife. The claims were staked in 1956 by Lorne Sykes. Several trenches were excavated on a uranium showing on the property in that year but no work has been done since and the claims have lapsed.

The claims are underlain by granitic rocks of various compositions. The most common type is a pink, faintly gneissic, fine-grained rock consisting of feldspar, most of which seems to be plagioclase, quartz, and biotite. More basic rocks were observed; these are diorite and consist of plagioclase, hornblende and some biotite. The relationships between these types are unknown. In several places small, irregularly shaped patches of the weathered surface of the granitic rocks are covered with a thin coating of yellow uranium stain. In two such patches small fractures were observed which may have contained the radioactive material that on weathering formed the thin coating of stain.

The showing is on CX No. 1 claim and it consists of an easterly trending, steeply dipping, fault zone made up of three main fractures with associated shorter cross-fractures and branching fractures. Dips on these structures vary from 70 degrees south to vertical. The enclosing granitic rocks are crushed, brecciated, hematite stained, and locally sheared. Lenses or short, narrow veins of quartz are numerous along the fractures. Short, irregularly spaced sections of this zone are radioactive and yellow stain occurs in several places at fracture intersections. Sampling of the zone indicated that its overall grade is low.

For the most part CX Nos. 3 to 18 claims cover a long ridge along which a north-trending fault and associated short faults are located. This zone was prospected but no significant showings were discovered.

TR Group (65)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-J-11.

The TR group of 11 claims was staked in 1954 by C. Tremblay, A. Stevens and associates. The claims are located at Trout Rock on the north shore of the northwest arm of Great Slave Lake about 30 miles west of Yellowknife. In 1955 the claims were sold to Yellowknife Uranium Corporation and this company completed geological studies and blasted two trenches but decided that further work was not warranted.

The claims are underlain by fine- to medium-grained, grey to pinkish granodiorite. The pink phase may be younger than the grey and may intrude it. Coarse-grained, almost pegmatitic phases are found in the pink granodiorite. All granitic rocks are cut by pegmatites which form lens-like to irregularly shaped bodies. A thin coating of yellow uranium stain, locally, forms on the weathered surfaces of pegmatites, coarse-grained pink granodiorite and on the fine-grained pink granodiorite. The stain is most common in pegmatites or coarse-grained phases of the pink granodiorite. No stain is found localized in fractures or shears and the localization of stain bears no apparent relation to structure. No stain appears on the fresh surfaces of these rocks. Assays of samples return traces of uranium and thorium.

BCW, JMB, OL Groups (66)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-1.

The BCW, JMB, OL groups of 17 claims was originally part of a larger group of claims acquired by Yellowknife Uranium Corporation in 1955. The group is located between James Lake and Marian Lake at the northwest end of Marian Lake about 75 miles west-northwest of Yellowknife. Geological mapping and a geiger counter survey were completed on the property during the summer of 1955. In the fall of that year, 15 diamond-drill holes averaging 300 feet in length were drilled to test an interesting structure on the property. No further work was done and the claims have since lapsed.

The claims are for the most part underlain by metamorphosed sediments, granitized sediments and granitic gneisses. These rocks strike north to north-northwest and dip steeply. They are cut by a north-northwest, steep-dipping fault that can be traced for at least two miles. Small faults that curve off or are parallel to the main fault are numerous. Hematite alteration in the crushed and brecciated rocks near the faults is common and a quartz stockwork or "giant" quartz vein is located in the major fault.

No uranium mineralization occurs on surface. Only a few scattered, narrow and unrelated widths of uranium were intersected in the drillholes located to test the main fault.

Mars Group (67)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-K-16.

The Mars group of 18 claims is located just south of Bedford Point on the west shore of Marian Lake (62° 56'N, 116° 17'W) and is about 68 miles west-northwest of Yellowknife. The claims were staked in 1955 by A. Stevens and associates and in 1956, 4 trenches were excavated on a uranium showing discovered on the property. No further work was done and the claims have since lapsed.

The claims are for the most part underlain by a pink, fine- to medium-grained, faintly gneissic granitic rock that locally contains quartz eyes. This rock is cut by a fault that is located along a prominent ridge and

strikes about 340 degrees near its south end and curves so that at its north end it strikes about 330 degrees. The structure dips to the west at about 70 degrees. A number of subsidiary faults curve off the main fault. Rocks near the fault are crushed, locally mylonitized, and commonly stained with hematite. A quartz stockwork and network of quartz veins occur along the west side of the fault over much of its exposed length.

The main showing occurs near the north end of the ridge in the stockwork in a fault or fracture zone that curves off the main fault and strikes at 5 degrees and dips west at from 45 to 60 degrees. The width of the zone is between 5 and 15 feet and it can be traced over a length of 100 feet. Pitchblende is erratically distributed in the zone usually in short sections at fracture intersections.

Hump Group (68)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-11.

The Hump group of claims (63° 35'N, 117° 15'W) is about 11 miles west of the north end of Hislop Lake and about 122 miles northwest of Yellowknife. The claims were staked by E. Boffa, L. Peckham and A. Stevens in the summer of 1955. At that time, 7 trenches were blasted to open up the uranium showings which were discovered on the claims. No further work was done and the claims have since lapsed.

Most of the claims are underlain by flat-lying Paleozoic rocks of Ordovician age. The showings occur in a quartz stockwork which projects through the Paleozoic strata. Granitic rocks of Precambrian age outcrop along the sides of the ridge formed by the stockwork. These rocks consist of even-grained, gneissic granodiorites that weather a buff colour and contain buff to flesh coloured plagioclase, quartz, biotite and possibly hornblende. The stockwork strikes at about 70 degrees, is near vertical in dip, and is up to 150 feet wide. Its length is unknown but it is exposed over several claims. The stockwork consists of milky quartz cut by hematite seams and narrow veins of a second generation of quartz. No evidence of faulting was found along either contact of the mass but the south contact is poorly exposed. Most such stockworks in the general area occur in fault zones. Granitic rocks along the north contact of the vein are cut by numerous quartz veins, some of which can be traced into the main vein. Near the vein along the north contact the granitic rocks are silicified.

Mineralization occurs in the stockwork near the north contact on Hump No. 1 claim. Mineralization is in a fracture zone which strikes at about 70 degrees and consists of fractures striking at 70 degrees with short cross-fractures striking at 110-120 and 30-40 degrees. Pitchblende, yellow uranium stain, hematite, quartz, and locally green copper stain, occur in the fractures at or near intersections of fractures. Radioactivity is found in the fracture zone over a length of about 200 feet and over widths of up to 5 feet but the distribution of the mineralization is erratic within the zone. There are, therefore, sizeable sections within the zone which give no reaction on a geiger counter.

Nori Group (69)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-C-7.

The Nori group of 12 claims is at 64° 22'N, 116° 49'W or about 150 miles northwest of Yellowknife. The finds were made in 1954 by prospectors largely financed by Radiore Mines, Limited. In the summer of 1955 the claims were mapped geologically and geiger counter survey was completed. Trenches that had been blasted in the previous year were carefully sampled. No further work has been done on the showings; the claims have lapsed.

Rocks underlying most of the claims consist of granitized sedimentary gneisses. A biotite-rich quartz-feldspar gneiss and a gneiss with less biotite, 1-2 per cent, and containing quartz, plagioclase, and microcline are common types. The regional strike of the foliation is northwest; the dip is steep to the northeast.

Radioactivity is found in a dark, fine-grained rock consisting of up to 40 per cent magnetite. The magnetite occurs in bands that are parallel to the foliation planes in the gneiss. It either replaces the gneiss or is formed during the granitization process. Radioactivity seems fairly evenly distributed in the magnetite-rich rock although local areas of high reaction do occur. Fractures in the rock carry little or no radioactive material so radioactive minerals must be disseminated in the magnetite. Altogether five radioactive zones were outlined but only two are significant.

Zone A consists of the above described material in a zone that strikes northwest. Radioactivity has been traced over a length of 170 feet and width of 5 feet. Samples from trenches assay up to 0.2 per cent U_3O_8 but the average of a number of samples is much lower.

Zone D strikes northeast, parallel to the strike of foliation of the enclosing rocks, and consists of 3 closely spaced narrow bands of radioactive magnetite-rich rock. The length of the zone is 150 feet. Channel samples contain up to 2.5 per cent U_3O_8 but the average grade of the zone is low.

A second group of claims called the VU Group was staked by the same company in 1954 on radioactive showings in magnetite-rich rock about 14 miles north of the Nori group at 64° 37'N, 116° 48'W. The geology and nature of the showings are similar in all respects to those on the Nori claims but the significant radioactive zones are smaller and of a lower grade. The showings were sampled but no further work was done and the claims have since lapsed.

Caw Group (70)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-C-10, 86-C-7.

The Caw group of 36 claims (64° 30'N, 116° 40'W) is about 160 miles north-northwest of Yellowknife. The claims were acquired in 1955 by Yellowknife Uranium Corporation and geological and geiger counter surveys were completed and 4 trenches were blasted on the showings. No further work was done and the claims have since lapsed.

The showings are in granitized sediments and granitic gneisses. These rocks strike north-northwest and dip steeply. The rocks are cut by a north-northwest-trending fault that is part of a major north trending regional fault (Lord, 1942a). Mineralization occurs in a fracture zone that consists of north-trending fractures cut by short cross fractures. Pitchblende, hematite and quartz occur in the fractures. The distribution of pitchblende is very erratic and lengths and widths of mineralized sections are reported to be small.

The Alpha group of 24 claims adjoins the Caw group on the south. These claims were also held by Yellowknife Uranium Corporation and were staked to cover the extension of the structure described above. A small uranium showing in a north-striking fracture zone related to the major fault was discovered and opened up by a few trenches. The showing is similar to that on the Caw Group. The claims have lapsed.

Jackpot Group (71)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-F-9.

The Jackpot group of 64 claims (65° 41'30"N, 116° 30'W) is located between 2 lakes, locally known as Hartley and McPhoo Lakes about 5 miles east of Hansen Lake and about 230 miles north-northwest of Yellowknife. The claims were staked in 1953 by T. Hartley and associates and later a company known as Jackpot Uranium Mines, Limited was formed. During the summer of 1954 the property was prospected and the uranium showings were tested by diamond drilling. In 1956 one of the zones was partly developed with a short inclined shaft. Work continued on the shaft at intervals until 1957.

Rocks underlying the claims consist of biotite gneiss and granitic gneiss; these are cut by a large diabase dyke. The biotite gneisses are metamorphosed sediments and are banded, grey to black, fine-grained rocks consisting of quartz, grey plagioclase, and biotite. The latter varies in amount from a few per cent to about 15 per cent. Locally the rocks are garnetiferous. The granitic gneisses on the property are the result of granitization of the metasediments; all gradations between biotite gneiss and granitic gneiss can be observed on surface and in drill core. Commonly the rock is a pinkish, fine- to medium-grained, gneissic aggregate of quartz, feldspar, and minor biotite. Locally feldspar porphyroblasts occur in the gneiss. At the north end of the property these rocks are cut by a wide diabase dyke that strikes east-northeast and extends for miles along its strike both to the east and west. Foliation generally strikes north-northeast and dips steeply but there are sharp local variations of strike. The foliation planes in the biotite gneiss are contorted and thrown into small tight drag folds.

Radioactive minerals occur in magnetite-rich zones in the gneiss. Magnetite occurs in lenses, narrow bands and irregularly shaped patches and commonly concentrations of magnetite occur at crests of drag folds. As a rule individual bands of magnetite are narrow and short – few exceed a few feet in length. The largest observed was about 6 feet wide and 50 feet long. One zone in the gneisses containing a number of such bands and lenses of magnetite was roughly outlined. Magnetite bodies commonly carry narrow

veinlets of chalcopyrite. Radioactive minerals occur in the magnetite. No radioactive minerals were identified and they do not appear to occur in fractures in magnetite but to be finely disseminated. Grab samples assayed up to several per cent U_3O_8. Thorium occurs in many samples in a ratio to uranium of about 1:1. Spectrographic analysis of some samples indicate interesting amounts of cesium and a number of rare-earth elements.

Tan Group (72)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-N-10.

The Tan group of 18 claims (63° 37'N, 116° 40'W), is about 107 miles northwest of Yellowknife. The claims were staked in 1953 for Northern Mining Services, a now defunct company. In 1953 prospectors found slightly radioactive boulders of coarse-grained actinolite and apatite along a draw. The actinolite-apatite rock was similar to radioactive rocks in the East Arm of Great Slave Lake that were being developed at that time (see pp. 126, 128). In the winter of 1954, two holes were drilled into the draw and apparently a dyke of coarse actinolite was found; the cores were slightly radioactive. More drilling was done in 1954 and the dyke, which was about 10 feet wide, was traced for a reported length of 1,200 feet. Some core sections were slightly radioactive but values were low and erratically distributed. The dyke occurs in granitic rocks which are gneissic and in part porphyritic. No further work has been done and the claims have since lapsed.

Cormac Group (73)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-D-9; Lord, 1951.

The Cormac group of 24 claims is on the north side of the East Arm (Arden Bay) of Beaverlodge Lake about 95 miles south of Port Radium. The uranium showings on the property were first staked in 1934 but the present group consists of 6 claims staked years ago, probably in 1943, plus 18 adjoining claims staked in 1954. In 1954, the claims were acquired by Consolidated Beta Gamma Mines, Limited and in the spring of 1955, 16 holes were drilled to test the various showings on the property. In 1956, a 750-foot adit was driven into a zone outlined by drilling. This zone was opened up by a drift and a raise was driven to a second zone that was partially opened up before the operation was closed down. No work has been done on the property since 1956.

For detailed descriptions of the geology and surface showings the reader is referred to Lord (1951, pp. 110-113) and to Henderson (1949). Briefly the oldest rocks on the claims consist of interbedded volcanic and sedimentary rocks consisting of feldspar-quartz porphyry and quartzites. These rocks strike northeasterly and dip steeply to the northwest and are intruded by dark green, massive, altered gabbro. The quartzite band, often referred to as a giant quartz vein is, according to Henderson, a quartzite band into which irregular masses and veins of quartz have been introduced.

Nine deposits of pitchblende have been located in the quartzite band near the contact with porphyries. Only three of the surface showings were significant. The No. 3 showing, according to Lord, is 1,750 feet north of three cabins on the lakeshore; No. 4 deposit is just north of No. 3 and No. 10 is about 6,000 feet northeast of No. 3. Descriptions of these showings from Henderson (1949) follow:

"No. 3. A shaft has been sunk in quartzite about 6 feet northwest of the contact with the porphyry....

"According to Jolliffe (1935, p. 93), who visited the property when the shaft was being sunk, 'a small amount of secondary uranium minerals prompted the location' and 'an irregular compound pitchblende lens (was) exposed in the west wall of the pit.... The maximum dimensions of this lens exposed in cross-section during the development work measured slightly over six feet. Throughout this length there were three swells with intervening pinches. The top swell at its widest portion measured 6 inches across, the middle 8 inches, and the bottom one 7 inches'.

"The shaft is reported to have been sunk to a depth of 50 feet. No pitchblende was found beneath the lens described above.

"No. 4....A pit about 25 by 20 feet at the surface and 12 to 15 feet deep, with the bottom covered by water, has been sunk in the quartzite. In the northeast bottom corner of the pit a 3-inch seam of chlorite lies between two massive quartzite beds. It occurs only in the bottom of the pit as it pinches out before it reaches the surface, but patches of it can be seen along the northwest wall of the pit where it has not been mined out. The quartzite near the chlorite patches on this wall of the pit is coated with uranium stain.

"The chlorite has apparently been introduced along a crush zone parallel to the bedding for the quartzite along the chlorite seam on the northwest wall is fractured. There is practically no pitchblende left in this pit.....

"Jolliffe (1935, p. 91) describes the lenses that were mined out of this pit as follows: 'Three rudely lenticular pockets were located containing pitchblende and hematite disseminated through quartz....In view of the transitional character of the borders of these lenses the following measurements are only approximate. The pocket nearest the surface was more or less equidimensional and about 2 feet across. In the same vertical line were found two other lenses of which the upper had a maximum width of about 3 feet and was only a few inches deep. The bottom lens measured about 1 foot across its largest dimension. Intervening barren vein material separated these lenses'.

"No. 10....The pitchblende occurs along a zone of quartz stringers in quartzite, conglomerate, and argillite that strikes northeast and dips 55 to 60 degrees northwest. Three large trenches and a small pit have been dug across the zone in a length of 70 feet. The conglomerate bed, which is about 4 feet thick, is composed of quartz and porphyry pebbles up to 1 1/2 inches in diameter in a coarse, gritty quartzitic matrix. The conglomerate grades upward into a coarse, gritty quartzite containing a few scattered pebbles, and the vein zone containing the pitchblende is in the

gritty quartzite but, to the southwest, angles off into an overlying, greenish, thinly bedded argillite, and breaks up into a network of quartz stringers containing no pitchblende.

"The small southwesterly pit is in the vein zone after it has passed into the argillite, and the Geiger counter gives no appreciable reaction either in it or to the southwest of it. The large trench, 5 feet to the northeast, is 12 by 5 feet at the surface, and 6 feet deep, with the longer dimension along the vein zone. The vein zone is exposed at both ends, and lies between the 4-foot conglomerate bed to the southeast and the 1-foot bed of coarse, gritty quartzite succeeded by argillaceous sediments to the northwest. The vein zone, which consists of stringers of comb quartz with some associated hematite and pitchblende along the walls of the stringers, is 4 to 6 inches wide, increasing in width to 14 inches at the northeast end of the trench. There is much uranium stain along the vein zone...

"In the next trench to the northeast, which is 15 feet long, 3 feet wide, and 3 feet deep, with its longer dimension normal to the structure, the vein zone is exposed at the southeast end. It is not as well defined as in the last-described trench, but there are a few quartz stringers with much stain and a little pitchblende...

"The next trench is 30 feet northeast of the one last described, and is about 20 feet long, 3 feet wide, and 3 feet deep, and normal to the rock structure. The trench is in conglomerate and gritty quartzite, but there is no well defined vein exposed in it although one 2-inch quartz veinlet at the southeast end of the trench contains a little uranium stain...

"In summary the best part of this showing is exposed in the two southwesterly trenches, where a zone of quartz stringers 4 to 14 inches wide carrying pitchblende is exposed over a length of 35 feet. This zone dies out to the southwest, where it passes into slaty argillite, and apparently also to the northeast, where it has not been picked up in the most northeasterly trench."

Nine holes were drilled in 1955 to test the No. 3 and No. 4 zones; the holes were also extended through the quartzite-porphyry contact when possible. Two mineralized shoots were outlined. One was about 40 feet north of the shaft on the No. 3 showing and about 110 feet vertically below the surface. It is roughly 30 feet long, 15 feet wide, and of limited vertical extent. The grade in this shoot is high - one 9-foot core length assayed 3.03 per cent U_3O_8, a 4-foot length assayed 5.6 per cent U_3O_8. The second shoot is 40 feet northwest of the shaft and about 50 feet below surface. Again the grade in this small zone was high. The first mentioned zone was opened up by drifting from the adit and uranium mineralization was encountered in a fracture zone but extensions to the zone outlined by drilling were not found.

Pitch 8 Group (74)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-D-16; Lang, 1952.

United Uranium Corporation, Limited holds a group of claims generally referred to as the Pitch 8 Group, that consists of mineral claims Pitch 8-10, Pitch 29-31, and AWS 1-3. This group is on the east shore of Hottah Lake about 7 miles north of the south end of the lake and about 88 miles south of Port Radium. The claims were originally held by Consolidated Indore Uranium Mines, Limited whose assets were taken over by United Uranium Corporation, Limited in 1955.

The claims were staked in 1950 and a program of trenching and diamond drilling was completed. Nine shallow holes were drilled. In October, 1950, work began on underground development. An adit was driven to the mineralized zone which it cut at a vertical depth of 50 feet. About 500 feet of drifting along the mineralized zone was completed in 1952. In 1952 the zone was tested below the adit level with a few drillholes and uranium mineralization was cut in at least one hole at a vertical depth of 170 feet. Drilling along the strike of the zone indicated that the basic dyke with which the mineralization is associated continues to the north of the showing for at least 400 feet and to the south for at least 200 feet. Very little significant uranium mineralization was found in these holes. In 1952 a permanent camp was built, a 10 to 20-ton mill constructed and partially equipped and an electric plant installed. A cookhouse, 2 bunkhouses, powerhouse, assay office, warehouse and garage were completed. A station was cut in the adit level and work started on a vertical shaft. A headframe was built and hoisting equipment brought to the property. The operation was stopped in 1953. In 1955 the property was acquired by United Uranium Corporation, Limited and more work was done underground. About 1,000 feet of drifting was completed on the adit level and second level along both contacts of the basic dyke. Some underground drilling was done in the winter of 1956 to test the structure at depth. The property was closed in 1956 and no further work has been done.

The claims are underlain by granitic rocks of various compositions and structures. These rocks are cut by steep dipping gabbro dykes, many of which strike north. Pitchblende, hematite and quartz occur in a fracture zone along the contacts of a basic dyke that strikes slightly east of north and dips to the east at about 80 degrees. The dyke is about 25 feet wide and has been traced on surface and by drilling over a distance of about 600 feet. The granitic rock and, to a lesser extent, basic rock is fractured and locally sheared along both contacts of the dyke. Pitchblende is erratically distributed in the fractures along with hematite. Concentrations occur in more intensely fractured sections and at fracture intersections. The zone of fracturing is very narrow.

The erratic nature of the distribution of pitchblende made it difficult to outline ore zones in the underground development, however a few short, very narrow sections were defined. In all the ore zones totaled 300 feet in length with a grade of 0.35 per cent U_3O_8 over an average width of 1.5 feet. The drillholes completed in 1956 encountered only minor uranium mineralization at depth.

Pitch 27, 28 Group (75)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-D-16.

The Pitch 27, 28 group consists of three claims, the Pitch 27, 28 and Mar 1. The claims are located about 1/2 mile inland from the northeastern shore of Hottah Lake about 85 miles south of Port Radium. The group was staked in 1950 for Consolidated Indore Uranium Mines, Limited and are now held by United Uranium Corporation, Limited. The uranium showing on the claims was opened up by trenches in 1950 and further trenching was done in 1951 when several shallow holes were drilled under the showings. No further work was done on the claims which have since lapsed.

The claims are underlain by granitic rocks that are cut by several basic dykes. The granitic rocks where observed are about granodiorite in composition and are fine grained and slightly gneissic. Mineralization occurs in a fracture system that strikes northwest and dips steeply. The zone consists of a number en echelon fractures with short cross fractures. In places along the zone the granitic rock is sheared and brecciated. Chlorite and fine-grained quartz occur in the sheared and brecciated granite and there is a network of narrow quartz veins in the fractures. The zone is about 700 feet long and up to 5 feet wide. Pitchblende is found in quartz veins and in highly sheared or fractured rock. Its distribution is erratic. Pitchblende was scattered along the zone for 600 feet. Individual mineralized sections tend to be short and narrow and occur in areas of intense fracturing or at fracture intersections.

June Group (76)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-D-16.

The June group of 5 claims is located a few miles east of the south part of Hottah Lake or about 200 miles north-northwest of Yellowknife and was staked by F. Avery in 1954.

The claims are underlain by granodiorite and feldspar porphyry. The granodiorite is pink, slightly gneissic, medium- to fine-grained, and contains flesh coloured feldspar, quartz and a small amount of biotite. The porphyry is a reddish, very fine grained rock with buff coloured phenocrysts of plagioclase.

Mineralization is localized in a fracture zone that strikes at about 35 degrees and dips steeply to the west. The zone occurs in fine-grained granitic rock that contains narrow bands and lenses of mafic-rich material.

The zone consists of one fracture about 250 feet long with a number of short, closely spaced parallel fractures and cross-fractures. The width of the zone is less than 2 feet. Rocks near the fractures are slightly brecciated and radioactive minerals are scattered along the fractures in short discontinuous sections. Hematite and minor quartz are also present.

DH Group (77)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-D-16.

The DH group of 8 claims is located a few miles east of the south part of Hottah Lake on the west shore near the south end of Lac Dubois. The ground was staked in 1954 as the Ann group by F. Avery and associates. The claims were allowed to lapse but were subsequently restaked as the DH group. A radioactive showing was exposed in 3 trenches that were excavated in 1954.

Because of restaking since the author's examination, the showings cannot be surely located but are thought to be on what is now DH No. 2. The area around the showing is underlain by granodiorite and diorites that are cut by several narrow diabase dykes. The granodiorite is a pink weathering, massive, medium-grained rock made up of feldspar, quartz, biotite, and hornblende. The rock locally contains phenocrysts of plagioclase. The diorite is a grey weathering, fine-grained, massive aggregate of plagioclase and hornblende. The mineralization occurs in a fault and associated fractures that strike at 20 degrees and dip vertically. The fault can be traced over a length of 400 feet and is located along a contact between granodiorite and diorite. Rocks along the fault are brecciated and locally sheared and contain lenses of milky white quartz. A number of short curving fractures are associated with the fault on its east side in the diorite. These are locally filled with hematite-stained quartz. Radioactive minerals are scattered in this zone over a length of about 100 feet. Most of the pitchblende occurs in one fracture that curves off the fault to the east and then north. A number of radioactive sections occur in this fracture over a length of 60 feet. Grab samples assayed well but chip samples at intervals across the last mentioned fracture gave assays of 0.1 per cent U_3O_8 or less.

Eldorado Mining and Refining, Limited
Port Radium Mine (78)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-K-4.

The Port Radium Mine of Eldorado Mining and Refining, Limited began production in 1933 and closed down in September, 1960 due to lack of ore. The mine is at Port Radium on Labine Point on the east shore of Great Bear Lake.

In 1959, the last full year of operation, 98,883 tons of ore were treated and 723,518 pounds of U_3O_8 were produced. The average recovery per ton was 7.32 pounds. In the same year, 193 employees, of which 111 were hourly rated, worked at the mine.

A large literature has been built up over the years describing all phases of the operation, history, geology and mineralogy of the Port Radium Mine and the author makes no attempt to repeat or summarize it in this report. The geology and mineralogy of the mine have been described by Kidd (1932a, b, c, d, e, 1933, 1936), Haycock (1935), Kidd and Haycock (1935), Lord (1941a), Jolliffe and Bateman (1944) and Murphy (1946). For a complete description of the history and geology and mineralogy and a summary of the operations of the mine up to the end of 1948, the reader is referred to Lord (1951) and Lang (1952). The most recent and up to date descriptions of the geology are by Donald (1956a) and Campbell (1957). The latest description of the surface plant, mining plant and methods is by the company's engineering staff. The various phases of the milling, leaching and acid plants are described by McNiven et al. (1956) and by Hoffman and Tremblay (1957).

El Bonanza Mining Corporation, Limited (79)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-K-4; Lord, 1951; Lang, 1952.

The El Bonanza Mining Corporation holds 18 leased claims on Dowdell Peninsula on Great Bear Lake about 6 miles south-southwest of Port Radium. The claims include St. Paul 1-7, Bonanza 7-9, Boland 1-3, and Bloom 1-5. For early history of the property, the reader is referred to Lord (1951) and Lang (1952).

In 1956, the company began a program of underground development. An old inclined shaft was repaired and deepened and two levels were established. The lowest level is 150 feet down the 80 degree incline and 135 feet vertically below the shaft collar. The operation was closed down late in 1956 before the program was completed.

It was planned to develop the Spud deposit on the first level and the downward extension of the Bonanza vein on the lower level. Mineralization was found in about the proper places on both levels but it is not certain that the zones found underground correlate with those on surface. On the upper level, a shoot about 30 feet long of fairly high grade silver was found in a carbonate vein. Veins that were cut on the lower level were narrow and low grade.

The geology of the deposits as described by Lord (1951, pp. 86, 87) follows. The western deposit referred to is the Bonanza showing and eastern zone is the Spud.

> "The western deposit is in a band of sedimentary rocks that ranges up to 300 feet in width and trends about northwest. The strata are mostly well-banded, hard, fine-grained, grey and pink, highly altered rocks; they strike about northwest and dip nearly vertically. Granite is intrusive into the strata on the south side of the band, and granodiorite on the north side. The granite is younger than the granodiorite. A fractured zone, with an exposed width up to 30 feet, has been traced for 300 feet and strikes northwest; part

and perhaps all of the exposed zone is in the altered sediments. Some of the fractures are occupied by veinlets of manganiferous carbonate, native silver, chalcopyrite, either niccolite or bornite, and at least two, unidentified, soft grey, metallic minerals. A stripped part of the zone, measuring (Kidd, 1933, p. 27) 30 by 12 feet, contains eight silver-bearing areas, which range in size from 1 inch by 12 inches to 8 inches by 30 inches; these areas contain silver wires in carbonate and the silver content may range from 5 to 50 per cent. Eight areas of similar size contain silver and occur in another stripped part of the zone that measures 54 by 16 feet.

"At the eastern deposit silver occurs in two zones. The occurrences resemble those of the western deposit, but contain a little pitchblende (Feniak, 1947, p. 25), bornite, galena, covellite, sphalerite, tetrahedrite, malachite, fluorite, and quartz. The carbonate gangue, at least in part, is calcite rather than manganiferous carbonate (Kidd, 1936, p. 40).

"The silver occurrences are younger than the granodiorite and may be genetically related to the granite, which, like them, contains a little fluorite (Feniak, 1947, p. 25)."

Aid Group (80)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-K-11; Lord, 1951, p. 109.

The Aid group of claims is on Sloan River about 4 miles northeast of the site of the settlement of Hunter Bay and about 30 miles north-northeast of Port Radium. The property was formerly held by Cominco Limited and finally the claims were allowed to lapse. The Aid claims were staked in 1957 and acquired by Panamerican Ventures, Limited (now Westfield Minerals, Limited). During the summer of 1957, the claims were mapped geologically and copper showings were examined in detail. No further work was completed and the claims were allowed to lapse.

The description of the geology and showings by Lord (1951, p. 109) is here briefly summarized. Mineralization consisting of bornite, chalcocite, and chalcopyrite occurs in fractures in a "giant quartz vein" which strikes at 35 degrees. Sulphides occur over widths up to 2 feet and apparently over a length of 400 feet. The mineralization may not be continuous over this length. Two other small occurrences in the vein are reported. The mineralized fractures tend to occur along the margins of the quartz stockwork. The stockwork itself is localized in a fault and is exposed on claims Aid 2, 3, 6, 7, 10.

GW Group (81)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-K-5; Feniak, 1949.

The GW group of claims is located on the north shore of Hunter Bay, Great Bear Lake, about 2 miles southwest of the mouth of Sloan River and 32

miles northeast of Port Radium. The claims were acquired by Panamerican Ventures, Limited (now Westfield Minerals, Limited) in 1957 and at that time the Win, AT and NB groups of claims were staked around the original group for the company. Several diamond-drill holes were drilled in the spring of 1957 and again in September of that year. No further work has been done on this property.

The following description of the showing is from Feniak (1949):

> "Copper mineralization occurs within a giant quartz vein... on the north shore of Hunter Bay... Here two trenches and some pits expose bornite, chalcopyrite, pyrite, hematite, and carbonate within vugs, along fractures, and on vein breccia for a distance of nearly 150 feet. Limonite, malachite, azurite, and chalcanthite (?), largely as stains, are secondary. Quartz bornite stringers cut quartz stringers that are later than the main quartz. Near the surface, distribution of copper minerals is erratic. The quartz vein at this point is approximately 100 feet wide and is bounded by granite on the northwest side, and by porphyritic dacite on the southwest side. Both are considerably altered to a greenish colour for a distance of more than 50 feet from the vein."

The quartz stockwork strikes northeast and is emplaced in a northeast-striking, steep-dipping fault. The mineralized zone strikes parallel to the vein and dips steeply.

In 1957 the initial drilling was done off the ice on the bay to test the extension of the zone under the lake. One hole intersected about 80 feet (core length) of high grade material reported to assay about 8 per cent copper. Bornite was the sulphide in the zone intersected. Similar but lower grade material was cut in check holes but over narrow widths.

DEPOSITS IN CHURCHILL PROVINCE

CPT Group (97)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-H-14.

The CPT group of 18 claims is located around an easterly-trending bay at the northeast end of the largest of the Caribou Islands in the East Arm of Great Slave Lake. The property is about 50 miles southeast of Yellowknife. The claims were staked in 1958 by Rio Tinto Canadian Exploration, Limited and soil samples were collected for geochemical analysis. These returned significant amounts of zinc and lead in an area near what may be a west-striking fault west of the above mentioned bay. No outcrops of mineralization were found. During the following winter magnetic and EM surveys were completed in the area of the geochemical anomaly. According to Stockwell (1936b) the claims are underlain by dolomites of the Pethei Formation of the Great Slave Group. Just south of the claims diorite or syenite intrudes the sediments. The sediments strike easterly and dip to the south. No further work was completed and the claims have lapsed.

Easter Group (98)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-H-10; Brown, 1950a.

The Easter group of 15 claims (61° 44'N, 112° 52'30"W) is on one of the Simpson Islands locally known as Easter Island in the East Arm of Great Slave Lake and is about 110 miles southwest of Yellowknife. The showings were staked in 1951 for W. V. Cole as the Kit group and the claims were optioned to Falconbridge Nickel Mines. No work was done on the property and the claims lapsed. They were restaked as the Easter group in 1952 and optioned to Goldcrest Mines, Limited (now North Goldcrest Mines, Limited) in 1953. Adjoining claims, the Dyke group, were acquired by the company at this time. The company prospected the claims and several thousand feet of drilling were done on the Easter and Dyke groups. The company relinquished its option on the Easter group and these claims were purchased by Consolidated Easter Island Mines, Limited in 1956. Very little work was done at this time and nothing has been done on the property since.

The claims are underlain by granitic gneisses that are cut by a basic dyke. The grey to pink, fine- to medium-grained granitic gneiss is made up of plagioclase, quartz, biotite, some hornblende and a variable amount of potash feldspar. Bands of highly metamorphosed and partly granitized sediments, that are now biotite and hornblende schists, are abundant. The gneissosity strikes northeast and dips at about 40 degrees to the northwest. In detail the foliation planes are contorted and drag folded. These rocks contain lenses and irregularly shaped masses of pegmatite and fine-grained pink granite. They are cut by a dyke that, where observed, varies from gabbro to diorite in composition. It strikes about 45 degrees on the property and appears to dip steeply to the southeast. It is between 100 and 200 feet wide and has been traced by Brown over a length of about 15 miles. The rock is fine- to medium-grained and consists of grey plagioclase, hornblende pyroxene and minor biotite and quartz. In places, a pink feldspar is observed in the rock.

The showings are found on Easter No. 1 claim on a long narrow northeasterly-trending peninsula. The basic dyke outcrops along the southeast side of the peninsula. One showing occurs about 400 feet northeast of the tip of the peninsula and consists of mineralized fractures along the northwest contact of the basic dyke and related fractures that strike at about 320 and 30 degrees and extend from the dyke contact into the granitic gneisses. The fractures along the contact are exposed over a length of about 70 feet; fractures at 320 degrees extend into the granitic gneisses for up to 60 feet. The zone, therefore, consists of a network of fractures some of which contain quartz-carbonate veins. Individual veins vary in width up to six inches. Niccolite and native silver occur in the veins along small fractures and as irregularly shaped masses. Sections of significant mineralization are short and narrow. Drilling indicates a limited vertical extent – less than 50 feet. A second showing occurs near the tip of the peninsula. Here quartz-carbonate veins occur in fractures in the basic rock and in a fine-grained biotite schist. Veins and fractures strike at 60 and 20 degrees. Shearing is found along some of the fractures. The vein oriented at 60 degrees is about 60 feet long

and up to six inches wide; the other vein is about 50 feet long and up to one foot wide. Silver occurs in seams in the quartz and carbonate that are oriented parallel to and at right angles to the vein and niccolite is erratically distributed. High grade sections are short – in the order of 15 feet long.

The basic dyke is sparsely mineralized with blobs of sulphides consisting of pyrite, pyrrhotite, and cobalt minerals. These seem to be most abundant along the northwest contact of the dyke and were discovered while drilling the showings and then were found in the dyke on the Dyke claims where they were again tested by drilling. The zones are ill-defined in shape and extent. Samples of mineralized material assay for nickel and cobalt. The amounts are small, generally much less than one per cent combined.

IBC Group (99)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-13; Stockwell, 1936.

The IBC group of claims is on the south shore of Union Island and extends both east and west of a bay about half-way along the island. The property is about 90 miles southeast of Yellowknife and the main showing is at 61° 55'30"N and 112° 00'W. The claims were staked in 1956 by A. Stevens and associates to cover a copper showing. Some trenching was done at this time. In the winter of 1958-59 magnetometer and EM surveys over part of the property were completed by Rio Tinto Canadian Exploration, Limited who had optioned the property. The option on the property was later relinquished and the claims have lapsed.

The showings occur in limy sediments that may be part of the Union Island Group (Stockwell, 1936b). Most of the property is underlain by granitic rocks that Stockwell maps as older than the Great Slave Group and by sandstones of the Preble Formation of the Et-then Group. The granitic rocks where observed were fine- to medium-grained, pink rocks consisting of pink to grey feldspar, quartz and minor biotite. These rocks contain zones of greenish fine-grained rock that are probably inclusions of highly altered sediments. The Preble Formation is represented on the property by pink to reddish arkoses that strike northeast and dip to the southeast. These rocks are separated from the granitic rocks by a fault that strikes at about 60 degrees. The sediments and more obviously the granites are brecciated along the fault. A number of fractures or fracture zones extend into the granitic rocks from the fault for distances up to 500 feet. These zones generally strike at about 120 degrees. Quartz veins occur in parts of some of these zones and small amounts of chalcopyrite and pyrite have been observed in quartz veins and fractures in short sections of a few of these zones.

The showings occur in a narrow band of grey dolomite that is commonly brecciated and locally silicified. This rock may be part of the Union Island group that occurs in a similar position along the fault at the east end of the island; however, it is possible that, around the showings, the limy rock represents a carbonate zone along the fault. The showings occur at the west end of a bay on and southwest of IBC claim No. 20. Mineralization occurs in a quartz vein in a silicified zone in the limy rock. The vein strikes at about 60 degrees and dips almost vertically. The vein has been traced for about 800 feet and has an average width of about 6 feet. The quartz is light

grey, very fine grained and flinty. Chalcopyrite and pyrite are disseminated in the quartz as small grains and in short fractures, many of which strike at about 110 degrees. The vein is about 100 feet south of the valley that marks the location of the fault. Sampling across the zone in 8 trenches along the vein gave an average grade of just under 1 per cent copper. At the southwest end of this zone and about 30 feet to the north is a short parallel mineralized zone in silicified rock. Most of the sulphides in this zone occur in short vertical fractures that strike at 110 degrees.

The geophysical work mentioned above was done over the showing and along its extension to the northeast in the bay. No magnetic anomalies were found and the EM survey indicated a weak conductor over the showing.

Eagle Group (100)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-H-9.

The Eagle group of 10 claims is on the south shore of Great Slave Lake about 1 1/2 miles north of the mouth of LaLoche River (63° 12'N, 112° 13'W) and is about 90 miles southeast of Yellowknife. The claims were staked in 1956 by G. Werowitz and during the summer of that year several small trenches or pits were blasted in chalcopyrite-bearing fractures. The author is not aware of any further work on the property.

The claims are underlain by chlorite schists and chloritic, granitic gneisses. In places, it appears that the chlorite schist is partially granitized. All of the rocks are schistose and feldspar and quartz appear to be crushed and broken. The foliation planes and contacts strike northeast and dip steeply both to the northwest and southeast. Zones of mylonite were observed in the granitic rocks. The crushing or brecciation is probably related to the northeast striking MacDonald fault that is thought to run along the shore of the lake (Stockwell, 1936b). A second north-northeast-trending fault occurs a short distance in from the shore of the lake and is probably a subsidiary fault of the MacDonald fault. A large number of east and east-southeast-striking short fracture zones or faults occur between these two faults. Most of these breaks extend less than 1,800 feet inland from the shore of the lake.

Copper mineralization is found in many of these short fracture zones and pits were excavated in two such showings. One of these showings is on Eagle No. 2 claim along a shallow draw that extends inland from the bay formed by the point on which the claims are staked. Mineralization occurs in a fracture zone that strikes at about 110 degrees. The zone consists of fractures of the above strike with short cross-fractures that strike at about 50, 80, and 315 degrees. The maximum width of fractured rock exposed is about 5 feet. Chalcopyrite, minor chalcocite and a few grains of native copper are disseminated in narrow quartz veins that fill some of the fractures. Individual veins are short, less than 50 feet, and the distribution of copper minerals in the zone is erratic. The fracture zone has been traced over a length of 1,000 feet but mineralization is confined to a section about 200 feet in length. The second zone is on claim No. 8. It consists of a fracture zone in a shallow draw that strikes east-northeast and from the shore of the main lake inland for about 500 feet. The occurrence is similar to the one described above except that less sulphides are present.

Pearl Group (101)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 85-H-9.

The Pearl group of 12 claims (61°42'N, 112°10'W) is on the south shore of Great Slave Lake about 87 miles southeast of Yellowknife. The claims are about 30 miles northeast of the mouth of Talston River. The group was staked in the summer of 1957 by F. Diamond and the showings were opened up with trenches. The claims were allowed to lapse in the following year and were restaked in 1958 by Mr. Diamond. Further trenching was done at this time.

Most of the claims are underlain by sheared altered granitic rocks of various compositions. The showings, however, on mineral claim Pearl No. 1 occur in red sandstone with some interbeds of white sandstone that belong to the Sosan Formation of the Great Slave Group. Elsewhere these rocks lie unconformably on the sheared granitic rocks but here they are probably separated from the granitic rocks by a fault. The sandstone strikes about northeast and dips rather steeply to both the north and south. The sediments are cut by a fault that strikes at 65 degrees and seems to dip steeply.

The sediments are intensely fractured just south of the fault and many of these fractures are filled with veins of quartz and some carbonate which vary in width from a fraction of an inch to several feet. Two zones of more intense or more persistent fracturing can be outlined. One is about 600 feet long and occurs about 400 feet south of the fault; the other is about 300 feet long and is about 100 feet south of the fault. The strongest fractures strike about 65 degrees roughly parallel to the fault and tend to dip to the north at angles between 30 and 70 degrees. Shorter cross fractures are numerous and commonly strike at about 100, 340, 80 and 20 degrees. These fractures tend to dip to the east at angles between 30 and 60 degrees.

The quartz veins all contain some disseminated pyrite and chalcopyrite, but significant concentrations of sulphides are found where fracturing is most intense. In such zones the quartz veins form almost a stockwork and pyrite, chalcopyrite, a greenish black sphalerite and galena occur in varying proportions. Chalcopyrite commonly occurs in other sulphides in veinlets or small blebs. Sphalerite occurs as rectangular masses up to 10 inches long and 2 inches wide. Two sections of almost massive galena about 10 feet long and 6 inches wide were observed. Sulphides were not observed in the country rock. The best mineralized sections were about 50 feet long and up to 2 feet wide. Quartz in the more heavily mineralized veins is usually a light grey or creamy colour, whereas quartz in barren veins is white and very fine grained.

CoGo Group (102)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-7.

The CoGo group of 22 mineral claims (62°19'N, 110°45'W) is on the north shore of Lac Duhamel about 5 1/2 miles south-southwest of the settlement of Snowdrift and is about 115 miles east of Yellowknife. Four of the

claims were staked in 1936 by W. Haywood. In 1956 these claims were sold to Monpre Mining Company and at that time the remaining claims were staked. Also in that year the claims were prospected and mapped geologically and showings were trenched and sampled. In 1958 a drilling program consisting of 15 holes with a total footage of about 3,000 feet was completed. In 1959 the Monpre Mining Company optioned the claims to Consolidated Mining and Smelting Company of Canada, Limited but the option was dropped in the following year.

The eastern quarter of the property is underlain by sedimentary rocks of the Sosan Formation of the lower part of the Great Slave Group of rocks. According to Barnes (1951) these rocks consist of carbonate-cemented conglomerate overlain by thick-bedded white sandstones with a few interbeds of reddish sandstone. These rocks are overlain by massive and thin-bedded dolomites with some sandstone interbeds. The carbonate rocks are followed by white sandstones that are overlain by red, thinly bedded sandstones. On the property these rocks occur in an east-northeast-trending anticline that plunges gently to the northeast. The remaining western part of the ground is underlain by older quartz-mica-cordierite feldspar schists of variable composition that are cut by a pink coarse-grained pegmatitic rock consisting mostly of feldspar and quartz with books of biotite and muscovite. Foliation in the schists strikes west to northwest. The sediments around the granitic rocks show no evidence of metamorphism. These rocks are cut by a north of east striking fault which, according to Barnes (1951) has a vertical displacement of 1,800 feet and little horizontal movement.

Of the 20 occurrences discovered on the property, three zones, Nos. 3, 4, and 5 were considered the most promising. The No. 3 zone is located on CoGo No. 2 claim about 200 feet north of the shore of the lake and roughly 2,800 feet east of the log buildings shown on maps of the area. It occurs in a fracture zone that strikes at about 50 degrees, dips steeply and is made up of a number of fractures of roughly the same strike with a number of short cross-fractures. The zone is in red siltstone. Fractures are commonly filled with narrow quartz-carbonate veins up to 3 inches wide. Chalcopyrite is disseminated in these and also occurs in almost massive form in narrow veins in the siltstone with little or no gangue mineral. The zone is up to 30 feet wide and is exposed by trenches over a length of 200 feet. The company reported (Northern Miner, August 21, 1958, p. 5) a grade of 1.40 per cent copper over an average width of 24 feet and a length of 210 feet. This zone strikes towards the fault described above. Drilling of this zone indicated less mineralization at depth.

The No. 4 zone is 1,200 feet northeast of No. 3 zone on claim No. 1. Quartz-carbonate veins mineralized with erratically disseminated chalcopyrite occur in fractures in a zone that strikes at about 120 degrees and dips steeply. The zone is made up of a number of southeast-trending fractures and other short fractures, many of which strike at 0 and 330 degrees. Quartz veins are up to 8 inches wide. The zone can be traced for about 400 feet, and is up to 5 feet wide. Grade of one section of unknown length was 1.33 per cent copper over a width of 2.6 feet (Northern Miner, August 21, 1958, p. 5). This and the following zone occur in mica schist cut by granitic rocks.

The No. 5 zone is located on CoGo No. 1 about 700 feet west of zone No. 4. The zone consists of a number of quartz veins in fractures that strike at about 110 degrees. The veins are curved so that local strikes vary between 80 and 120 degrees. Chalcopyrite is disseminated in fractures in

quartz veins and varies in amount from 1 or 2 to 10 per cent. This zone is about 150 feet long, and one 90-foot section is reported to contain 2.27 per cent copper over a width of 2.8 feet (Northern Miner, August 21, 1958, p. 5).

Rex Group (103)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-8; Barnes, 1952.

The Rex group of 24 claims is on a peninsula that forms the north shore of Regina Bay on the south shore of Stark Lake in the East Arm of Great Slave Lake. The property is about 130 miles east of Yellowknife and 14 miles east of the settlement of Snowdrift. The claims were staked in 1949 by A. Krys and H.R. Wilson and sold to Ridley Mines Holding Company. This company was reorganized in 1954 to Ridley Uranium Mines (Canada), Limited.

In the years after 1949 the claims were prospected and five radioactive zones outlined. Fifteen diamond-drill holes, totalling 3,300 feet were drilled along the C zone and an adit was driven into the C zone for more than 100 feet. The property closed down in 1952 and in 1954 the new company mapped the claims geologically and completed about 2,000 feet of drilling on the C and A zones. The property was again closed late in 1954 and has since been inactive.

The claims are underlain by sedimentary rocks of the lower part of the Great Slave Group and by quartz diorite. Nearly all of a mass of quartz diorite exposed on the peninsula is covered by the claims. This rock was considered by Barnes (1952) to be older than the surrounding sediments but evidence from holes drilled in 1954 suggests that the diorite intrudes the sediments. Drillholes spotted along the southern contact of the diorite continued in sediments for up to 200 feet beyond surface exposures of diorite. Sediments from drill core near the diorite contact have a baked appearance. Also a sill of diorite was found in the sediments. The sediments strike northeast and dip moderately both north and south suggesting northeast-trending folds. But gentle northerly-trending folds were found near the diorite body by detailed mapping in 1954.

Five radioactive zones have been found on the property and are located on Barnes' maps. They are from east to west known as the A, B, C, E and Stevens veins. The mineralogy of the veins is described (Barnes, 1952, p. 20) as consisting "mainly of actino-tremolite in acicular growths, oriented, in general, perpendicular to the vein wall. Midway of the walls the veins carry apatite and fine-grained uraninite has been seen in them, but the radioactivity does not appear to be zoned as in the case of the gangue minerals". The veins occur in fractures or fracture zones in the quartz diorite. They vary in width from a few inches to six feet and in length up to 500 feet. These veins rarely if ever occur in the surrounding sediments, nor where tested by drilling do they extend into the sediments down the dip of the vein.

The C vein is the best on the property. It is about 570 feet long and varies in width from 50 inches to about 18 inches at either end where it fingers out into narrow stringers. It strikes about northwest and dips almost

vertically. Drilling results indicate that it pinches out at a vertical depth of about 150 feet. The average grade of the part of the vein exposed in the adit is 0.29 per cent U_3O_8 over a width of 4 feet.

The A vein strikes northeast and is about 400 feet long and up to 3 feet wide. Radioactive minerals are erratically distributed along it. The B zone can be traced for 200 feet, strikes about northeast, and consists of a number of narrow vein-filled fractures. Radioactivity was noted in several places along the zone. The E zone strikes north to northeast and is about 200 feet long. It is up to 4 feet wide and consists of a number of fractures containing fine-grained amphibole. The Stevens vein strikes northeast and is about 75 feet long and up to 6 feet wide. A magnetite-rich zone occurs along the south contact of the vein. Most of the scattered radioactivity occurs in or near the magnetite-rich portion of the vein.

Fair Group (104)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-8.

The Fair group of 7 claims is on the south shore of Regina Bay on Stark Lake (Barnes, 1952) in the East Arm of Great Slave Lake about 130 miles east of Yellowknife. The claims are held by Nu-World Uranium Mines, Limited. In 1956 the showings were tested with a few Packsack drillholes. The claims were formerly known as the Stark claims and were under option to Radiore Uranium Mines, Limited in 1952. At that time about 18 trenches and pits were excavated on the showings and ten holes with a total footage of about 1,000 feet were drilled with an X-ray drill to test the zone over a length of 450 feet and to a maximum depth of about 70 feet.

Highly contorted red ferruginous slates of the Kahochella Formation occur along the shore of Regina Bay on the property. Just inland these rocks are separated from dolomites and limestones of the Pethei Formation by a high scarp that marks the position of an east-northeast-trending fault known as the Stark Lake fault. These formations are part of the Great Slave Group of sediments. The showing occurs in quartz diorite that outcrops just south of the fault on the property. This rock is massive, fine grained, reddish in colour and consists of plagioclase, hornblende, some biotite and a variable amount of quartz.

The showing occurs on Fair No. 1 claim about 700 feet south of the Stark Lake fault scarp and roughly 50 feet south of the contact between the sediments and quartz diorite. Mineralization occurs in a curving fracture zone whose strike varies between 40 and 20 degrees. The dip of the zone varies from vertical to 70 degrees to the southeast. It is exposed on surface across about 350 feet and varies in width from 2 to 6 feet. Shearing and brecciation are found in the rocks in several places along fractures. The structure may be subsidiary to the Stark Lake fault. Short lenses and irregularly shaped masses of quartz are scattered along the zone in some fractures and cobaltite, chalcopyrite, malachite and erythrite are erratically disseminated in fractures along the length of the zone. Niccolite and pitchblende are less abundant. Copper and radioactive minerals seem most abundant in a 100-foot section at the southwest end of the zone. These minerals occur as small grains or seams in fractures and appear to favour fracture

intersections. Chip samples of reasonable widths up to 4 feet in the trenches returned assays for uranium oxide ranging from trace to 0.4 per cent. Assays for copper were generally low but a few samples contained about 1 per cent copper. Cobalt content varies between 0.1 and 0.4 per cent. Assays of drill core for uranium confirmed surface results. The observable erratic distribution of sulphides was confirmed by the sampling program.

UR Group (105)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-7.

The UR group (62° 24'N, 110° 58'W) of 16 claims was staked in 1953 by Fred Lypka and in 1954 an adjoining group of six claims, the T group, was staked by him. The property is on the south shore of Great Slave Lake about 7 miles west of Snowdrift or about 110 miles east of Yellowknife. In 1953 the ground was optioned to Ridley Mines Holding Company who carried out some prospecting and trenching before they relinquished their option. In 1954 the property was optioned for 3 months to Conwest Exploration Company, Limited. No work was done on the property by the company and nothing more than some trenching for assessment purposes has been done since.

The claims are for the most part underlain by quartz diorite. In several places along the shore of the lake a narrow band of grey thin-bedded dolomite and red ferruginous shales is found. These rocks strike easterly and dip to the north. According to Barnes (1951) the rocks are part of the Stark Formation of the Great Slave Group. The quartz diorite is medium- to coarse-grained, massive and consists of pink to reddish feldspar, minor hornblende and biotite and a variable amount of quartz.

Showings are located on UR claims Nos. 3, 2, and 8 in quartz diorite, about 100 feet south of the contact with sediments. There are 6 showings on the property that are approximately on strike thus the fractures in which the mineralization occurs may, therefore, be parts of one zone but lack of outcrop makes it impossible to be certain of this. The length of such a zone would be about 1 1/4 miles. It is certain that mineralization is not continuous over this length. The zone is exposed on the eastern part of UR No. 3, on several places on UR No. 2, and across the bay on UR No. 8. The individual fracture zones, where exposed, strike between 70 and 110 degrees. Dips are generally to the south at angles between 60 and 80 degrees. Individual zones consist of fractures of the above strikes along with many short cross-fractures. In places the rocks are fractured in this manner over widths up to 40 feet; in other places only a single fracture is observed. Locally these fractures contain peculiar actinolite-apatite veins and quartz-carbonate veins that are rarely over 100 feet long. The actinolite-apatite veins vary in width from a fraction of an inch to six feet. Actinolite is the essential mineral and it occurs in acicular or bladed crystals that are up to 1 foot long and that are commonly oriented perpendicular to the walls of the veins. The crystals appear to grow from both walls to the centre of the vein resulting in a junction along the centre of the vein. In some wider veins several such pairs occur over the width of the vein. In other wide veins the long actinolite crystals tend to have no orientation relative to the walls and to radiate from centres within the vein. In narrow veins a few inches wide actinolite occurs as

a felt of fine needle-like grains with no apparent orientation. Brick red apatite is irregularly distributed in the veins occurring along actinolite crystals in elongate lenses or as irregularly shaped patches. It varies in amount from nil to about 20 per cent of the vein. Quartz-carbonate veins with hematite occur in fractures in the actinolite veins and in fractures near such veins. Chalcopyrite and cobalt minerals are erratically disseminated in quartz veins and in fractures in the actinolite veins. Radioactive minerals are scattered in the actinolite veins. The best radioactive sections occur where sulphides are present. Individual radioactive zones are less than 100 feet long and some sections are about 20 feet long. Widths vary up to about 6 feet. Three channel samples across widths of six feet from the most easterly zone on claim UR2 are reported to average 0.4 per cent U_3O_8. Two chip samples from a zone about 450 feet west and south of this zone on the same claim averaged 0.14 per cent U_3O_8.

COP Group (106)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-8.

The COP group of 6 claims (62° 24'N, 110° 03'48"W) located between Wilson and Stark Lakes is in the East Arm of Great Slave Lake about 135 miles east of Yellowknife. The claims were held by Nu-World Uranium Mines, Limited but were allowed to lapse.

Most of the property is underlain by quartz diorite that is part of an elongate mass found north of Wilson Lake. Stockwell (1936 c) considered the intrusions to be younger than the sediments. The quartz diorite, where observed is a fine grained, pink to grey rock comprising massive aggregates of feldspar, hornblende, and possibly biotite and minor amounts of quartz. It is cut by a northeast-trending fault that is located along the north shore of Wilson Lake.

The showing occurs near the boundary of COP Nos. 1 and 4 near the north margin of the quartz diorite body. Mineralization is found in a fracture that strikes at 80 degrees and dips steeply. A number of short fractures that commonly strike at 50, 120, and 0 degrees branch off the main fracture giving a braided effect. The zone can be traced along its strike for about 100 feet and has a maximum width of 8 feet. Chalcocite and minor chalcopyrite occur in parts of these fractures along with some carbonate and quartz and on surface the sulphides are stained with malachite and azurite. The best concentrations of sulphides occur in or near fracture intersections. The best section of chalcocite is about 5 feet long and up to 1 1/2 feet wide.

Murky Fault Metal Mines, Limited (107)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-8; Barnes, 1952.

In 1955 and 1956, Murky Fault Metal Mines, Limited staked 476 claims in several groups in the East Arm of Great Slave Lake. The property extends from the end of Regina Bay on Stark Lake northeast for about 11

miles to the central part of Wilson Lake and is 1 to 1 1/2 miles wide. In 1956 and 1957 the property was mapped geologically, prospected, and geiger counter and magnetometer surveys were completed over most of the claims. A few showings discovered were trenched and sampled. No further work was done and most of the claims have since lapsed.

The claims are underlain by sediments of the Great Slave Group and by younger quartz diorites. The sediments are mostly limestones and dolomites and ferruginous siltstones and slates of the Pethei Formation. These rocks are folded into northeast-trending folds. Parts of two bodies of quartz diorite occur on the property, one south and east of Regina Bay and the other north of Wilson Lake. These rocks are cut by the Murky fault which strikes north-northeast and extends over the full length of the property and beyond.

A number of small copper showings were found in fracture zones in the quartz diorite near the Murky fault. These showings generally consist of chalcopyrite disseminated erratically in quartz-carbonate veins and in fractures along the fracture zones. None warranted development. Uranium mineralization was found in some of the zones.

One rather peculiar showing occurs in the sediments on the Par claims about 6,000 feet west and a little north of the west end of Wilson Lake, about 200 feet south of a small bay on the south shore of Stark Lake, on Par 3, 56 and 57. The rocks in the area consist of alternating bands of brown and light grey dolomites. Individual bands are up to 50 feet thick. These rocks are folded and the strikes vary from north-northwest near Stark Lake to east-southeast 1,500 feet south of the lake. The beds dip to the northeast. Tiny grains of chalcocite and chalcopyrite are disseminated in the light grey dolomite in ill-defined irregularly shaped zones over a strike length of about 1,200 feet. Sulphides seem more abundant near the crest of the folds. At least three bands of the grey dolomite contain this type of mineralization. The amount of chalcocite varies up to several per cent. Near surface the sulphides are commonly altered to malachite. The sulphides do not appear to occur in fractures but to replace the dolomite. About a dozen such zones were discovered. They vary in size up to 100 feet long and possibly 10 feet wide. Grab samples contained up to 2 per cent copper.

GM Group (108)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-6.

The GM group of 12 claims are located on a peninsula on the south shore of Great Slave Lake south of Redcliff Island (62°16'N, 111°20'W). The property is about 18 miles southwest of the settlement of Snowdrift and 95 miles east of Yellowknife. The claims were staked in 1950 by George Michalow and George Labelle to cover a uranium showing and in 1952 were optioned by American Yellowknife Mines, Limited (now Rayrock Mines, Limited). This company did some geological mapping, a preliminary geiger counter survey and some trenching. The option was relinquished in 1953 and the claims have lapsed.

The property is mostly underlain by massive, fine-grained quartz diorite that consists of red feldspar, hornblende and minor quartz. The author has not examined the property. The main showing is on GM No. 1.

It is in a fracture zone that strikes at about 70 degrees. Radioactivity can be detected at intervals over a length of 150 feet. The radioactive minerals occur in fractures along with carbonate veins, hematite, chalcopyrite, apatite and cobalt minerals. Several other showings are reported to occur on the property and actinolite-apatite veins similar to those described on the UR group (105) and Rex group (103) apparently occur on these claims.

NIX Group (109)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-5.

The NIX group of 17 claims is about 17 miles southwest of Taltheilei Narrows and 5 miles northeast of Sachowia Point. Both locations are on the north shore of Great Slave Lake. The property is 80 miles east of Yellowknife. It is reported that the nickel showings on this property were first developed by Consolidated Mining and Smelting Company in 1940 and 1941. However, in 1957 the claims were held by C. McAvoy and associates and were optioned to Venture Resources, Limited. During the summer of 1957 this company completed a development program that consisted of geological mapping of the claims and about 3,000 feet of diamond drilling.

The nickel showings occur in highly metamorphosed volcanic and sedimentary rocks of the Yellowknife Group. These rocks are cut by granitic rock and along contacts the older rocks have been granitized and contain considerable introduced pegmatitic material. Diabase dykes cut the rocks near the showings.

Mineralization occurs in fractures in the metamorphosed volcanic and sedimentary rocks. These fractures are near diabase dykes and along a lineament which may mark the position of a fault. The fractures are filled with quartz and carbonate containing disseminated and lensy masses of nickel and cobalt arsenides. In the main showing a lens, reported to contain about 5,000 tons of almost massive niccolite, has been outlined by drilling. Other fractures developed contained lesser amounts of these minerals.

BBX Group (110)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-12.

The BBX group of 2 claims (62° 35'N, 111° 33'W) is about 1 3/4 miles southwest of Taltheilei Narrows at the west end of McLeod Bay in the East Arm of Great Slave Lake. The claims are about 90 miles east of Yellowknife. The two BBX claims and the adjoining five CC, nine Goodbye, and ten Flo claims were staked over the years by the McAvoy interests. Late in 1956 they were optioned to Preston East Dome Mines, Limited and in the spring of the following year about 3,000 feet of drilling was completed on the showings. The option was dropped in 1957 after some geological work was done during the summer of that year.

The claims are mostly underlain by rocks of the Great Slave Group that rest unconformably on older granitic rocks. The showings are confined to the Sosan Formation that is exposed along a prominent cliff on the property. The Sosan rocks are mainly basalt breccias consisting of angular fragments of altered basalt with some fragments of jasper, granodiorite, and dolomite in a matrix that in thin section is seen to consist of chalcedony that is partially and locally almost completely replaced by carbonate. In thin section the basalt fragments are seen to consist of a fine felt of brown chlorite enclosing small grains of feldspar. Devitrified shards of volcanic glass can be identified in thin section. These rocks where exposed are essentially flat lying.

Along the cliff face where these rocks are exposed the rocks are deeply weathered and splashed with green copper stain and minor amounts of pink cobalt stain. Lack of outcrop makes it impossible to assess the size or the nature of the containing structure. In drill core sulphides consisting of pyrite with varying amounts of chalcopyrite and minor amounts of smaltite are observed in the matrix of the breccia. In a few places sulphides occur in carbonate-filled fractures. These veinlets cut fragments of rock in the breccia. Examination of a few thin sections of the mineralized material suggests that the sulphides occur only in the carbonate that replaces the chalcedony matrix. Assays of copper for reasonable lengths of drill core are rather low, the best being about 1 per cent.

Barnston River Copper Showings (111)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-16.

Copper showings occur at the mouth of the Barnston River (62° 55'48"N, 110° 10'W) on the north shore of McLeod Bay in the East Arm of Great Slave Lake. These showings have been staked a number of times over the years but little or no development work has been done. Claims were last staked on the ground in 1956.

The rocks around the showings are grey weathering, fine- to medium-grained granitic gneisses that contain variable amounts of biotite, plagioclase, microcline and quartz. Bands of biotite-rich, partly granitized metasediments are found in the gneisses. The foliation strikes in a northerly direction and dips steeply. In several places on both sides of the river near its mouth, carbonate veins with some quartz occur in fractures in the granitic gneisses. The fracture zones strike at 50, 75 and 100 degrees and dip steeply. Rocks are brecciated along the fractures. The carbonate veins are up to 1 foot wide and are less than 100 feet long. Chalcopyrite is disseminated in the veins and along the margins of the veins in amounts up to 15 per cent of the vein material.

Waldron River Copper Showing (112)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-L-15.

This copper showing is located just west of the mouth of the Waldron River on the north shore of McLeod Bay (62° 56'N, 110° 34'24"W) in the East Arm of Great Slave Lake and is about 125 miles east-northeast of Yellowknife. The showings were discovered and first staked in 1939 and have been staked several times and held by several owners since then. The showings are briefly mentioned by Lord (1951, p. 253) under the Ryan Group.

The showings occur in biotite and knotted biotite schist derived from greywacke-shales of the Yellowknife Group. Foliation strikes about 10 degrees and dips steeply to the west. A few narrow diabase dykes cut these rocks and strike north-northwest. Mineralization occurs in two sets of steeply dipping fractures that trend about parallel to and across the foliation. The rocks are locally brecciated along the fractures. Calcite with minor quartz occurs in the fractures as veins, short lenses and irregularly shaped masses. Chalcopyrite is disseminated in the carbonate veins, along the margins of the veins and in fractures with little or no vein material. The best mineralized sections are where two fractures intersect. Sections of massive chalcopyrite up to 1 foot wide and a few feet long occur in several places in the fractures. In one showing, on the point south of the mouth of the Waldron River, a north-trending vein is mineralized over a length of about 30 feet and a width of up to 6 inches. A second showing is about 800 feet to the west and consists of an easterly-striking vein that is mineralized over a length of about 50 feet and contains a short section of massive chalcopyrite. The width of the vein varies between 4 and 12 inches.

Ross Group (113)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 75-K-11, 75-K-12; Wright, 1952.

The Ross group of 205 claims along with the Rita 1-10 and Ann 1-5 cover a large block of ground that extends from the northeast end of Meridian Lake southwest along the north shore of the lake to its southwest end. The block measures about 9 miles in length and is from 1 1/2 to 2 miles wide. The Ann and Rita claims were staked in 1954 by Bill Rossing and E. McAteer. These claims were sold to Slave Lake Copper Mines, Limited in 1955 and the Ross claims were staked by the company. In 1956 the property was prospected and mapped geologically. About 1,000 feet of X-ray drilling were completed on a copper showing discovered on the claim Ross 152. No further work was done and the claims have since lapsed.

The claims are underlain by rocks of the Great Slave Group that, according to Wright (1952), occur on this property on the south limb of an easterly-trending synclinorium. Two formations, the Kahochella and Pethei, outcrop on the property. The Kahochella formation, where observed, consists of red shales with some red or pink, thin bedded shaly limestone. The Pethei Formation consists of grey and locally pink dolomites with a few narrow beds of pink sandstone. These rocks trend northeast to east and occur in a series of northeast- to easterly-trending folds. The sediments are cut by two bodies of hornblende-quartz diorite. This rock is fine grained, massive, reddish and consists of red plagioclase, hornblende, minor biotite and variable amounts of quartz. All rocks are cut by a fault that strikes west-northwest and is located just south of Mid Lake.

The showing on claim Ross 152 is just west of the southwest end of a small lake, 2 3/8 miles north of the southwest end of Meridian Lake. It consists of a series of quartz veins with some carbonate in a curving fracture zone or series of en echelon fractures in red shale. The strike of the zone varies from 105 to 135 degrees and it dips steeply to the southwest. Cleavage in the shales strikes at 30 to 60 degrees and dips steeply. Individual quartz veins or lenses in the fractures are up to 6 inches wide and 50 feet long. Such veins are found over a length of 350 feet. Chalcopyrite and minor pyrite are erratically disseminated in the veins in fractures and along the margin of the veins. Grab samples run up to 4 per cent copper but overall grade is much lower. Drilling indicated that the vein system persisted to about 75 feet, the depth tested.

Several such fracture zones with mineralized veins were found elsewhere on the property but all were narrow and of low grade.

On the Ann and Rita claims, several mineralized zones have been located but not developed in any way. Mineralization occurs in quartz veins and in zones of silicified limy sediments that are laced with a network of quartz and carbonate veins. Individual quartz veins are usually a few inches wide but some are up to twenty feet wide. Two such zones strike at 90-100 degrees and a third appears to strike at about 60 degrees. These stockworks may occur along fault zones but lack of exposures makes it impossible to be certain. Certainly in places the wall-rocks are sheared or brecciated. Sulphides consisting of chalcopyrite, pyrite and rarely chalcocite occur in small grains in fractures in the quartz or altered sediments. The distribution of sulphides is erratic and samples over reasonable lengths run less than one half of one per cent copper. Hematite commonly occurs along the fractures. Such zones have been traced for lengths up to 1,500 feet and are up to 100 feet wide.

Ann Group (114)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-K-11; Wright, 1952.

The Ann group of 16 claims extends between the northeast end of Meridian Lake northeast to the end of Maufelly Bay on Great Slave Lake. The property is about 8 miles southwest of the settlement of Reliance and 150 miles east of Yellowknife. The claims were staked by W. Rossing in 1955 and in the same year optioned to Giant Yellowknife Gold Mines. This

company excavated eight trenches across the mineralized zone and sampled them carefully and in 1956 completed self-potential and EM surveys over the property. The main showing and a slight self-potential anomaly were tested with about 1,000 feet of drilling. The company then relinquished its option and up until 1958 no further work was done on the claims.

The claims are underlain by shales and dolomites, or limestones that, according to Wright (1952) are part of the Kahochella Formation of the Great Slave Group. The shale is laminated, maroon-red in colour with yellow bleach spots and contains scattered thin beds of red siltstone. The dolomite is a thin bedded, white to pink, finely crystalline rock. The rocks strike about northeast, are thrown into folds whose axes strike at about 40 degrees. Axial plane cleavage in the shales strikes at 40 to 50 degrees and dips steeply to the southeast.

The main showing is on Ann 2 and 3 about 1,700 feet northeast of the northeast end of Meridian Lake. A network of quartz-carbonate veins occurs in shale. The zone strikes at about 50 degrees and dips at about 60 degrees to the southeast. The veins are about parallel to the cleavage in the shales. Individual veins vary in width from an inch to about 2 feet and the zone is about 800 feet long and varies in width from about 6 to 20 feet. Chalcopyrite and pyrite are disseminated in the veins in fractures but not in the intervening shales. Sampling of the trenches indicates that the overall grade of the zone is just under one per cent copper.

Very little work was done on another mineralized zone that occurs in limestone about 2,200 feet northeast of the main showing. The zone consists of a network or stockwork of narrow quartz-carbonate veins in what appears to be silicified limestone. It strikes about northeast and can be traced for more than 1,000 feet. Poor exposures make it difficult to estimate the width of the vein system but in places it is almost 100 feet wide; the average width may be in the order of 50 feet. Chalcopyrite and pyrite are erratically disseminated in the veins and silicified limy rocks. The author estimates that the overall grade of any sizeable portion of this zone would be considerably less than one per cent copper.

Other Copper Showings in the East Arm of Great Slave Lake

A number of small copper showings have been, over the years, found in the East Arm of Great Slave Lake and claims have been staked on some of these at various times but little or no development work has been done. Some of these showings are located on various maps of the Geological Survey of Canada (Wright, 1951; Brown, 1950).

Wright (1951) describes such showings from the Christie Bay map-area as follows:

> "Quartz-calcite veins carrying disseminated chalcopyrite are found in Yellowknife sedimentary rocks and in muscovite granite west of the mouth of the Burpee River, near Thompson Landing, and near the mouth of the Barnston River... Veins of quartz occur in the Great Slave Lake Group, in the dioritic intrusions and in the Et-then Group. They are not known to contain gold or more than traces of silver, but many of them carry calcite, barite, and chalcopyrite. Copper minerals are found in brecciated sandstone and in fractures in diabase near Tultheilei Narrows and on islands 6 miles

northeast of the narrows, on the south side of Tochatui Bay and at the eastern end of Portage Inlet, on the north shore of Stark Lake, on Murky Channel, near Pekanatui Point, and in carbonate veins cutting dioritic rocks at the southwest end of Et-then Island..."

Brown (1950) describes mineral occurrences in the Fort Resolution map-area as follows:

"Quartz veins are widely distributed in rocks of the Wilson Island Group. Many of these carry specularite and orthoclase, and a few carry carbonate, chlorite, pyrite, galena, and chalcopyrite... A little galena, pyrite, and chalcopyrite was observed in quartz stringers in an island 1/2 mile north of Wilson Island and 12 miles from its east end. Some disseminated chalcopyrite is associated with fluorite and carbonate in quartz stringers near the first portage on Thulon River. On the south shore of Great Slave Lake at a point 17 miles east of the mouth of Taltson River many quartz stringers occur in schist and contain disseminated pyrite and a little chalcopyrite. To the east of Snuff Channel, about 10 miles from the mouth of Taltson River, quartz veins containing galena, buff carbonate and small amounts of sphalerite, fluorite, and calcite occur in low granite hills..."

In the Reliance map-area Wright (1951) mentions the following:

"...Chalcopyrite-calcite lenses have been prospected near Bigstone Point. Claims have also been staked on Fairchild and Maufelly Points where chalcopyrite-carbonate stringers occur in clastic beds of the Sosan Formation..."

Island Group (115)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-8.

The Island group of 10 claims is located on and around a small island near the northwest shore of MacInnis Lake at about 61° 24'N, 110° 14'W. The property is about 157 miles east-southeast of Yellowknife. The claims were staked in 1954 for Consolidated Mining and Smelting Company of Canada (Cominco, Ltd.) to cover a uranium find made by their prospectors, Cliff Brock and D. Bagan. Some trenching, geological mapping and detailed sampling were completed on the showings during the summer of 1955 and in 1957 approximately 1,000 feet of diamond drilling was done. No further development has been done and the claims have lapsed.

The claims are underlain by arkose of the Nonacho Group and older granitic gneisses. The showings are in rocks of diorite to gabbro composition in the basement granites. These rocks are dark to rusty weathering, grey, fine-grained, massive aggregates of amphibole and plagioclase and possibly minor quartz. Gabbro occurs in bands in the granitic rocks on the west half of the island. These rocks may represent metamorphosed basic intrusions. Granitic rocks in contact with the gabbro are pink, fine grained, slightly gneissic and contain red feldspar, quartz, and minor amounts of

mafic minerals. Granitic gneisses in contact with sedimentary rocks are buff coloured, variable in composition and contain biotite and hornblende along with plagioclase, quartz and possibly potash feldspar.

The showings occur in one of the bands of basic rock in a fracture zone that consists of fractures striking at about 325 degrees and dipping to the west at about 60 degrees. These fractures are cut by a number of short cross-fractures. The zone varies in width up to about 20 feet. Individual fractures are not continuous over the whole length of the zone and are separated by several feet of rock. The zone is continuous for about 200 feet and then outcrops again about 100 feet along strike. The fractures on the latter exposure are poorly defined and contain minor mineralization. Radioactive minerals are scattered in the fractures and favour those striking at 325 degrees. Sections up to 20 feet long in individual fractures give significant geiger counter reactions. Quartz and hematite are associated gangue minerals. Although small sections contain significant amounts of uranium, the overall grade of the zone is very low.

Bragon Group (116)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-8.

The Bragon group of 10 claims (61° 25'N, 110° 14'W) is on the northwest shore of MacInnis Lake and is about 155 miles east-southeast of Yellowknife. The claims were staked in 1954 for Consolidated Mining and Smelting Company of Canada to cover a uranium find made by their prospectors, Cliff Brock and D. Bagan. Some trenching, geological mapping, and detailed sampling were done during the summer of 1955. No further work was completed and the claims have lapsed.

The claims are underlain by arkose of the Nonacho Group, older granitic gneisses and mylonite. The showings are located in diorites in the basement rocks. These rocks are dark to rusty weathering, grey, fine grained, massive aggregates of amphibole and plagioclase and possibly minor quartz.

The mineralization occurs on an outcrop of diorite that is cut by variously oriented, steep-dipping fractures. Common orientations are 90, 70, 30, 45, and 10 degrees. Single fractures are of various lengths but few extend across the whole outcrop. Density of fracturing varies over the outcrop but it is impossible to map a single fracture zone. There is some evidence of the existence of a fault along the southeast side of the outcrop to which the fractures may be related.

Mineralization, consisting of minor quartz and carbonate, hematite, pitchblende and yellow uranium stain, is localized in fractures. Gangue minerals are not abundant and radioactive minerals are erratically distributed. Individual fractures contain radioactive minerals over lengths up to 20 feet; significant mineralization is commonly concentrated at fracture intersections. Individual samples from these fractures give high assays but samples cut to test the grade of the material over mining widths and lengths returned very low assays.

Canada Pipeline and Petroleum Company (117)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-8.

Canada Pipeline and Petroleum Company holds a large number of claims including the Ace, Tux, Rex, Ginger, Pat, Carl, Mabel, Red and parts of the Don group of claims on the west side of MacInnis Lake. These claims were optioned and purchased from a number of individuals during the summer of 1955. The claims extend from the central part of the west shore of the lake southeast along the shore of the lake to a point within a mile of its south end. During the summer of 1955 much of the property was prospected and covered with a scintillometer survey. Several showings discovered were tested with something over 3,000 feet of diamond drilling. In January of 1956 a second drilling program of about the same footage was initiated and completed before breakup. No further work has been done on the property.

Rocks underlying the claims consist of sediments of the Nonacho Group in a narrow band along the shore of the lake and older granitic gneisses inland from the lake. The sediments, where observed are pink arkoses with some quartz-pebble conglomerate and white arkoses or quartzites with a few slate interbeds. These rocks dip about 40 degrees to the east; the strike varies from just west of north in the south to about north 20 degrees east in the north part of the property. The latter strike approximates the regional strike in the area. The rocks are cut by a number of steep-dipping faults that strike north-northeast and north. The main showings occur near the intersection of two such structures.

Two types of radioactive zones occur on the property. On the Ace 16 and 17 claims and on nearby claims, "high background counts" were obtained in brecciated granitic gneisses. These zones are irregular in shape but generally are elongated parallel to the foliation. Mineralized fractures are not apparent in the zones. Assays of samples of this material indicated uranium oxide in amounts ranging from trace to 0.02 per cent.

The second type of showing consists of mineralized fracture zones in the sediments. Such occurrences are found near the boundary of mineral claims Ace 20 and Don 11 and on Don 11, 8, 9, 3, and 4. The zones strike in a northerly direction and dip steeply to the east. They usually are formed by strong fractures of the above strike with a number of short cross-fractures. The rocks are brecciated and locally sheared along the fractures. Quartz and hematite fill some fractures and the wall-rocks particularly, where sheared, are hematite-stained. These fracture systems vary up to 100 feet in length. In the main showing on Don 11, several such fractures occur on an outcrop about 70 feet wide. Pitchblende occurs in sections up to 15 feet long in the fracture systems, commonly in zones of intense fracturing and brecciation. The zones between such shoots are essentially barren of radioactive minerals.

The radioactive zones exposed on surface were tested by drilling down to a depth of about 150 feet. No significant radioactive sections were cut but the fractures were found to persist. During the winter, a number of holes were drilled from the ice on the lake in a westerly direction toward the shore apparently to test the bands of quartz-pebble conglomerate. Results are unknown to the author.

WW Group (118)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-8.

The WW claims were staked in 1958 by Snowdrift Base Metals, Limited. The uranium showings on the claims were discovered in 1955 on the Show group that was owned by W. Cole. The Show claims were allowed to lapse in 1958. The claims are located on the west side of MacInnis Lake at about 61° 16'N, 109° 57'W. The property is about 165 miles southeast of Yellowknife.

The author has not examined the property. The following brief description is the result of a conversation with Mr. Cole, the former owner of the claims. Showings occur in a band of granitic gneiss as part of the basement of arkose of the Nonacho Group. Mineralization occurs in a fracture zone that trends about north and dips vertically and consists of a braiding network of fractures. Pitchblende occurs near intersections of fractures along with quartz. Grab samples gave good assays for uranium oxide but values were lower in chip samples from trenches. No work has been done on the property and the claims have lapsed.

Try Me Group (119)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 75-E-8, 75-E-9.

The Try Me and Tag groups of 28 claims (61° 30'N, 110° 18'W) on the west shore of the central part of Taltson Lake or about 145 miles southeast of Yellowknife. The claims were staked in 1957 and optioned to Star Uranium, Limited. About 2,000 feet of drilling was completed on showings on the claims in 1957 and 1958.

The author has not visited the property and has only limited knowledge of it. Uranium showings occur in a fracture zone in brecciated and crushed granitic gneiss. The fracture zone, which is reported to strike in a northerly direction, is near a quartz stockwork. Pitchblende, quartz and hematite are rather erratically distributed in fractures. One section of fairly persistent mineralization is reported and this and the fracture zone in general were tested with 9 drillholes. The highest assay from drill core was reported to be 0.15 per cent but most assays were less than 0.1 per cent. Mineralized sections cut in the holes were reported to be narrow and apparently did not persist from hole to hole.

Zobo Group (120)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-9.

The Zobo group of 9 claims is just west of the central part of Taltson Lake on the Taltson River (61° 32'N, 110° 18'W) and is about 150 miles southeast of Yellowknife. The showings were discovered by C. Brock and

D. Bagan and staked for Consolidated Mining and Smelting Company of Canada, Limited in 1956. The showings were sampled in that year and in 1957 the company drilled 5 holes to test the prospect. In the following year, the property was turned back to the prospectors and the claims have lapsed.

The author did not examine the property. The showings occur on Zobo 5 in sediments of the Nonacho Group. Pitchblende, with hematite and quartz, is erratically distributed in fractures within a zone that trends northerly and dips steeply. At least two short, narrow, high grade sections were exposed on surface. The zone was tested by drilling to a vertical depth of about 100 feet. Fracturing persisted to this depth and the erratic distribution of the pitchblende was confirmed. One high grade, narrow section was intersected in one hole. Assays of radioactive sections from other holes were reported to be low.

FD Group (121)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-F-5.

The FD group of 13 claims is located at the northeast end of Salked Lake (61°26'N, 109°47'W) and is about 165 miles southeast of Yellowknife. The claims were staked by F. Lyaka in 1956 to cover a number of copper showings and in the same year they were optioned to Giant Yellowknife Mine, Limited. During the summer of 1956 the company mapped the claims geologically, completed magnetometer, self potential and resistivity surveys over parts of the property, and tested the showings with several thousand feet of diamond drilling. The option on the property was relinquished by the company late in 1956 and no further work has been done on the claims.

The claims are underlain by arkose of the Nonacho Group and by older granitic rocks. The arkose strike about northwest, and according to Henderson (1939) occur near the nose of an east-northeast-trending syncline that plunges to the east. Granitic rocks occur in a narrow northwest-trending band. They are commonly gneissic and have been brecciated and mylonitized. The foliation parallels the regional trend. Composition is variable but pink to flesh coloured feldspar, quartz and some biotite and locally hornblende are the essential minerals. The mafic minerals are commonly altered to chlorite and the amount of quartz varies considerably. Bands of mylonite are numerous in the granite.

The showings occur in fracture zones in the granitic rocks. Chalcopyrite, chalcocite and bornite occur in narrow fractures, the most persistent of which strike at 15 degrees, and dip 80 degrees to the east. Other shorter fractures strike at 60, 135 and 35 degrees. The rocks are sheared or crushed along some of the longer fractures. White, fine-grained quartz occurs in some fractures but often only chalcopyrite, and bornite that is partly altered to malachite, are present. Two trenches expose similar mineralized fracture zones but individual fractures do not persist from one trench to the other. However rock exposed between the trenches has a rusty weathered surface and contains small blebs of chalcopyrite along fine fractures in amounts up to about 5 per cent of the rock. In the two trenches, the rocks were fractured over a width of about 30 feet; individual fractures were less than 50 feet long.

A small self-potential anomaly was found to cover the two trenches and intervening area. Drillholes were located under the trenches to test the anomaly. In the deeper holes, chalcopyrite and rarely native copper were found. Fracturing seemed less intense and sulphides less abundant. The best intersection was cut just north of the trench. The core assayed about 2 per cent copper over a length of 28 feet.

Two smaller but otherwise similar showings were discovered on the property. One occurs on the shore of the lake north of the ridge of granitic gneiss; the other is located along the south contact of the granitic mass about 200 feet west of the main showing.

Sol Group (123)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-F-4.

The Sol group of 64 claims, on the west shore of Thekusthili Lake about 6 miles from the north end of the lake (61° 16'N, 109° 57'W) is about 165 miles southwest of Yellowknife. The claims were staked in 1954 by Giant Yellowknife Mines, Limited to cover a radioactive occurrence discovered by their prospectors. A geiger counter survey and geological map of the property were completed during that year and in 1956 about 1,000 feet of drilling was done. No further work was done and the claims have lapsed.

The rocks near the showing consist of greywacke or subgreywacke with interbeds of shale. These rocks have been metamorphosed to fine-grained biotite schist. Nearby are conformable masses of granitic gneisses with many bands of biotite-rich, partially granitized sediment. These rocks are part of the basement to rocks of the Nonacho Group. Bedding and gneissosity strike at about 60 degrees and dip steeply. Foliation planes are locally crinkled and drag folded. Several north-trending lineaments occur in the area and are thought to mark the position of faults. Shearing in places along the shore of the lake just east of the showings indicate that a north-trending fault may occur near the lake shore..

The main showing is located near a point of land about 1/2 mile south of the mouth of a river that drains an unnamed lake to the west. Radioactivity occurs in a fracture zone that strikes north and dips very steeply to the west. Some shearing is evident along the zone. The zone is exposed over a length of about 100 feet and fracturing and shearing occur over a width of up to 2 feet. One fracture in sheared material persists over the length of the zone and a number of short fractures curve off it. Hematite and quartz occur in the fractures. Pitchblende is erratically distributed in fractures and at intersections of fractures along the zone. Three chip samples across radioactive areas in the zone gave the following results: 0.106 per cent U_3O_8 across 20 inches, 0.01 per cent U_3O_8 across 34 inches and 0.422 per cent U_3O_8 across 32 inches. There are three adjacent similar but much smaller zones. No other significant finds were discovered on the property. The zone disappears under overburden to the north. Drilling failed to encounter significant mineralization under the surface exposures of the zone or to extend the zone along strike to the north.

MWK Group (124)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-5.

The MWK group of 49 claims is located on the southeast side of O'Connor Lake about 120 miles southeast of Yellowknife. The claims, staked in 1948 to cover a manganese-bearing gossan and a lead-zinc showing, were held by O'Connor Lake Lead Syndicate. In 1951 the claims were optioned to American Yellowknife Mines, Limited and in 1954 this company was reorganized to Rayrock Mines, Limited who now own the group. The property has been inactive since 1952.

Development

The first work done on the property consisted of sampling and trenching on the manganese gossan and on the No. 1 showing of lead-zinc. In 1948 a large trench or open cut about 20 feet long and 7 feet wide was made on the northwest part of No. 1 vein. About 50 tons of high grade galena ore was cobbed from this cut. Also at this time four X-ray holes were drilled to intersect the vein at vertical depths of about 25 feet. Between 1948 and 1951, eight more X-ray holes were drilled into the No. 1 zone. The total footage of this drilling was about 800 feet.

In 1951, American Yellowknife moved a heavy drill to the property and initially four holes were drilled to cut the No. 1 vein at a depth of 50 feet. Then 20 holes were drilled to cut the vein at the 100-foot horizon at 50-foot intervals over a strike length of 1,000 feet. An additional 14 holes were drilled to cut the vein at 200 feet down dip, 11 holes to the 300-foot horizon, and 3 holes to the 500-foot horizon. Total footage drilled by American Yellowknife Mines, Limited was 12,735 feet.

In August of 1952, underground development was initiated. A shaft was sunk to a depth of 180 feet with a station cut at the 150-foot level. A crosscut was driven 127 feet to the No. 1 vein and 202 feet of drifting was completed along the vein.

Geology and Mineral Deposits

The claims are underlain by biotite gneiss, amphibole gneiss and granitic gneiss. The biotite gneiss is a brown to grey weathering, coarsely banded rock consisting of biotite, plagioclase and quartz. It is commonly garnetiferous and, according to Irwin and Prusti (1955) commonly contains sillimanite. Amphibole gneiss is fine grained, finely to coarsely banded, and rusty weathering. These rocks contain masses of pink weathering, fine- to medium-grained, granitic gneiss consisting of potash feldspar, plagioclase, quartz, and biotite. Locally, the latter rocks contain pegmatites and commonly gradational contacts occur between there and the older gneisses. Foliation in the gneisses strikes north-northwest and dips steeply both east and west.

The No. 1 vein occurs on MWK No. 6 claim. The vein is in a shear zone in amphibole gneiss that contains some bands of granitic material. The strike of the vein varies from 315 degrees at its north end to 335 degrees at the south and the dip varies between 50 and 75 degrees to the west. On surface the vein is exposed over about 180 feet and varies in width from 1 1/2 to 6 feet. The width of the vein may be related to strike and dip changes as its widest part occurs near the point of its maximum curvature.

Vein filling consists of white to creamy coloured, fine- to coarse-grained, carbonate and fine-grained white quartz. In places quartz occurs as veins in carbonate and is, therefore, later. Crystal-lined vugs are common in the vein. Vein material fills fractures in the wall-rock and evidence of replacement of country rock is lacking. The relative amounts of quartz and carbonate vary considerably along the vein. Galena, sphalerite and minor amounts of pyrite and chalcopyrite occur in fractures in the vein. Veins of almost massive sulphides up to 5 inches wide and some tens of feet long are found but most of the sulphides are erratically disseminated in the vein. The highest concentrations of sulphides tend to be near the margins of the vein but they are not found in the wall-rocks except in the matrix of breccia that is locally found along the margins of the veins.

The vein as exposed on the 150-level underground is essentially the same as on surface. At this level its average width is about 5 feet. There is some suggestion from sampling of drill core that the grade decreases with depth but this may be due to fewer intersections at depth.

According to figures published in the Northern Miner (January 15, 1953, p. 13), the company then estimated, mostly from information from drillholes, that 33,160 tons of ore carrying 15 per cent combined lead-zinc were outlined above the 150-level in 2 blocks of combined length of 540 feet. It was also calculated that above the 250-level, 67,950 tons of ore carrying 12 per cent combined lead-zinc existed in blocks of 600 feet total length. The lead-zinc ratios vary between 1:4 and 1:2.

The manganese showings are on MWK claims No. 3 and No. 4 about 1.7 miles west of south of the No. 1 vein. Development work consists of 11 pits or trenches that were cut in 1949. No work was done on this zone by American Yellowknife Mines, Limited.

According to Lord (1951) the rocks near the showings are fine to medium grained, dark green or black, banded amphibole biotite gneiss. Garnet, pyrrhotite and graphite flakes are common minor constituents. Just to the west of the ridge on which the mineralization is found, the rock is a pink, medium-grained, biotite gneiss. Foliation in the gneisses strikes about 340 degrees and dips into the ridge from both sides suggesting a fold or basin structure.

Soft, black manganese oxide, which occurs in fractures in the amphibole gneiss in the form of stains and crusts up to 1/8 inch thick, is commonly mixed with rusty coloured iron oxide. A more or less continuous, hook-shaped zone of such material, about 2,450 feet long, can be outlined. The outcrop width of this zone varies between 10 and 100 feet. For the most part, this zone is parallel to the trend of the gneiss. The manganese oxide appears to be localized mainly in a fractured zone within the zone. The true thickness of this smaller zone may be in the order of 5-15 feet. Chip samples across this latter zone in 5 locations contained from 4.5 to 8 per cent manganese. Lord (1951) felt that the manganese oxide had been deposited from surface waters percolating through manganese-bearing rocks.

BSM Showings (125)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-5; Irwin, 1951.

These showings are on the east side of the north end of O'Connor Lake (61° 21.5'N, 111° 51'W) or 120 miles southeast of Yellowknife. The showings were originally covered by the BSM group of claims staked in 1948 and held by the Great Slave Mining Syndicate. The claims have since lapsed and the ground has been restaked at least once but in 1958 the showings were not covered by claims.

The area is underlain by metamorphosed sediments that may have been originally greywacke, and by granitic gneiss probably derived from the sediments. These rocks are cut by irregularly shaped masses of pegmatite. The gneisses strike in a northerly direction and dip steeply.

Two showings were found on the original property. The No. 1 showing is just south of a little bay 2.1 miles southeast from the north end of O'Connor Lake. It occurs in granite gneiss. In 1951 it was tested by 4 diamond-drill holes. The mineralized zone strikes northwest and dips steeply. The following description is from an unpublished report by A. B. Irwin.

> "The outcrop of the showing is about 20 feet long and 15 feet wide and includes a number of quartz veins, two of which are mineralized. The latter average 12 inches and 6 inches wide and are separated by 1 to 3 feet of waste. They trend about N25° W and dip steeply east. A composite sample taken across the total 18 inches of mineralized vein material assayed:
>
> zinc - 3.35 per cent
> lead - 0.65 per cent
> silver - 0.15 ounces/ton
>
> ... Three holes, drilled to intersect the northwesterly extension of vein No. 1 intersected no significant amount of mineralization.
>
> "The quartz in the well mineralized veins is both massive and crystalline. The latter has comb structure... The sphalerite and galena occur in interstitial spaces between quartz crystals and as mineral aggregates in more massive quartz. Traces of chalcopyrite occur in the ore."

The No. 2 vein is located 1 1/3 miles east and a little north of the No. 1 vein. According to Irwin:

> "The No. 2 vein... outcrops for 300 feet in a direction N35° W and dips steeply southwest. Six small pits located at favourable points along the vein expose quartz up to 3 feet wide of a character similar to the No. 1 vein. The wallrock is granite and granite gneiss. At its south end the quartz vein becomes narrower and swings to a strike of 350° E into a drift filled draw which is part of a north-south lineament several miles in length".

MCO and Morcol Groups (126)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-5; Irwin, 1951.

The MCO and Morcol groups of 15 claims are located between O'Connor and Frank Lakes at about 61° 21'N, 111° 56'W. The claims are about 120 miles southwest of Yellowknife and were staked in the late 1940s; in 1950 they were held by W. Cole.

Following are excerpts from an unpublished report by A. B. Irwin[1] who examined the property in May, 1951.

> "The rock in this area is largely gneissic granite or migmatite in which there are inclusions of sedimentary rocks. The gneissosity strikes in a northeasterly direction, but locally is subject to intense folding. Northwesterly striking dykes cut the granitic rocks. Those observed are up to 25 feet wide, generally red on weathered surface, fine grained, hard and of medium to acid composition.
>
> "On the MCO No. 17 mineral claim a quartz vein containing sphalerite and galena, about three feet wide, is exposed at the base of a bluff near the shore. The vein strikes 30° west of north and dips 75° southwest. Only about 6 feet in length have been opened up, one end being covered by overburden and the other end by coarse talus from the bluff. The hangingwall of the vein is not exposed. There are exposures of the same vein to the southeast showing only sparse sphalerite and galena mineralization.
>
> "Along the shore and within 200 feet to the south of the showing, there are a number of boulders of quartz, mineralized with sphalerite and galena, ranging in size from one foot to three feet in diameter. It is estimated that the boulders and the well-mineralized portion of the vein have a content in excess of 20 per cent zinc. The lead content is much smaller. Several small mineralized veins parallel to the one at the foot of the bluff, were seen farther south along the lake shore. There is also a low area covered with overburden in which other veins could exist.
>
> "The sphalerite and galena are both quite coarse-textured. Two types of sphalerite may be present in the same specimen. One type is honey yellow in colour while the other type is quite black. The latter is predominant. In addition to sphalerite and galena, small amounts of chalcopyrite were noted.
>
> "On the Morcol No. 1 claim a rather persistent, narrow shear zone was examined, striking east-west and dipping 70 degrees north. This zone cuts both granitic rocks and sedimentary inclusions. One exposure showed a quartz vein with angular fragments of wall rock and sparse sphalerite, galena and chalcopyrite."

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[1] Irwin, A. B. MCO and Morcol groups at Frank Lake, Thulon Lake area, Geol. Surv. Can., unpubl. report (1951).

Fred Group (127)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-5.

The Fred group of 9 claims is on the north shore of the southwest arm of Thubun Lakes (61° 29'N, 111° 59'W), about 105 miles southeast of Yellowknife. The claims cover ground formerly staked as the BJ and Rex groups. The Fred claims were staked in 1957 by Fred Lypka for Giant Yellowknife Mines, Limited. Some trenching and sampling were done in 1957 and the claims were later turned back to the prospector.

The claims are underlain by biotite gneiss and granitic gneiss that probably represent metamorphosed and granitized sediments of greywacke-shale type. Foliation in these rocks strikes northeast and dips steeply. The main showings are in a northwest-trending, almost vertically dipping fracture zone that can be traced for 1,500 feet. The average width of the zone is about 10 feet. The fractures are filled with quartz and carbonate and galena, sphalerite and chalcopyrite are erratically disseminated in the veins.

Hank Group (128)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-E-4.

The Hank group of 45 claims is located about 12 miles east of south of the south end of O'Connor Lake at 61° 05'N, 111° 46'W, some 127 miles southeast of Yellowknife. The Hank claims were staked by Snowdrift Base Metal Mines, Limited and associated companies in 1958 to cover a copper-nickel showing. In 1958, some trenching, sampling and preliminary geophysical work was completed. In 1959 the claims were mapped geologically and showings were tested with about 30 diamond-drill holes. The total footage drilled was over 5,700 feet. The claims have since lapsed.

The claims are, for the most part, underlain by biotite gneiss and hornblende-bearing gneiss. Included in these rocks are remnants of ungranitized but highly metamorphosed sediments and possibly volcanic rocks. Gneissosity trends north to northeast and dips steeply. These rocks are cut by a series of northwest-striking, steeply dipping gabbro dykes, a number of which occur near the showings. One northwest-striking, steep dipping fault is known to cut the gneisses, and lineaments with parallel trends suggest the possibility of a number of such faults.

The main showings occur near the junction of Hank claims 5, 6, 7, and 8. Sulphides occur in and near a gabbro dyke that is about 100 feet wide, several miles long, strikes northwest and dips nearly vertically. The dyke is located just a few feet northeast of a parallel vertically dipping fault. Near the mineralized zone, the dyke apparently consists of gabbro with a central zone of mottled gabbro of about the same composition but different texture. Narrow zones of porphyritic gabbro occur in the dyke. Locally along the contacts a breccia occurs that consists of fragments of country rock in gabbroic material.

The mineralized zone consists of pyrrhotite, chalcopyrite and possibly pentlandite disseminated in the gabbro and contact breccia. Sulphides occur as blebs and irregular masses in the gabbro and in places seem to fill small fractures. Some cobalt is reported to be found in assays of samples. The amount of sulphides varies from a few blebs to about 25 per cent of the gabbro and the mineralized zone is about 600 feet long. Initial drilling results confirm the fact that significant amounts of sulphides are restricted to the contact zone of the dyke and to the contact breccia and suggest that the sulphides do not extend very far down the dip of the dyke. Sulphides do not seem to occur in the mottled gabbro. Assays of grab samples show about 4 per cent combined nickel and copper with a ratio of about 1:1. Results of systematic sampling are unknown to the author.

TSC Group (129)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-D-12.

The TSC group of 50 claims is located on a long peninsula on the east side of Tsu Lake at about 60° 37'N, 111° 51'W, and about 45 miles north of Fort Smith. The claims were staked in 1954 by R. Kirk, V.A. Littler, and associates. An airborne scintillometer survey was flown over the area and some trenches were blasted in the showing. The claims have since lapsed.

The claims are underlain by granitized sediments, migmatites, and gneissic granitic rocks. Metasediments occur only as remnants in the granitic rocks and consist of biotite schist and locally hornblende gneiss. All gradations exist between these rocks and a pink to buff coloured granodiorite gneiss with about 2 per cent biotite. The transition is marked by increase in plagioclase and probably potash feldspar and decrease in biotite. Gneisses with porphyroblasts of feldspar are common. The gneissosity strikes slightly west of north and generally dips to the west between 50 degrees and vertical. These gneisses are cut by elongated bodies of pink to white, coarse-grained, massive, pegmatitic granitic rock consisting of plagioclase and microcline, quartz and locally biotite. In places this rock contains up to 40 per cent quartz. These rocks are in sharp contact with the gneisses.

Radioactive minerals occur in the gneisses in a zone that extends the length of the peninsula and on to small islands just north of the peninsula. In one type of occurrence, mineralization is localized on a fracture zone that consists of braided or branching fractures, the most persistent of which strike about north and dip west at about 65 degrees. These zones vary in width up to 4 feet and one near the end of the peninsula can be traced for 200 feet. On the peninsula three such zones occur in gneisses containing biotite-rich bands and bodies of the pegmatitic rock. Radioactive minerals occur along fracture and particularly at intersections of fractures. Some fractures filled with a soft dark chloritic (?) material give high geiger counter readings. Grab samples from these zones assay up to 4 per cent U_3O_8 equivalent but apparently about half this value is related to the presence of thorium.

A second type of occurrence on the peninsula consists of zones of granitic gneisses with biotite-rich zones and bodies of quartz-rich pegmatitic rock which give better than background readings on the gieger. Such zones

are irregularly shaped but are elongated parallel to the regional strike of the gneisses. Radioactive minerals are not localized in visible fractures but seem to be a constituent of the rock. The uranium content in these zones is low.

Taz Group (130)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-D-7.

The Taz group of claims, on the west side of Tourangeau Lake (60° 17'N, 110° 33'W) is about 50 miles east-northeast of Fort Smith. The claims were staked in 1953 by prospectors working for Cominco, Limited. In 1954 further detailed prospecting was done and two radioactive zones were tested with a series of trenches. The claims have since been allowed to lapse.

The claims are underlain by metamorphosed sedimentary rocks, granitized metasediments and granitic gneisses and rocks of varying composition. Sediments appear only as highly metamorphosed bands or remnants in migmatite zones. The granitic gneiss also contains biotite-rich bands which probably represent granitized sediments. The regional strike is about north and dips are generally steep but locally the foliation planes are highly contorted and drag folded and dips may be as low as 20 degrees on limbs of small overturned folds.

There are two known radioactive zones on the property. One is in a migmatite zone or a biotite-rich zone in gneissic granodiorite. The rocks in the zone vary from a gneissic granodiorite containing about 2 per cent biotite to a similar rock with about 10 per cent biotite. This complex contains lenses and pods of pegmatitic material. The zone strikes north and the average dip to the west is about 70 degrees. It has been traced for more than 3,000 feet and has an average width of 40 feet. Radioactivity is evenly distributed throughout the zone. Fractures do not contain concentrations of radioactive minerals but there is a suggestion of slightly higher concentrations in biotite-rich portions of the zone. Pegmatitic material gave no reaction on the geiger counter. Assays from surface and from the trenches were very low and were less than 0.05 per cent.

The second showing is in a gneiss of diorite composition consisting of a medium-grained aggregate of maroon plagioclase, hornblende and some biotite. The mafic content varies in this gneiss in amount and in relative amounts of biotite and hornblende. The showing is in a zone containing mafic-rich bands of rock. Geiger counter reaction over most of the zone is about three times background but in one trench sheared basic material gave higher geiger counter readings. Fractures occur parallel and at right angles to the zone; some of these contain copper stain and one contained a concentration of radioactive minerals. This zone has been traced for about 150 feet; it strikes at about 340 degrees and seems to dip nearly vertically. Sampling of the radioactive zone gave low values of uranium.

Thoa Lake Claims (131)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 75-A-2.

A large group of claims were staked on the southeast shore of Thoa Lake by Canadian Nickel Company in 1953. The claims are located at about 60° 14'N, 104° 35'W, a few miles west of Selwyn Lake or about 350 miles southeast of Yellowknife. A fairly large drilling program was completed by the company in 1953 and to the author's knowledge no work has been done since then. The author has not visited the property.

The claims are in part at least underlain by paragneisses and massive granitic rocks (Taylor, 1959a). These rocks are cut by or include a mass of peridotite and gabbro which apparently is sheared in places. Sulphides including pyrrhotite, pyrite and some chalcopyrite are disseminated in the basic rock. Zones of sulphides were intersected by drilling but the nickel-copper content was variable and commonly low.

DEPOSITS IN HELIKIAN ROCKS

Canadian Nickel Company, Limited (82)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 86-0-3, 86-J-11, 86-J-14; Fraser, 1960; Smith, 1961.

Canadian Nickel Company, Limited holds a group of about one thousand claims that cover a large body of basic and ultrabasic rock containing, in places, nickel-bearing sulphides. The property extends from just south of Coppermine River at about 115° 08'W, northward for about twenty-nine miles, and is up to five miles wide. The main camp is at the north end of McGregor Lake, about sixty-five miles south of the settlement of Coppermine. The property is three hundred miles north and a little west of Yellowknife.

History and Development

In 1956 the sighting of rather spectacular gossan zones from the air led to the discovery of the complex of basic rocks and related sulphides. About one thousand claims were staked at this time to cover the largest part of the complex. A few holes were drilled to test some of the gossans and a geological reconnaissance was made of the complex. Early in 1957, the company, being the successful bidder, was granted a concession by the then Department of Northern Affairs and National Resources, Ottawa for a period of three years. The concession area was about six hundred square miles and surrounded the block of claims. In the spring of 1957 about five hundred tons of oil, drilling equipment, materials for camp building, a D-4 "cat" and

several tracked vehicles were flown to McGregor Lake on to an ice strip by Bristol and York aircraft from Yellowknife. At this time airborne EM and magnetometer surveys were completed over about the southern two thirds of the property. During the summer of 1957 the property was mapped geologically and ground EM and magnetometer surveys were done over promising areas and to check anomalies from the airborne geophysical work. Approximately 19,000 feet of diamond drilling were completed with five machines. The concession was dropped at the end of 1957 but work continued on the claims. During the summer of 1958 geophysical work, including gravity surveys, was continued; special geological studies were completed, and about 18,000 feet of drilling was done. The work program was reduced in 1959. Geophysical work was continued and several thousand feet of drilling was completed with one machine. The total footage drilled on the property is between 40,000 and 50,000 feet. The claims have been allowed to lapse.

Geology

The regional geology of the area has been described by Fraser (1960) and the geology of the complex by Smith (1962). The oldest rocks consist of basic lavas and amphibolites derived from them, and greywacke-shales and its metamorphosed equivalent, mica schist. These rocks are cut by granitic rocks which, on the property, are for the most part granitic gneiss and migmatite. The gneiss is commonly a rusty weathering, fine- to medium-grained rock consisting of biotite, sometimes hornblende, grey feldspar and quartz. Bands of biotite-rich metamorphosed sediments and bodies of fine-grained, almost massive, pink granodiorite occur in the gneiss. The strike of the gneissosity is northerly and the dips are steep. These rocks are overlain unconformably by the Hornby Bay Group of gently dipping, white to buff coloured quartzites and grey or buff dolomites. Dark brown weathering, green or grey basaltic flows of the lower part of the Coppermine River Group overlie conformably rocks of the Hornby Bay Group. All of these rocks are cut by numerous diabase or gabbro dykes and sills. Many of the dykes strike north-northwest.

The basic and ultrabasic rocks, with which the nickel bearing sulphides are associated, are part of what has been named the Muskox Complex. The rocks cut the metasediments and for part of their length occur along the contact of the granitic gneisses and metasediments. They also intrude the quartzites of the Hornby Bay Group but their age relationships to the Coppermine lavas are uncertain. The complex is thought to be a result of the same period of basic magma generation that produced the lavas and diabase dykes and sills. The magma probably was emplaced along a fracture and on reaching the gently dipping rocks of the Hornby Bay Group spread out and possibly domed up the sediments to form a funnel-shaped mass. This body, which, south of the Coppermine River, is a dyke between 400 and 1,000 feet wide, north of the river broadens to a width of over three miles and is essentially a layered complex of ultrabasic, basic and acidic rock. The dyke can be traced south of the river for about forty miles. The complex extends north of the river about thirty miles. The strike of the complex is north-northwest to almost due north.

Smith (1962) describes the complex in detail and only a brief, generalized summary is presented here. South of the river the dyke is for the

most part gabbroic in composition but contains a number of lens-like bodies of more basic picrite and peridotite that are up to five miles long. The latter rocks occur near the centre of the dyke where it is fairly wide and are less common towards the south end. The dyke appears to be nearly vertical.

North of the river the complex broadens and the east and west contacts dip towards the centre of the mass at angles of between thirty and fifty degrees with a mean angle of dip of about thirty degrees. Along both contacts of the body a marginal phase is developed consisting of bands of various rocks that dip about parallel to the contact. At the contacts for much of their length gabbro is found; this grades to picrite, then feldspathic peridotite and finally peridotite. The gabbro phase at the contact is either missing or very narrow towards the north end of the intrusion. A layered sequence of rocks occurs in the central part of the intrusion. Near the contacts these layers dip moderately toward the centre of the mass, but away from the marginal zones they are flat lying but tilted to the north at about ten degrees. The layered series comprises alternating layers of dunite, peridotite, pyroxenite and gabbro with dunite being most abundant near the base. The layered rocks are about 8,500 feet thick. These rocks are overlain by gabbro-granophyre and granophyre. The marginal phases and layering are probably in part due to differentiation of a gabbroic magma but this process may be complicated by other factors such as several influxes of magma or intrusion of a crystal mush of olivine grains.

These rocks are cut by a fault that trends just west of north and seems to be steeply dipping. It is near the west side of the complex and movement on it is west side down and to the south.

Sulphides consisting of pyrrhotite, chalcopyrite, pyrite and possibly pentlandite are disseminated as blebs in the basic rocks near the contacts of the intrusion. Most of the sulphides are within one hundred feet of the contact and over much of the length of both contacts. The amount of sulphide is commonly about one or two per cent but higher concentrations occur in various places. Zones of massive sulphides and breccia ore are found locally in the contact area. So far no significant amounts of sulphide have been discovered in the layered part of the complex in the central part of the intrusion.

North of Speers Lake and in the east side of the intrusion in the upper part of the layered series a band of disseminated chromite up to one and one half feet wide has been discovered and traced seven miles along strike. It forms one of the layers in the upper part of the layered complex.

Sherritt Gordon Mines, Limited (83)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 86-J-11, 86-O-2, 86-J-14.

About 250 claims, staked in 1957 by C. McAvoy and J. Harriman and associates, were optioned by Sherritt Gordon Mines, Limited late in the summer of 1957. These claims which include the ZO, V, FOX, FOG, ROB, GP, LINK, DEV, JO and SUN groups are east and south of the block of claims staked by Canadian Nickel Company in the Coppermine River area and are about eighty miles south-southeast of Coppermine and about 255 miles

north of Yellowknife. Late in the summer of 1957 one diamond-drill hole was drilled by the company; during the following summer sixteen holes, with a total footage of about four thousand feet, were drilled.

The claims are underlain by biotite gneiss and granitic gneiss containing remnants of biotite schist and hornblendic rocks that may be correlated with rocks of the Yellowknife Group. The northeastern claims are underlain by gently folded unmetamorphosed dolomites and shales of the Epworth Group that lie unconformably on the older gneisses. All rocks are cut by gabbro dykes. A number of gossans are found in the gneisses. They mark the location of zones of disseminated and rarely massive sulphides consisting of pyrite, pyrrhotite, and some chalcopyrite. A few of the larger zones were tested by drilling but significant amounts of copper or nickel were not found. The option on the claims was dropped and the claims have lapsed.

D Group (84)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-J-14.

The D group of claims (about 66°57'N, 115°21'W) is about three hundred miles north of Yellowknife and sixty miles south of Coppermine. The group of thirty-four claims was staked for Pickle Crow Gold Mines, Limited in 1956. In 1957 Panamerican Ventures, Limited (since reorganized to Westfield Minerals, Limited) and Northfield Mines Incorporated agreed to finance and manage an exploration program on these and other holdings belonging to Pickle Crow Gold Mines. During the summer of 1957, the property was mapped geologically and mineralized zones were examined and sampled.

The claims are underlain by migmatite and gneissic granitic rocks containing many inclusions of older biotite schist that is locally garnetiferous. These rocks are cut by small stocks and dykes of massive granite and by gabbro dykes. The foliation in the gneissic rocks strikes north to northwest and tends to dip to the west at about 45 to 80 degrees. North and northwest striking steeply dipping faults cut the above rocks.

Sulphide mineralization occurs in a number of ways on the property. Some of the fault zones contain disseminated sulphides, mainly pyrite, along part of their length. Although the amount of sulphide is small, less than five per cent, these zones are marked by spectacular gossans. Sulphides, essentially pyrite with minor chalcopyrite, are disseminated along the margins of an intrusion of granite. Sulphides occur as fine grains in parts of the gabbro dykes where they form less than five per cent of the rock. The sulphides in the various environments contain only minor amounts of copper or nickel.

Gos Group (85)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-J-14.

The Gos group of claims (66° 57'N, 115° 21'W) is about three hundred miles north of Yellowknife and sixty miles south of Coppermine.

Eighteen claims were staked for Triana Exploration Company by E. Boffa and associates during the summer of 1956. In 1957 this company mapped the property geologically and examined and sampled gossan zones. No further work has been done on the claims and they have lapsed.

The claims are underlain by migmatites and gneissic granitic rocks containing many inclusions of older biotite schist that are locally garnetiferous. These rocks are cut by stocks of massive or faintly gneissic granite and by gabbro dykes. The foliation in the gneissic rocks strikes north to northwest. The gossans on the property mark the locations of zones of disseminated sulphides, chiefly pyrite localized in north and northwest striking, steeply dipping fault zones.

Pickle Crow Gold Mines, Limited (86)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 86-O-5, 86-N-8, 86-N-7.

Pickle Crow Gold Mines, Limited, after some preliminary investigation during the summer of 1955, in 1956 acquired a concession in the Coppermine area. The concession covered an area of about five hundred square miles and extended from around the Dismal Lakes in the south and west, north almost to Coppermine and east a few miles past Coppermine River. It was located so that much of it was underlain by basic lavas of the Coppermine River Group. In the spring of 1956 airborne EM and magnetometer surveys were flown over the concession and in the following summer it was mapped geologically and prospected. All anomalies outlined by the geophysical work were checked on the ground. During the following winter the concession was dropped and roughly five hundred claims were staked in two large groups within the concession area. These claims were located to protect areas underlain by basic lavas of the Coppermine River Group which by previous work had been found to contain copper mineralization. During the summer of 1957 the work done on these various groups of claims was financed and managed by Panamerican Ventures, Limited (since reorganized to Westfield Minerals, Limited) and Northfield Mines Incorporated. Work on the claims in the Coppermine River area consisted of further geological studies, prospecting, and diamond drilling on two copper showings. Following is a description of the copper showings.

The main showing was found by prospectors of Northern Aerial Minerals Exploration, Limited in 1928 or 1929 and covered by the D group of claims. The claims lapsed and the showings were restaked in 1944 or 1945 by American Metals Company of Canada, Limited and again by the same company in 1951. The claims were allowed to lapse in 1956 and the showings were covered by the group of claims staked by Pickle Crow Gold Mines, Limited in 1956. The showings are located about 67° 21'N, 115° 59'W, near the source of Burnt and Willow Creeks and about seventeen miles east-northeast of the outlet of Dismal Lakes and one hundred and four miles northeast of Port Radium.

The showings are in rusty weathering, dark green, fine-grained basalt of the Coppermine River Group. Individual flows vary in thickness between about seventy-five and one hundred and fifty feet. The tops and sometimes the central portion of the flows are amygdaloidal. The amygdules

are filled with calcite, quartz, chlorite, epidote and rarely with chalcocite or native copper. Native copper also occurs as thin films in fine, short fractures in the rocks. The flows strike about east and dip at about ten degrees to the north.

Mineralization occurs in a fracture zone which strikes north and dips vertically. The fractures are braided or branching along strike and in section; the rocks have been brecciated along the zone. Fractures are filled with quartz-calcite veins and stringers that contain chalcocite in irregularly shaped and distributed masses. The larger masses of chalcocite tend to be at fracture intersections. The mineralized zone is about three thousand feet long and averages about ten feet in width. There is some evidence to suggest that it is limited to about three flows, the thickest of which is approximately one hundred feet.

This showing was drilled by American Metal Company of Canada, Limited in 1952 (Jenney, 1954) to test the vein over a length of 1,100 feet and 62,000 tons of ore averaging 8.78 per cent copper were outlined. The zone was drilled to a vertical depth of one hundred feet.

A second showing was drilled during the summer of 1957. It is about five miles east of the above showing just south of Burnt Creek about four miles from its junction with Coppermine River. Chalcocite occurs in calcite-quartz veins in a fracture zone or fault which strikes about northeast and dips vertically. The chalcocite is erratically distributed in the zone over a length of three thousand feet. Drilling in 1957 confirmed the surface observations.

Val D'Or Mineral Holdings, Limited B Group (87)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-N-10.

The B group of claims was staked for Val D'Or Mineral Holdings, Limited in 1955. The claims are about one mile east of Cliff Lake (or 67° 36'N, 116° 50'W), approximately fifty miles southeast of the settlement of Coppermine, and 105 miles north-northeast of Port Radium. The showings were originally found by prospectors working for Northern Aerial Minerals Exploration, Limited between 1929 and 1931 at which time about six trenches and some diamond drilling were completed to test the showing. In 1955 the group was staked by Val D'Or Mineral Holdings, Limited to cover the original showings. About six drillholes were completed on the original and other showings during the summer of 1955. In 1955 additional claims were staked around the original claims and during the summer of 1956 the ground was prospected and mapped geologically by Pickle Crow Gold Mines, Limited. This latter company managed the work for Val D'Or Mineral Holdings, Limited. During this same summer, additional diamond drilling was completed, part of which, at least, was designed to test an airborne EM anomaly located from surveying done by Pickle Crow Gold Mines, Limited in the area.

A description of the showings by Kidd (1932, pp. 59-60) is found in Lord (1951, pp. 77-78). The author visited the property in 1955 and 1956.

The claims are underlain by basaltic lavas of the Coppermine River Group. These rocks strike about northwest and dip gently to the northeast. Individual flows vary in thickness up to 100 feet and are fine grained near the top and bottom and slightly coarser grained in the centre. The tops and sometimes the central portions of the flows are amygdaloidal. The amygdules are filled with quartz, calcite, epidote, chlorite and feldspar in various proportions. Native copper and chalcocite are found in some amygdules in certain flows. These rocks are cut by faults of three different trends. A north-northwest striking fault, which can be traced for several miles, is in the valley in which Bornite Lake is located. A second set of faults strikes at about 20 degrees east of north and one of them at least dips to the west at about 60 degrees. Faults of a third set strike at about 280 degrees and are close to vertical in dip; they can be traced along strike only over short distances. The faults are located in shallow draws commonly containing areas of broken rock.

The original showing occurs in a draw that marks the location of a fault, which can be traced for about 3,000 feet. Rocks along the walls of the valley are fractured and some fractures contain quartz veins. The mineralization is exposed in a series of trenches in the draw; only a few of the trenches now reach bedrock as the rest have caved. Sulphides, consisting of bornite and chalcocite and in places chalcopyrite occur in fractures in a quartz-carbonate vein or network of veins in fractures in the flow rocks. The sulphides are usually disseminated in the quartz but in some exposed sections almost massive sulphides occur in widths up to 8 or 9 feet. This material contains about 45 per cent copper. Such sections are short, in the order of 50 feet long. Mineralization is found in the zone over a length of about 250 feet; the zone varies in width up to 20 feet. Drilling indicates that the vertical extent is limited, possibly less than 50 feet. It is not known whether the fracturing is restricted to one or two flows or if the mineralization simply dies out at depth in a more persistent fracture zone. Descriptions of individual trenches as exposed in 1931 can be found in Lord (1951, p. 78).

A second showing, a short distance west of the main zone, contains bornite and chalcocite disseminated in a quartz vein over a length of about 70 feet. The vein is part of a network that occurs in a fault or fracture zone which strikes at 280 degrees and is vertically dipping.

South of the main showing is an area where float consisting of boulders of quartz mineralized with bornite is found. This material has never been traced to its source.

An anomaly outlined by airborne EM survey done by Pickle Crow Gold Mines, Limited is located in the valley which contains Bornite Lake and is just southeast of the lake. It was checked by drilling with negative results.

Cu Group (88)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-N-8.

The Cu group of six claims (67° 25'N, 116° 19'W) is about 107 miles north-northeast of Port Radium and 40 miles southwest of Coppermine. These claims were staked by E. Boffa and associates during the summer of

1955 and sold to Vandoo Consol Explorations, Limited. During the summer of 1956 they were mapped geologically and the showing was tested by diamond drilling.

The claims are underlain by rusty weathering, dark green, fine-grained basalts of the Coppermine River Group. The flows strike northwest to west and dip gently to the north or northeast. Rocks on the property are cut by faults that strike at 45 and 325 degrees and apparently dip steeply. These faults are marked by zones of brecciation and fracturing, but no alteration or shearing is found along them. The faults are expressed topographically by long shallow valleys commonly containing extensive areas of broken rock.

The showings are located along a fault striking at 325 degrees which can be traced for at least a mile and which terminates against a northeast-striking fault. Mineralization occurs in a fracture zone in the east wall of the fault near the northeast-striking fault. The zone consists of a number of intersecting fractures, the most abundant of which strike at 12 and 280 degrees; dips are nearly vertical. The overall effect is a braiding fracture zone about 500 feet long and averaging about six feet wide. Some fractures are filled with bornite and chalcocite, others contain quartz-carbonate veins with the bornite disseminated in fractures in quartz. Individual veins are narrow, up to two inches wide, and mineralized fractures are not closely spaced but are separated by a foot or so of barren country rock. At some fracture intersections pods of massive bornite up to three feet long and six inches wide were observed. Individual veins run very high in copper but the copper content of the whole zone is unknown to the author.

Met Group (89)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-N-8.

The Met group (about 67°23'N, 116°29'W) is 105 miles north-northeast of Port Radium and 45 miles southwest of Coppermine. These claims were staked by E. Boffa and associates during the summer of 1955 and sold to Vandoo Consol Explorations, Limited. During the summer of 1956 the claims were mapped geologically. The showings were once held by American Metals Limited; this company did some trenching and drilling on the property.

The three claims are underlain by rusty weathering, dark green basalts of the Coppermine River Group; the rocks strike about 30 degrees and dip at about 10 degrees to the northeast. The flows vary in thickness up to about 150 feet and have amygdaloidal tops. The rocks are cut by a fault striking at 310 degrees and dipping steeply. This fault has been traced for a number of miles. The showings consist of mineralized boulders found in the depression marking the position of the fault. Chalcocite occurs in amygdules along with malachite. In some boulders, chalcocite is observed in fractures with quartz and calcite. These boulders are scattered over an area in the depression measuring in length hundreds of feet. Drilling and trenching have apparently failed to locate the source of the material.

Nic Group (90)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheet 86-0-5.

The Nic group of claims is located about three miles southwest of the mouth of Burnt Creek and about one hundred and five miles northeast of Port Radium (or about 67° 18'N, 115° 45'W). The claims were staked by E. Boffa in 1955.

The claims are underlain by dark green, fine-grained basalts of the Coppermine River Group that strike about east and dip gently to the north. Flow tops are amygdaloidal with calcite, quartz, epidote, chlorite filling the amygdules. Showings occur in a fracture zone or fault that strikes northeasterly and dips vertically. The zone can be traced for about four thousand feet and is up to fifty feet wide. Lenses or veins of chalcocite, calcite, and quartz are erratically distributed along the zone. Such mineralized sections are up to twenty feet long and five feet wide; about a dozen of them were seen along a 1,500-foot length of the fracture zone.

DEPOSITS IN PHANEROZOIC ROCKS

Pine Point Mines, Limited (132)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 85-B-10, 85-B-15, 85-B-16.

Introduction

Pine Point Mines, Limited is controlled by Cominco, Limited. In 1960 the company held 1,015 claims covering an area about 34 miles long and 2 1/2 miles wide. The property is near the south shore of Great Slave Lake about 110 miles south of Yellowknife and 50 miles east of the settlement of Hay River at the terminus of the Mackenzie Highway. The claims extend from the Buffalo River in the west to a point near Great Slave Lake just south of Paulette Island in the east.

History

First reports of the lead-zinc showings at Pine Point were made by R. Bell (1902) who saw them in 1899. Apparently the showings were first found by Indians in the area and in 1897 claims were staked by prospectors. Interest lagged when it was discovered that the sulphides were not silver-bearing. There was some development in 1908 and 1914 but in 1920 a more extensive exploration program was initiated by Paine, Weber interests and J. Mackintosh Bell. In 1929 Northern Lead Zinc Company was formed and Ventures Limited and Cominco, Limited became associated with the enterprise. Dr. Mackintosh Bell directed a program which included sinking of a 90-foot shaft, 196 churn-drill holes at 50-foot centres around the main ore showings, and 47 diamond and churn hole drills in scattered

localities drilled for geological information and to test favourable areas. This work was stopped in 1930 but data available at that time indicated the presence of about 500,000 tons of lead-zinc ore. In 1936 Kidd (1936) pointed out the possibly significant spatial relations between the Pine Point mineralization and the projections of major Precambrian faults mapped by Stockwell (1936). Re-examination of the property and available data in 1940 by geologists of Consolidated Mining and Smelting Company of Canada (now Cominco Limited) suggested the possibility of extensive deposits in a large area beyond the previously explored block. In 1948 a concession for exclusive prospecting rights for a period of three years covering an area of about 500 square miles was granted to the companies by the Federal Department of Mines and Resources. The concession was granted subject to a number of conditions one of which was that a minimum of $50,000 be spent on exploration work in the first year and at least $75,000 during each of the following two years. The concession was terminated in 1951 and at that time over 1,000 claims were staked and a new company, Pine Point Mines, Limited, was incorporated. Exploration work on the claims continued until the summer of 1954. In 1955 the claims, having been surveyed, were leased. This work was financed by Cominco, Limited who control Pine Point Mines, Limited.

The work done between 1948 and 1954 consisted of geological studies, some geophysical surveys, a very large diamond-drill program and the sinking of two exploration shafts. One shaft was sunk to a depth of 40 feet, the other to a depth of about 160 feet. A few hundred feet of lateral work was done from this latter shaft. About 900 holes with a total footage of about 182,000 feet were drilled. A total of 2 1/4 million dollars, or $2,200 per claim was spent on this work (Telfer, 1955).

The initial drilling was done on a surveyed line cut roughly parallel to the strike of the faults in the Precambrian basin. Holes were drilled at mile intervals along this line. Then sections perpendicular to the base line were drilled off with holes spaced at about 1,000-foot intervals. These sections were at first 3 miles apart but were finally located 1 mile apart. Selected favourable areas were tested with a grid of holes at 1,000-foot centres and ore intersections were developed by holes spaced at from 50 to 200 feet apart. An area about 25 to 30 miles long and about 2 1/2 miles wide was explored in this manner.

The property was essentially inactive until about 1960 when the decision was made to put it into production. By 1964 a townsite had been constructed, a railway built to the Pine Point from Grimshaw, Alberta, by the Canadian National Railways at a cost of $86,000,000, orebodies prepared for open pit mining and a concentrator built. Production began in 1964. Recent company annual statements report reserves of indicated ore of 37,800,000 tons grading 2.9 per cent lead and 6.8 per cent zinc.

Geology

Most of the following information is from Campbell (1950); Lord (1951); Douglas (1959); and Norris (1965). For detailed description of the stratigraphy the reader is referred to the above papers.

Ore occurs in Middle Devonian rocks that outcrop in a northwest-trending belt in the Great Slave Lake region. The succession is very complex (Table XVIII) because of many rather abrupt facies changes due to differing depositional environments in Middle Devonian time. The Chinchaga Formation, the oldest Middle Devonian unit, occurs throughout the region and is typically light grey to brown anhydrite with minor amounts of brown or grey cryptocrystalline dolomite. South of Pine Point it includes a thin limestone and brecciated limestone member, the Hay Camp Member, near its base.

At Pine Point all Middle Devonian rocks above the Chinchaga strata are carbonate rocks in northwest-trending reefal carbonate buildup. The Pine Point Formation, the lowest unit, comprises a basal limestone that thins to the southwest and a fine-grained, granular, in part vuggy and petroliferous dolomite, or sandy earthy dolomite. These rocks are overlain by the Presqu'ile Formation comprising massive, coarse-grained vuggy recrystallized dolomite. These rocks are overlain by light brown stromatoperoidal limestones and argillaceous limestones of the Sulphur Point Formation or by brown, fine-grained stromatoporoidal limestones, fragmental limestones and grey argillaceous limestones of the Slave Point Formation.

Southeast of Pine Point, the Pine Point and Presqu'ile Formations grade to or interfinger with the Nyarling Formation in evaporite sequence that is composed essentially of gypsum with minor amounts of brown thinly bedded limestone. Northwest of Pine Point, toward the south shore of Great Slave Lake, the Pine Point strata consists of basal, fine-grained dolomite overlain by thinly bedded limestone, in part petroliferous, and interbedded nodular limestones and black bituminous shales which are followed by limy shales and brown, fine-grained limestone, petroliferous limestone and argillaceous limestone. These units interfinger and grade laterally with the dolomite at Pine Point. The Presqu'ile rocks at Pine Point are overlapped and in part grade to rocks of the Sulphur Point Formation at Great Slave Lake. The Sulphur Point is composed of brown stromatoporoidal limestone, argillaceous limestone and petroliferous sandy limestone.

The reefal rocks or carbonate buildup at Pine Point lies astride and along the southwest projection of the Macdonald fault system in the Precambrian rocks along the south shore of Great Slave Lake (Douglas, 1959). The position of the reef complex may, therefore, relate to topographic highs along these faults or to Devonian movement on these faults. The strata in the Pine Point area have a regional dip of about 20 feet per mile to the southwest. The strata, at Pine Point, are very gently folded about axes that strike about southwest. A few faults of about southwest trends are known to cut the Devonian strata.

Description of the Sulphide Deposits

Sulphides have been found over an area 22 miles long and 2 to 4 miles wide but outcrop in one locality only. All the sulphides, consisting of sphalerite, galena and marcasite, occur in the upper part of the Pine Point and in the Presqu'ile Formations. Most of the mineralization is in the coarse, vuggy replacement dolomites or reef core. Sulphides occur as disseminated grains, masses or veinlets replacing dolomite or calcite and lining the walls of open cavities. In the cavities or vugs, botryoidal and colloform

structures are common in the sulphides. Individual orebodies are irregular in outline and may occur as sheets, possibly localized in structural depressions, or as zones of greater thickness than width suggesting a vertical fracture control, or localization in solution or collapse structures. Orebodies may contain barren areas and there is every gradation between rocks with a few scattered grains of sulphide to rocks containing over 11 per cent combined lead and zinc. In the ore sections, lead-zinc ratios vary up to 1:4 but large tonnages have been outlined with ratios of 1:2. No silver or copper occurs in the ore. Apparently marcasite tends to concentrate around the margins of the sulphide zones as does elemental sulphur. The sulphides commonly occur in a poorly defined horizon near the base of the replacement dolomite or reef core but its upper boundary rises into higher levels as the amount of sulphides increase. The ore occurs, therefore, at surface and then down dip to a depth of about 400 feet. Campbell's summing of events (1957) is as follows: a stage of dolomitization of the reef core perhaps unrelated to deposition of ore minerals followed by recrystallization of most of the core and surrounding sediments resulting in dolomite that is bleached, coarse grained and composed of intergrown crystals. According to Campbell, "the process started with intensive shattering, followed by solution and redeposition of dolomite near fractures. Cavities were lined with freely terminating crystals, or completely filled with vein-like masses of white dolomite. The deposition of clear calcite in cavities or veins appears to have followed. Sphalerite, galena, and marcasite occur as disseminated grains, masses, or veinlets, replacing the dolomite and calcite and lining the walls of open cavities". Campbell believed that the dolomitization (which transgresses stratigraphic horizons) and the deposition of the ore are hydrothermal but mentions lack of conclusive evidence and suggested that meteoric waters could have been responsible for some of the solution and redeposition and deposition of sulphides.

The important factor is that the reef complex provided a very porous zone into which or through which solutions migrated and produced dolomites and deposited ore minerals. More work is required to determine whether such solutions were of hydrothermal or meteoric origin or were part of a diagenetic process and, therefore, whether the source of metals was the sedimentary pile or a distant magmatic source.

Conwest Exploration Company, Limited, Pine Point Claims (133)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 85-B-16, 85-B-10.

In the fall of 1955 Conwest Exploration Company, Limited staked about 500 claims in the Pine Point area. The A group, about 150 claims, was staked on the north side of the central part of the area held by Cominco, Limited and the remaining claims, the FS and B groups, were staked on the south side of the central part of the Cominco holdings. The claims are about 110 miles south of Yellowknife and about 50 miles east of the settlement of Hay River. The claims have since been allowed to lapse.

In 1956 a gravity survey of a reconnaissance nature consisting of several lines across the claims was completed. Some EM surveying was done with negative results. A broad, gentle, northeast-trending gravity high was found on the north group of claims. Twenty diamond-drill holes were drilled; all but one of the holes being on the north group of claims. Lead-zinc mineralization was encountered in two holes but closely spaced follow-up holes failed to intersect more mineralization. Up to 60 feet of coarse-grained replacement dolomite, possibly the Presqu'ile Formation, were encountered in the holes.

For a complete description of the geology in this area the reader is referred to the section on Pine Point Mines, Limited (see preceding section).

American Metals Company of Canada, Limited "A" Concession (134)

American Metals Company was granted the "A" Concession in the Pine Point area in 1948. The concession adjoined the concession of Cominco, Limited on the west. The "A" Concession's east boundary was for the most part less than a mile west of the Buffalo River. The concession was about 6 miles wide and extended south of the south shore of Great Slave Lake for approximately 11 miles.

The concession was held for about a year and during this time about 24 holes were drilled and geological studies were completed. A north-south section located very near the east boundary of the property was drilled. The concession was dropped and no further work was done presumably because of discouraging results. Most holes intersected varying thicknesses of coarse recrystallized dolomite of the Presqu'ile Formation at depths of over 300 feet and were stopped at the base of that formation.

For a description of the geology of the area and list of references the reader is referred to the section on Pine Point Mines, Limited.

Windy Point Mining Company, Limited (136)

References: Department of Indian Affairs and Northern Development, Mineral Claim Sheets 85-G-12, 85-F-8, 85-F-9, 85-G-5.

Windy Point Mining Company, Limited in 1955 staked 1,015 claims near the west shore of Great Slave Lake west of Caribou Point, Sulphur Bay and Windy Bay and around Falaise and Prairie Lakes and east of Boulogne Lake. Associated companies and individuals staked an additional thousand claims in the area. The ground is about 30 miles north of the settlement of Hay River and 75 miles southwest of Yellowknife. The claims were staked to cover a large area to be explored for lead-zinc mineralization of the Pine Point type.

Late in 1955 and during the spring and summer of 1956 a program consisting of geological mapping, some geochemical prospecting, and a large amount of diamond drilling was completed. The area covered by the claims was mapped geologically at 1/2 mile to the inch. Large areas were prospected using geochemical methods and testing soil samples. About 120 diamond-drill holes with a total footage of 20,000 feet were drilled. Most holes were

short and were drilled just to the base of the Presqu'ile Formation. A number of sections were drilled off with vertical holes at about 1,000 foot centres.

In 1956, 430 claims of the original group of one thousand were allowed to lapse. The remaining 577 claims were in two separate groups, one in the north part of the original block between Jones Point and Prairie Lake and the other in the south on Windy Point and south of Windy Bay. These claims have since been allowed to lapse.

Lead-zinc mineralization was cut in a number of holes but economically significant intersections were rare and closely spaced drilling failed to outline mineralized zones of any significant size.

The geology of the area is similar in many respects to the geology of the Pine Point area (see Table VIII). The claims are underlain by rocks of the Pine Point and Presqu'ile Formations. Most of the mineralization occurs in the Presqu'ile.

The following description of the Presqu'ile Formation is from Douglas (1959). The basal beds consist of thick bedded, fine-grained, granular, brown, vuggy dolomite. Massive, medium to coarsely crystalline, vuggy dolomite, locally with bitumen and oil in pore spaces overlie the above rocks in thicknesses varying from 0 to 150 feet. The eastern contact with the Pine Point Formation is irregular due to erosion but the western contact of the Presqu'ile near Prairie Lake is linear and suggests a reef front. South of Prairie Lake thin bedded, rubbly, medium grey, argillaceous and fossiliferous limestones flank the reef front and strike northerly and dip 15 degrees away from the front. South of Windy Bay, massive, coarsely crystalline, vuggy, petroliferous, brown dolomites of the Presqu'ile Formation are overlain and grade laterally into thinly and evenly bedded, fine-grained and cryptocrystalline limestones that are partly nodular and stromatoporoidal.

The rocks around the reef front strike north which is a divergence from the regional northwest strike. The rocks dip gently to the west. According to D.C. Malcolm (pers. comm.) there is evidence that the strata are gently folded into northeast-trending folds. There is no evidence of major faulting on the property but a number of minor faults are found cutting the Paleozoic rocks. These faults strike west-northwest and west and have small displacements.

Most of the sulphide mineralization occurs in the coarse replacement dolomites in the reef structure. Galena and sphalerite are found as isolated crystals, in seams, as disseminated grains or irregular patches in the coarse dolomite, or as veinlets in brecciated fine-grained dolomite. Pyrrhotite and chalcopyrite are sometimes associated with the other sulphides. In all the formations pyrite, galena and sphalerite are sometimes found as replacements of calcite-filled fossils. Sulphides are disseminated through the coarse portions of the Presqu'ile Formation but no concentrations of economic interest were outlined by the drilling.

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