



GEOLOGICAL
SURVEY
OF
CANADA

DEPARTMENT OF ENERGY,
MINES AND RESOURCES

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PAPER 68-68

THE MINERAL INDUSTRY OF YUKON TERRITORY AND
SOUTHWESTERN DISTRICT OF MACKENZIE
1967

D. C. Findlay



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Available by mail from the Queen's Printer, Ottawa,

from Geological Survey of Canada,
601 Booth St., Ottawa,

and at the following Canadian Government bookshops:

HALIFAX
1735 Barrington Street

MONTREAL
Æterna-Vie Building, 1182 St. Catherine Street West

OTTAWA
Daly Building, Corner Mackenzie and Rideau

TORONTO
221 Yonge Street

WINNIPEG
Mall Center Building, 499 Portage Avenue

VANCOUVER
657 Granville Street

or through your bookseller

Price: \$2.00

Catalogue No. M44-68-68

Price subject to change without notice

The Queen's Printer
Ottawa, Canada
1969

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ABSTRACT

This report summarizes developments in the mineral industry of Yukon Territory and southwestern District of Mackenzie, during 1967.

During the period 1964-1966 the value of Yukon mineral production declined from \$15.2 million to \$11.3 million, but this trend was reversed in 1967 when the value of production increased to about \$15.5 million (preliminary figure). This increase was mainly due to the introduction of two new producing mines into the economy - the Little Chief Mine of New Imperial Mines Limited near Whitehorse and the Clinton Mine of Cassiar Asbestos Corporation Limited west of Dawson. Additional revenue was also generated due to higher prices for silver realized by United Keno Hill Mines Limited from its silver-lead-zinc operations at Elsa.

In lode exploration the Yukon recorded an active year in 1967. Exploration activity was distributed more widely throughout the Territory rather than being heavily concentrated in the Anvil-Vangorda district as was the case in 1965 and 1966. However, the Anvil district continued to receive attention, in part spurred by the announcement early in the year that Anvil Mining Corporation Limited would bring its large-tonnage Faro lead-zinc deposit into production by the fall of 1969. This company began extensive pre-production work on the Faro deposit in 1967.

Placer gold production decreased from 52,953 crude ounces in 1966 to about 11,837 crude ounces in 1967. This decrease was entirely due to the termination of the Yukon Consolidated Gold Corporation's Klondike dredging operations in the fall of 1966. Total recorded production from smaller company operations and from individual miners was slightly greater in 1967 (11,345 crude ounces) than in 1966 (11,050 crude ounces).

MINERAL INDUSTRY OF YUKON TERRITORY
AND SOUTHWESTERN DISTRICT OF MACKENZIE, 1967

INTRODUCTION

This is the seventh in a series of annual reviews of Yukon mineral industry published by the Geological Survey since 1961. For reference material on past developments in Yukon mineral industry readers are referred to Annual and Summary Reports of the Geological Survey from 1898 through 1933. Although most of the original earlier reports are now out of print many of them have been collected in a single volume (Bostock, 1957) which is available. Mineral industry records for the period 1934 to 1940 are contained in reports by Bostock (1935, 1936b, 1937, 1938, 1939 and 1941). Reports in the present series were compiled by Skinner (1961, 1962); Green and Godwin (1963, 1964); Green (1965, 1966); and Findlay (1967).

The information in this report was obtained from visits to properties, from discussion and correspondence with individuals and companies, from releases in various newspapers and trade journals, and from reports of the Department of Indian Affairs and Northern Development Mining Recorders at Dawson, Mayo, Watson Lake and Whitehorse.

Acknowledgments are extended to individuals and companies engaged in mining and mineral exploration in the Yukon Territory and to members of the Department of Indian Affairs and Northern Development. Their co-operation in providing information has greatly facilitated the preparation of this report.

Project 540052

Manuscript received: 19 November 1968
Author's address: Geological Survey of Canada
Box 969
Whitehorse, Yukon Territory

TRANSPORTATION FACILITIES

Whitehorse, the capital is the principal distribution centre in the Yukon Territory and is supplied mainly by ship and rail from Vancouver via Skagway (White Pass and Yukon Route) and by truck and air from Vancouver and Edmonton. Scheduled commercial air flights provide daily connections with Vancouver and Edmonton (Canadian Pacific Airlines) and with Alaska (Wien Air Alaska Airlines). Thrice-weekly to daily bus schedules (Canadian Coachways Limited) operate within the Yukon Territory and connect to Edmonton and Vancouver via Dawson Creek, B.C.

The principal Yukon municipalities - Watson Lake, Whitehorse, Mayo, and Dawson - are linked by all-weather secondary roads that provide the basic transportation framework. The system includes three principal routes; the Alaska Highway (Watson Lake-Whitehorse-Alaska), the Whitehorse-Mayo-Keno road, and the Stewart Crossing-Dawson road. An alternate route, connecting Watson Lake with the Whitehorse-Mayo road at Carmacks via the settlement of Ross River, is under construction. Various lesser access roads link the main traffic network with smaller settlements and mining centres. Both the Federal Government and the Territorial Government participate in construction costs of access roads for mining, forestry and agriculture purposes.

Fixed-wing aircraft are available for charter at Whitehorse, Watson Lake, Dawson, and (intermittently) Mayo and Ross River. Helicopters are based in Whitehorse, Ross River (summer) and Watson Lake.

In Table I, comparative transportation costs are listed for facilities available in the Territory.

MINERAL PRODUCTION OF YUKON

In 1967, as in past years, the mineral industry formed the principal economic base of Yukon. Table II lists production figures for 1965 to 1967 inclusive, as well as cumulative totals to the end of 1967. The data of Table II show that the trend of declining mineral production which actually began during the 1964-65 period (not shown in Table II) reached a low in 1966 and in 1967 began a sharp upward turn with total values increasing from about \$11.3 million in

TABLE I

Representative Transportation Costs for Yukon Territory, 1967

RAIL AND BOAT (container ship every 2 weeks)

Ore and concentrates - Whitehorse to North Vancouver
Commodity rate on 30,000 lb. carloads

Lead or zinc concentrates.....\$16.00 per ton
Asbestos fibre..... 17.00 per ton

Mining equipment and related supplies - North Vancouver to
Whitehorse - Commodity rate on 10,000 lb. carloads¹

Machinery.....\$ 2.75
Petroleum products..... 3.15
Drilling mud, building materials..... 2.90

TRUCK

Basic rates, Whitehorse from Edmonton and Vancouver

Pounds.....	100	5,000	10,000
From Edmonton			
(dollars per 100 lb.).....	7.25	5.50	5.35
From Vancouver			
(dollars per 100 lb.).....	8.23	6.90	6.38
(Commodity rates in effect for many items)			
(Backhaul rates considerably less)			

BUS - (3 times per week, daily in the summer)

Express rates, Whitehorse from Edmonton and Vancouver

Pounds.....	1-2	2-10	10-20	40-50	90-100
From Edmonton					
dollars.....	2.05	2.55	3.40	6.40	11.35
From Vancouver					
dollars.....	2.65	2.85	4.00	7.85	14.20

¹per 100 lbs.

TABLE I (cont.)

AIR - (daily)

Air express and air freight, Whitehorse from Edmonton and Vancouver

	Edmonton to Whitehorse	Vancouver to Whitehorse
Air express		
minimum.....	\$ 4.00	\$ 4.00
dollars per pound.....	.43	.43
Air freight		
minimum.....	5.25	5.25
dollars per pound.....	.21	.21
dollars per 100 pounds	18.00	18.00

CHARTER AIRCRAFT

Type	Rate per hour	Rate per mile
Fixed Wing		
Cessna.....	\$ 65.00	\$ 0.55
Beaver.....	80.00	0.80
Aztec.....	110.00	0.60
Otter.....	120.00	1.20
DC-3.....	200.00	1.30
Helicopter		
Bell 47G-2.....	\$110.00 (fuel and oil included)	
Bell 47G3-B1.....	140.00 (fuel and oil included)	
Hiller 12E.....	135.00 (fuel and oil included)	
Bell Jet Ranger (4 passenger jet heli- copter)	225.00 (fuel and oil included)	
	(rate per mile not applicable)	

1966 to about \$15.5 million in 1967¹.

Four principal factors have influenced the change in total value of mineral products between 1966 and 1967. These are: the termination of the Yukon Consolidated Gold Corporation Limited's Klondike placer operations, representing a loss of about \$1.5 million; the effect of initial copper-gold-silver production (commencing May 1, 1967) from the Little Chief

¹Preliminary figure

Mine of New Imperial Mines Limited, representing an increase of about \$4.4 million; the effect of minor asbestos production from Cassiar Asbestos Corporation Limited's Clinton Mine representing an increase of \$0.5 million; and, a significant increase in the average price obtained for silver from United Keno Hill Mines Limited silver-lead-zinc producing operations at Elsa (\$1.78 Canadian in 1967 against \$1.39 Canadian in 1966).

It is expected that the total value of Yukon mineral industry products should show a significant increase in 1968, when the full effects of production from New Imperial Mines Limited (about \$8 million) and the Clinton Mine (about \$14 million) will be felt in the economy. However, increases due to these factors may be partly offset by the anticipated decrease in production from United Keno Hill Mines Limited which will be operating at a level of about 50,000 tons per year, or approximately half of the 1967 level. Some additional revenue may also be anticipated in 1968 from two small silver-gold operations currently readying for production - Arctic Gold and Silver Mines Limited near Carcross and Mount Nansen Mines Limited west of Carmacks. In 1969, the value of Yukon mineral production should increase very substantially due to the impact of production from Anvil Mining Corporation Limited's Faro lead-zinc deposit northwest of Ross River. Annual sales from this operation should be approximately \$55 million when full production is achieved.

PLACER MINING AND EXPLORATION - YUKON

Yukon placer gold production for 1967 with comparative figures for 1966 is summarized in Table III. Production in 1967 decreased from the 1966 level by 41,116 ounces of crude gold, due almost entirely to the termination of the Yukon Consolidated Gold Corporation Limited's Klondike operations in late 1966. The number of smaller, individual operators producing more than 30 ounces increased from 22 to 25 (excluding the Yukon Consolidated Gold Corporation Limited) and the total production of these operators increased slightly in 1967 relative to 1966 (11,166 ounces and 10,753 ounces respectively¹). Some operators experienced problems with low water conditions in the creeks but these problems were not as serious as those experienced in the extremely dry summer of

¹excludes miscellaneous production of Table III

TABLE II

Mineral Production of Yukon Territory¹

Product		1965	1966 ²	1967 ³	Cumulative Total (1886 to 1967 inclusive)
Gold	fine oz.	45,031	43,466	17,474	11,113,644
	\$	1,698,975	1,639,103	659,644	262,073,667
Silver	fine oz.	4,615,995	4,194,580	3,894,644	150,049,398
	\$	6,462,393	5,868,217	6,917,435	128,464,059
Lead	lb.	17,851,309	15,975,125	15,469,569	496,972,587
	\$	2,766,953	2,386,684	2,274,027	55,457,413
Zinc	lb.	13,247,653	11,450,510	10,872,074	251,485,073
	\$	2,000,396	1,729,027	1,337,265	33,701,532
Cadmium	lb.	138,918	118,735	128,269	2,765,013
	\$	386,192	306,336	371,980	5,503,288
Copper	lb.			7,314,203	21,686,488
	\$			3,454,989	6,556,772
Tungsten	lb.				32,169
	\$				27,499
Platinum	fine oz.				19 ⁴
	\$				1,553
Coal	tons	8,801	5,670	3,000	279,825
	\$	85,626	46,390	21,000	2,572,341
Asbestos	tons			3,000	3,000
	\$			513,000	513,000
Totals		13,400,535	11,975,757	15,549,340	494,871,124

¹Figures from Dominion Bureau of Statistics (1957; and later releases).

²Revised figures for 1966, Dominion Bureau of Statistics.

³Preliminary figures from Dominion Bureau of Statistics (January, 1968), modified by recent data on 1967 Yukon mineral production.

⁴Produced in 1960.

TABLE III

Yukon Placer Gold Production, 1967 and 1966

District	Area	Number of Operators*		Approximate production of crude gold (ounces)	
		1967	1966	1967	1966
Dawson	Klondike	15	14	8,213	50,540**
	Sixtymile River	3	1	350	-
	Kirkman Creek, Stewart River	1	2	350	677
Mayo	Haggart Creek, Dublin Gulch	2	2	943	1,017
	Hight Creek, Johnson Creek	2	2	1,129	1,100
	Thunder Gulch	1	-	113	-
Whitehorse	Kluane Lake	2	2	560	322***
Miscellaneous Production (various areas) (10)				179	297
Totals		26	23	11,837	52,953

*With production greater than 30 ounces

**Includes 41,903 ounces produced by the Yukon Consolidated Gold Corporation. In 1967 this company recorded a production of 492 ounces from miscellaneous clean-up operations.

***Records incomplete.

1966.

Placer exploration in 1967 was confined principally to testing of new ground presently held by producing operators. On Gold Run Creek in the Klondike area, Consolidated Mines (Yukon) Limited began a major ditching operation to provide drainage for mining a stretch of virgin ground on the lower part of the creek. Also in the Klondike area Ballarat Mines Limited did some test drilling on its holdings on Quartz and Dominion Creeks. In Mayo area, Spruce Creek Placers Limited was occupied during most of the 1967 season in digging a long drainage ditch to allow access to new ground on Haggart Creek.

LODE MINERAL EXPLORATION IN YUKON

Exploration activity in 1967 continued at a relatively strong pace; however unlike 1966, efforts were not as exclusively focussed in the Anvil Range lead-zinc area but were dispersed more uniformly over other parts of the territory.

As in recent years, the Whitehorse Mining District continued the most active in the territory with exploration and property development programs concentrated in Dawson Range, Kluane, White River, Whitehorse Copper Belt, Anvil Range and Carcross-Wheaton River areas. In the Dawson Range area, Casino Silver Mines Limited continued surface exploration and diamond drilling on its Casino-Canadian Creek silver-lead property, and Canex Aerial Exploration Limited did additional diamond drilling on its copper-molybdenum prospect on Granite Mountain and did surface work on the nearby Tinta Hill silver-lead showing. West of Carmacks, Mount Nansen Mines Limited began an extensive underground development program on its Webber and Heustis silver-gold properties, with a view to bringing them into production in mid-1968. In Kluane Range, Newmont Mining Corporation Limited continued surface exploration and diamond drilling of its optioned copper prospect near Quill Creek and also carried out a helicopter-supported regional geochemical soil sampling program in this part of Kluane area. Geophoto Services Limited carried out helicopter supported primary exploration programs in various parts of Kluane and White River areas.

In Upper White River area, Silver City Mines Limited triggered a staking rush late in the season following discovery of a new copper showing on its Marc Group property. Downriver from the Silver City property Discovery Mines Limited continued surface exploration, including bulldozer trenching and diamond drilling, on the old Canalask Nickel property, and announced interesting new ore intersections. In the Whitehorse Copper Belt, New Imperial Mines Limited brought its Little Chief open-pit mine into production in May, 1967 and continued surface exploration of its other copper deposits in the area. Late in the 1967 season and early in 1968, interest in the Copper Belt was spurred by staking of new ground by several companies, on both sides of Yukon River near Whitehorse. To the south, in Wheaton River-Carcross areas Yukon Antimony Corporation Limited carried out surface exploration and limited diamond drilling on its Skukum Creek copper prospect and International Mine Services Limited, acting as operator for several companies, did additional work on the Tally Ho Gulch silver-gold property and on several other properties in the area. On Montana Mountain south of Carcross, Arctic Mining and Exploration Company Limited (now Arctic Gold and Silver Mines Limited) announced that it would bring the Arctic Caribou (Big Thing) silver-gold property into production in mid-1968 and continued underground development work and surface mine facilities construction directed toward this end. Downhill to the north from the Arctic Caribou property, International Mine Services rehabilitated part of the 2300-foot tunnel on the old Peerless property (down-dip extension of the Arctic Caribou vein system) and began new underground exploration of this silver-gold prospect. On Windy Arm of Tagish Lake, Venus Mines Limited continued underground exploration of the Venus vein system of the old Conrad gold-silver camp.

Northeast of Whitehorse, extensive exploration continued in the Anvil Range lead-zinc belt and in the adjacent Glenlyon area to the northwest. Anvil Mining Corporation Limited announced early in 1967 that it would bring its 63 million-ton Faro lead-zinc deposit into production early in 1969 and began surface stripping of the orebody and mine and mill construction programs. The company also continued surface exploration, including diamond drilling on its numerous other holdings in the Anvil Range area. Southeast of the Faro deposit, in Swim Lakes area, Kerr Addison Mines Limited carried out a limited drilling program early in the 1967 season. Fifty miles to the northwest of the Faro deposit, in

the Detour Lakes area along Tintina Trench, Glenlyon Mines Limited continued surface exploration, including bulldozer trenching, on its extensive holdings in this area. General Enterprises Limited of Whitehorse, constructed a 70-mile tote-road from Pelly Crossing to its claims adjacent to the Glenlyon Mines Limited property and did limited exploration and prospecting of its holdings there.

The principal development in Dawson Mining District in 1967 was the commencement of asbestos production in October from the Clinton Mine of Cassiar Asbestos Corporation Limited. Elsewhere activity was not great, but Selwyn Explorations Limited staked and did initial prospecting of magnetite occurrences near Shell Creek north of Dawson and Sphere Development Company Limited continued exploration for asbestos in Fortymile area. In the Klondike area Orekon Limited carried out extensive bulldozer trenching on its claims on the east flank of King Solomon Dome, and uncovered numerous quartz veins carrying minor silver-lead mineralization.

Activity in the Mayo Mining District was spurred early in the 1967 season by the discovery of a new copper-cobalt show east of Bonnet Plume River by Bonnet Plume River Mines Limited. Also in the northern part of the district, Pacific Giant Steel Ores Limited carried out a diamond drilling program on its Bear River iron prospect. In the Elsa area, a combination overburden and diamond drilling program carried out by United Keno Hill Mines Limited resulted in the discovery of a new ore zone (Husky) located on the south edge of McQuesten Flats near the Elsa school. The company also continued surface exploration of its claims on Mount Hinton, southeast of Elsa. Across McQuesten valley from Keno Hill, Foley Silver Mines Limited carried out a limited underground exploration program on its Stand To Hill silver-lead prospect.

Exploration activity in the Watson Lake Mining District in 1967 was focussed mainly in the Cassiar Mountains, southeast Pelly Mountains, Ketz River, Pelly Lakes, McPherson Lake and MacMillan Pass areas. In the Cassiar Mountains, Pure Silver Mines Limited carried out additional underground exploration on its Logjam Creek silver-lead property. In Ketz River area, Stump Mines Limited completed a bulldozer trenching and diamond drilling program on its newly-discovered 'A-1' zone silver-lead vein and announced plans for underground work on the prospect. Southeast of Ketz River along Tintina Trench, Northlake Mines Limited continued surface exploration

and some diamond drilling on its several blocks of ground between Pelly and Hoole Rivers. To the west, in southeast Pelly Mountains, Canol Mines Limited carried out geochemical surveys, and trenching and diamond drilling programs on its silver-lead property east of Lapie Lakes on the Canol Road. Atlas Explorations Limited continued last year's regional exploration program in the general Four Corners area (105 G* - Finlayson Lake; 105 J - Sheldon Lake; 105 I - Nahanni; 105 H - Frances Lake) and in addition carried out detail operations on several properties, notably Pike Group (geochemistry and geophysics), Pay Group near Fortin Lake (trenching, diamond drilling) and Fyre Lake property (diamond drilling). East of these general areas Spartan Explorations Limited operating from a base camp at McPherson Lake carried out an aircraft- and helicopter-supported regional exploration program in the Tillei-Tustles Lakes area north of Frances Lake. This program outlined several molybdenum and scheelite occurrences that will be further investigated in 1968. North of Itsi Range, in MacMillan Pass area near the Yukon-Northwest Territories border, Hudson Bay Exploration and Development Company Limited carried out an extensive diamond drilling program on its Tom Group lead-zinc property.

*Refers to National Topographic Series index system. Each numbered and lettered sheet (e.g. 105 G) comprises a 4 mile to 1 inch scale map.

TABLE IV

Mineral Claims Recorded, Yukon Territory
(Figures supplied by Department of Indian
Affairs and Northern Development)

Mining District	1963	1964	1965	1966	1967
Dawson	283	48	441	738	220
Mayo	347	607	1026	706	680
Watson Lake	1046	349	690	4828	2183
Whitehorse	1052	1819	5456	11666	4295
Total	2728	2823	7613	17938	7378

MINERAL PRODUCTION AND EXPLORATION
NAHANNI MINING DISTRICT, DISTRICT OF MACKENZIE

Operations at the only producing mine in Nahanni District, Canada Tungsten Mining Corporation Limited, were severely curtailed in 1967 due to a serious fire which destroyed the mill and concentrator plants in late December, 1966. The destroyed facilities were rebuilt in 1967, but production of concentrates was not resumed until December. During the last month of the year 13,380 stu* W₀₃ and 49,030 pounds of copper were produced from 7,778 tons of ore treated.

Elsewhere in Nahanni District, Cyprus Mines Corporation continued surface exploration of its optioned Lucky Lake lead-zinc property, about 40 miles southeast of the Canada Tungsten Mine. In MacMillan Pass area, northeast of the Hudson Bay Exploration and Development Company Limited Tom Group, American Metal Climax Incorporated did surface exploration on a tungsten property previously investigated by Southwest Potash Corporation in 1963 and 1964.

During 1967, 1065 mineral claims were recorded in the district, an increase of 721 from 1966. The Mining Recorder's office for the district is in Watson Lake, Yukon.

*short ton unit = 20 lb.

OIL AND GAS EXPLORATION, YUKON TERRITORY

For the first year since 1963 interest in oil and gas was renewed in the territory and a total of 6 holes were drilled in 1967 in three different areas, and another well was collared early in 1968. In northeast Peel Plateau area, just south of the Yukon-Northwest Territories border, Shell Oil Limited drilled three holes to depths ranging from 2,500 to 5,100 feet. In Eagle Plains area of north-central Yukon (Porcupine Basin) Canoe River Explorations Limited drilled one well to a depth of 4,740 feet, about 3 miles northeast of the original Western Minerals Chance No. 1 well that encountered significant gas and minor oil when it was drilled in 1959-60. The new hole in this area was collared late in 1967 and completed in early 1968. Following its completion the company moved the drilling rig about 6 miles to the east and began a second well in February, 1968. The company also

carried out an extensive seismic survey program in Eagle Plains area in 1967. In southeast Yukon, Scurry Rainbow Oil Limited and North Valley Resources Limited spudded in a well located near Garden Creek about 15 miles northeast of Watson Lake in December, 1967. This hole was completed to a total depth of 3,750 feet in January, 1968.

WORK BY THE GEOLOGICAL SURVEY DURING 1967 IN
YUKON AND SOUTHWEST DISTRICT OF MACKENZIE

In 1967, The Geological Survey continued its program of reconnaissance geological mapping for publication on a scale of 1 inch to 4 miles. In addition, work was continued on various projects of a more specialized nature, including investigations into glacial features and glacial history of parts of Yukon (O.L. Hughes, J.T. Gray, V.N. Rampton and N.W. Rutter) investigations of a volcanic-sedimentary complex straddling the Yukon-British Columbia border (M.B. Lambert) and studies of Yukon ultramafic rocks (D.C. Findlay). A new project was initiated in 1967 to determine the detailed stratigraphic and structural relations of the sedimentary and volcanic rocks of the Anvil Range area, with the objective of defining the geological setting of the lead-zinc deposits of this area (D.J. Tempelman-Kluit). The following brief summaries of work carried out by the Survey in 1967 are taken, in part, from Geological Survey of Canada Paper 68-1, Part A.

COAL RIVER AREA (95 D)

H. Gabrielse completed reconnaissance geological mapping of the Coal River area in southeast Yukon. The work showed that rocks of the eastern part of adjacent Watson Lake area, chiefly black, green and maroon shale and slate, conglomerate, grit, quartzite and argillite, all of probable Proterozoic age (unit 1, Gabrielse 1967), continue into Coal River area to near Coal River. Elsewhere in the area, a variety of sedimentary and subordinate volcanic assemblages ranging in age from Proterozoic to Carboniferous were mapped. In parts of the area, notably between Coal River and Rock River, westerly dipping strata are sliced by easterly-directed thrust faults. Intrusive rocks are sparse, but two small quartz diorite stocks occur in the extreme northeastern part of the map area.

Mineralization noted in mapping included barite in concretions in shale northwest of Last Mountain (60°47.5'N, 126°41'W), and minor chalcopyrite and malachite in Proterozoic (?) volcanic rocks west of Toobally Lakes and north of Spruce Creek and in Middle Ordovician volcanic rocks east of upper Rock River and west of Caribou River.

SEKWI MOUNTAIN (105 P) AND NAHANNI (105 I) AREAS
DISTRICT OF MACKENZIE AND YUKON TERRITORY

S.L. Blusson completed 4-mile reconnaissance mapping in Sekwi Mountain and Nahanni map-areas. Proterozoic rocks of Frances Lake area (unit 1, Blusson 1966), chiefly varicoloured shale and slate, phyllite, grit, quartzite and conglomerate, are represented in Nahanni area by a section 8 miles east of Mount Pike that contains the oldest strata recognized to date in Selwyn Mountains. A thin limestone-quartzite-boulder and cobble conglomerate near the base of the section is similar to part of the middle section of the Rapitan Group in Mackenzie Mountains to the northeast.

AISHIHIK (115 H), SNAG (115 J and K) AND
PART OF STEWART RIVER (115 N) AREAS

L.H. Green carried out spot reconnaissance work in parts of Aishihik, Snag, and Stewart River areas in preparation for a future helicopter-supported 4-mile mapping project. The principal objective of this initial work was to determine a basis for subdivision of Yukon Group metamorphic rocks that would be useful in later 4-mile mapping. From the 1967 work it was concluded that throughout much of the area, Yukon Group rocks could be subdivided approximately as suggested by Cockfield (1921):

1. 'Pelly gneiss' - principally quartz-feldspar-biotite and feldspar-hornblende gneiss
2. 'Klondike schist' - strongly foliated, white to light green, quartz-mica schist
3. 'Nasina series' - metamorphic rocks formed through alteration of sedimentary rocks, especially quartzite

4. 'Amphibolite' - amphibolite and related rock types, usually only of local distribution

No new unequivocal evidence bearing on the age of Yukon Group rocks was found. The metamorphic rocks are locally overlain by sedimentary and volcanic rocks of probable Mesozoic age that have been intruded by granitic rocks of probable Cretaceous age. Post-granitic rocks include basic to acidic volcanics and associated sedimentary rocks, chiefly conglomerate, sandstone and shale. No mineral occurrences, other than known showings such as the Casino silver-lead prospect near Casino Creek were noted during the 1967 work.

AISHIHIK LAKE AREA (115 H)

O.L. Hughes completed reconnaissance mapping of surficial geology of Aishihik Lake area in 1967. Evidence indicating two major stages of advance of the Cordilleran ice sheet and a third, less well defined advance was confirmed. The limits of the latest Wisconsin McConnell advance were traced across the area and local evidence was found that indicates significant readvance of this stage. The earlier, more extensive Reid advance of the Cordilleran ice sheet is defined by modified ice-marginal features and in the northern part of the area it appears to be the maximum limit of glaciation. Evidence of the older (Klaza and/or Nansen) advance defined by Bostock (1966) in Carmacks and McQuesten areas to the north was not recognized in Aishihik area, but local, well-preserved moraines lying between the McConnell and Reid limits indicate a third, intermediate advance that is not represented in Carmacks and McQuesten areas.

SNAG-KLUANE AREAS

(115 J and K (East Half), 115 G and F (East Half))

V.N. Rampton completed surficial geology field work west of Donjek River between St. Elias Mountains and the limit of glaciation. Techniques for quantitative description of moraines and for relating slope to age were used in determining the chronology of glacial advances. Neoglacial moraines adjacent to the snouts of Klutlan and Natazhat glaciers were dated by lichenometry and dendrochronology.

N.W. Rutter carried out morainal studies of the Bighorn and Grizzly glaciers in Donjek Range southwest of Kluane Lake and about 40 miles east of Steele Glacier. The purpose of this work was to determine characteristics of glacial deposits related to modern 'normal' (Grizzly) and 'surged' (Bighorn) glaciers so that such characteristics might be recognized and interpreted in the glacial record. The work showed that the moraine of the 'surged' Bighorn glacier is characterized by a thin, discontinuous and irregular drift mantle, whereas that of the 'normal' Grizzly glacier has an irregular, continuous and relatively thick mantle of drift. An additional characteristic was revealed by fabric analysis of tills in moraines of the two glaciers. In the Bighorn moraines, pebbles from undisturbed till a few feet above bed-rock in the valley floor showed little preferred orientation compared to those of the Grizzly moraines, and such orientation as is present is not in the direction of glacier flow. On the other hand, in the Grizzly moraines pebble orientation is parallel or nearly parallel to the flow direction. Texture analyses of till from moraines of both glaciers indicate that the matrix of Bighorn till is coarser-grained than the matrix of Grizzly till.

DAWSON (116 B (East Half)) and NASH CREEK (106 D) AREAS

J.T. Gray studied mass-wasting effects in selected areas in Ogilvie Mountains (Tombstone area) and Wernecke Mountains (Bear River area). The purpose of these studies is to assess rates of mass movement by rockfall, avalanche and creep processes in steep slope environments. The work consisted of recording avalanche and rockfall occurrences, measuring and instrumenting talus cones and rock glaciers to determine rates of movement, deployment of sample nets to catch annual rockfall debris, and mapping of periglacial and glacial phenomena. During the course of field work, sulphide mineralization was noted in several localities. In Nash Creek map-area chalcopryrite, azurite, and malachite were noted on joint surfaces of rock slabs in talus cones at two places. In one, (64°45'N, 134°15'W) mineralization was noted in a number of places within an area about 2 miles by 2 miles. The other occurrence (64°48'N, 134°15'W) was a single locality. Galena was observed on fracture surfaces of rock fragments (syenite) in talus cones in two adjacent valleys at about 64° 25'N, 138°34'W in the Tombstone area. In each case, mineralization was noted on 3 or 4 fragments.

WHEATON RIVER (105 D/5) AREA

M.B. Lambert continued detail studies of Skukum Group volcanic and associated rocks in Wheaton River area and in adjacent Homan Lake (104 M/14) area in British Columbia. The Skukum rocks form a distinctive sequence enclosed by Coast Intrusion granitic rocks that occur within a circular area about 12 miles in diameter near the head of the West Arm of Bennett Lake. The sequence includes a variety of volcanic breccias and tuffs, ignimbrites, granitic boulder conglomerates, granitic-fragment breccias, pebbly sandstone, tuffaceous sandstone and siltstone. Around its eastern periphery a nearly-vertical 300- to 1,500-foot-thick arcuate porphyritic rhyolite dyke occurs. The dyke was probably emplaced along a ring-shaped fracture system.

GEOLOGIC SETTING OF THE FARO, VANGORDA AND
SWIM BASE METAL DEPOSITS, ANVIL RANGE AREA
(contributed by D.J. Tempelman-Kluit)

This report summarizes data published in greater detail elsewhere (Tempelman-Kluit, 1968). The 1967 field season was spent examining the geology of the Anvil Range with particular regard to the stratigraphy and relations of the rock units that are the hosts of the Faro, Vangorda and Swim Lakes massive sulphide deposits.

Anvil Range is underlain by a thick sequence of Paleozoic strata that is intruded by Mesozoic granitic rocks forming the Anvil Batholith. The Paleozoic sequence is similar to that found elsewhere in the Selwyn basin and is dominated by thick sections of Cambrian phyllitic rocks, Devonian-Mississippian clastic rocks and Pennsylvanian volcanic strata. Angular unconformities of regional extent occur at the base of the Devonian-Mississippian and Pennsylvanian sequences. The 'unit 7' host rocks of the mineral deposits, (Roddick and Green, 1961) formerly thought to be Mississippian or younger, are now considered of Cambrian age and are correlative with Cambrian strata found over a large area south and southeast of Anvil Range. Thin sequence of Ordovician-Silurian and Siluro-Devonian strata are preserved locally beneath unconformities. The aggregate thickness of Paleozoic strata in Anvil Range is in the order of 15,000 feet. Late Paleozoic alpine-type ultramafic intrusions occur along an important fault immediately north of, and parallel to, Tintina Trench. The fault brings

rocks correlated with the Proterozoic "Grit Unit" in contact with Pennsylvanian volcanic rocks. A late Paleozoic conglomerate wedge, up to 2,000 feet thick, overlies the Proterozoic strata and is thought to have formed at the foot of the fault scarp.

The Cambrian phyllitic rocks which contain the mineral deposits were deformed probably in pre-Silurian time by transposition on a well developed crenulation foliation. Younger rocks are only moderately deformed.

The internal stratigraphy of the Cambrian host rocks has not yet been determined as marker horizons are absent and deformation has largely destroyed bedding. It has not been determined if the three economically-important sulphide masses are confined to one particular horizon within the phyllite unit, but if they are, this horizon is not readily distinguishable from other members of the unit. Specific controls of sulphide emplacement are also unknown, but there is no evidence to indicate that graphite content of the host, proximity to granitic rocks, metamorphic grade of the host, or relationship to subsidiary faults of Tintina Fault are significant in this regard.

Part of the season's field work involved examination of drill core obtained by mining companies during drilling of the sulphide bodies. Results of this investigation have been published (Tempelman-Kluit, 1968).

STUDY OF ULTRAMAFIC ROCKS, YUKON TERRITORY

D.C. Findlay

D.C. Findlay continued reconnaissance studies of Yukon ultramafic intrusions that were begun in 1966. Intrusions in the following areas were examined briefly, and reference sample suites collected: Kluane Range (115 A - Dezadeash and 115 F and G - Kluane), Dawson (116 B and C), Teslin (105 C), Tay River (105 K) and Watson Lake (105 A). Field studies to date (1966 and 1967) indicate that at least two types of ultramafic intrusions occur in Yukon. The southwestern belt (Kluane Range) is characterized by narrow dyke- or sill-like bodies that typically contain feldspar-bearing olivine-rich rocks (dunite, peridotite) with subordinate pyroxene-rich rocks (picrite, olivine pyroxenite) and minor associated

gabbroic rocks (olivine gabbro, gabbro). Copper-nickel sulphides occur in and near the intrusions at several places along the belt, notably Canalask (White River), Quill Creek, and Dickson Creek. Preliminary olivine composition determinations from the Canalask peridotitic rocks are in the range 83-85 per cent forsterite, and these are probably typical of the belt. Various features of these intrusions, including their sill-like shape, the composition of their olivine, their lithological variations, and the presence of interstitial feldspar (now altered to secondary minerals) suggest that they formed through differentiation of basaltic magmas. Toward the southeast end of the Kluane belt, in Dezadeash area (115 A) the character of the ultramafic intrusions changes; the bodies are larger, individual rock types are coarse-grained, and they contain prominent clinopyroxene-rich zones. Feldspar-bearing ultramafic rocks are absent or inconspicuous. Olivine from one of these intrusions, a small dunite body near Haines Junction, has a composition of 89 per cent forsterite.

Most other intrusions examined in Yukon show characteristics common to alpine-type peridotites. They are variable in size and shape, ranging from small elongate lenses to larger, oval-shaped plutons and their dominant rock type is green to brown-weathering, serpentinized peridotite, typically containing 15-20 per cent pyroxene. One representative of this type, a small intrusion lying northeast of Teslin Lake near Lone Tree Creek, shows alternating zones of dunite, peridotite and olivine pyroxenite, suggesting that some form of mechanical (flowage) differentiation was operative during emplacement. A large example of this type, the Dunite Mountain body (105 F) contains only buff-weathering dunite with olivine compositions in the range 90-94 per cent forsterite, significantly different from those of the Canalask body in Kluane belt. It was originally thought that this intrusion might have characteristics of southeast Alaskan-type zoned ultramafic intrusions, a point of potential economic interest since intrusions of this family (e.g. Good News Bay, Alaska, Tulaheen, British Columbia and various intrusions of the Ural Mountains, U.S.S.R.) were notable as the source of important placer platinum deposits, the precious metals being associated with chromite in the ultramafic rocks. A chromite concentrate from the Dunite Mountain body was therefore assayed for platinum and palladium by the Mines Branch, Department of Energy, Mines and Resources, but neither element was detected.

LODE MINING AND EXPLORATION

MAYO MINING DISTRICT

GALENA AND KENO HILLS AND ADJACENT AREAS

United Keno Hill Mines Limited (about 63°55'N, 135°29'W)
(Silver-Lead-Zinc)

Selected References: Boyle (1956, 1957, 1965); Green and McTaggart (1960); McTaggart (1960); Skinner (1961, pp. 21-25; 1962, pp. 22-27); Green and Godwin (1963, pp. 5-8; 1964, pp. 7-12); Green (1965, pp. 7-12; 1966, pp. 10-17); Gleeson, C.F. (1966, 1967); Findlay (1967, pp. 18-21).

United Keno Hill Mines Limited continued the largest lode-mining operation in Yukon in 1967. It ranked as Canada's third largest producer of silver, following the Kidd Mine of Texas Gulph Sulphur Limited and the Sullivan Mine of Cominco Limited. The gross value of concentrates sold in the year ending December 31, 1967 was \$9,112,000, up from \$8,777,558 in 1966. For the first half of the year (January to July) production was maintained at a relatively high level, with up to 500 tons of ore per day being treated; however on August 1, 1967, in accordance with plans announced in June, production was curtailed and operations designed to reduce the labour force and to consolidate the three camps (Elsa, Calumet and Keno 700) into one central townsite (Elsa) were begun. By the year end production had stabilized at about 175-200 tons per day, consolidation of the townsites was completed and the work force had been reduced from its January 1967 total of 400 to about 280.

A significant factor in the 1967 production records of the company was an increase of \$0.39 per ounce in the average price obtained for silver over last year (\$1.78 Canadian vs. \$1.39 Canadian). This meant that although both tonnage of ore milled and silver recovered decreased in 1967 relative to 1966 (106,189 tons vs. 120,374 tons and 3,804,644 ounces vs. 4,235,678 ounces) the value of silver sales increased by about \$1.1 million over that of 1966.

The principal development in the company's exploration program in 1967 was the location of a new ore zone (Husky zone) on the south edge of McQuesten valley about 800 feet north of the Elsa townsite school. This area was first tested by overburden drilling in 1964 and in 1965 and 1967 additional overburden drilling outlined a promising target area which was subsequently tested by a detail diamond drilling program that resulted in delineation of the new ore structure. In March 1968 a 500-foot, 3-level development shaft was begun to explore the new structure, and it is expected that over \$0.5 million will be expended on this operation during the current year.

The Keno-Galena Hill district has had a long history of intensive exploration and development, and the history of the camp encompasses a large part of the history of lode mining in Yukon. The first silver-lead discovery was made on the Silver King property in 1906, but mining did not begin until 1913. In 1919, discovery of the rich No. 9 vein on Keno Hill triggered extensive prospecting in the district, resulting in new discoveries. During the following twenty years about ten properties were developed to various stages of production, largely under the direction of the Treadwell Yukon Corporation Limited. Since 1919 the district has been in almost continuous production with a few exceptions, notably between 1942 and 1946.

Keno Hill Mining Company Limited was formed in 1945 to consolidate a number of properties in the area, including those of the Treadwell Yukon Corporation Limited. In 1948 the company was reorganized as United Keno Hill Mines Limited and in 1960 controlling interest was acquired by Ventures Limited. Since 1962, when the latter company was absorbed by Falconbridge Nickel Mines Limited, control of the present company has rested with Falconbridge.

From 1947 to December 31, 1967, total production from the camp has been 104,443,811 ounces of silver, 382,480,791 pounds of lead, 294,876,340 pounds of zinc and 3,727,448 pounds of cadmium, recovered from 2,854,052 tons of ore milled.

The Keno Hill-Galena Hill silver-lead ores occur in erratic shoots and lenses lying in vein-faults that cut fine-bedded to massive quartzites, intercalated greenstone sills and lenses, and various schistose rocks of uncertain age.

The vein-faults typically occur in parallel to subparallel series, trending generally northeast to east-northeast and dipping vertically to moderately southeast. Cutting, and in part displacing the ore-bearing vein-faults, is a system of northwest-trending, southwest-dipping younger faults. Ore-bodies are best developed where vein-faults cut the more massive quartzite members of the sedimentary sequence. They commonly plunge to the west, are irregular in shape, and may be distributed as isolated lenses down the dip-plane of a vein-fault.

During the first half of 1967 production came mainly from the Hector-Calumet, Elsa, and Keno Mines. Following the curtailment of production on 1 August 1967 the Keno and Elsa operations were cut back, with production from the Keno Mine eventually being stopped in October. By year-end essentially all production was from the Hector-Calumet Mine although development work is still being done in the Elsa Mine. A total of 2,532 feet of underground development drifting and crosscutting was completed, 515 feet of which were in ore (United Keno Hill Mines Limited, Annual Report for 1967). In the Elsa Mine 1967 work was concentrated on development of the 4-17SA vein, mainly on the 400 level and to a lesser extent on the 600 level. On the 400 level a total of 700 feet of drifting was completed, of which about 240 feet was in ore. About 300 feet of drifting was done on the 600 level. Elsewhere in the mine some pillar-mining was carried out in various of the old workings. In the Keno Mine mining was carried out from various places on the No. 9 vein system, from the 900 level up. On the No. 3 vein a crosscut was driven from the 200 level drift to Faro Gulch to serve as a waste haulageway and ventilation for future operations in the mine. A total of 309 feet of drifting was done in the Keno Mine, of which 117 feet was in ore (op.cit.). In the Hector-Calumet Mine two small ore zones were developed during 1967, both on the No. 3 vein system. Mining was carried out from various places in the mine and a total of 1,005 feet of development drifting and crosscutting was completed, 207 feet of which was in ore (op. cit.). It is anticipated that the bulk of production over the next year or so will come from the Hector-Calumet Mine.

In addition to mining and development work in the mines noted above, a major rehabilitation and reinvestigation program was commenced in June 1967 in the old Sadie Ladue Mine. This program was initiated as the result of overburden drill-

ing in the area which outlined favourable structures in foot-wall rocks northwest of the Ladue No. 2 shaft. The Sadie Ladue Mine was in production during the period 1927-1933 and a total of 116,000 tons of ore was milled at that time. Average grade was about 38 ounces per ton silver. During the period 1955-1957 the 600 Ladue tunnel was rehabilitated by the present company and minor development work was done on the 600 level. The current program will involve rehabilitation of the 600 Ladue tunnel and the Ladue No. 2 shaft to their junction point (about 2,400 feet from the 600 portal). The shaft will then be utilized to gain access to the 200 level from which development drifting to intersect the favourable footwall structures will be carried out. A camp has been established at the Ladue 600 portal for this operation and during the winter of 1967-68 about 20 men were employed on the project.

Surface exploration in the immediate Galena Hill-Keno Hill area in 1967 included overburden and diamond drilling of the Husky zone, and a continuation of the systematic mine-area overburden drilling program begun in 1963. Areas tested in 1967 by this program included: No-Cash 63 vein system extension; an area between the Birmingham Mine and the Coral-Wigwam property; Sadie Ladue; and, Dixie property east of the extension of the Elsa No. 5 vein in the vicinity of Porcupine Creek. This work involved the drilling of 643 holes for a total of 70,235 feet in 1967.

Outside the mine district, exploration of the Mount Hinton area southeast of Keno Hill (about 63°52'N, 135°04'W) was continued with encouraging results. In this area a number of veins of varying size carrying interesting silver and gold values have been located on the south and west sides of Mount Hinton. The veins are essentially quartz fracture fillings with lenses and pods of massive sulphides, chiefly galena, jamesonite, arsenopyrite, pyrite and minor sphalerite and chalcopyrite. A camp was maintained on the property during the summer and up to 4 men were engaged on the project. Additional work is planned for the 1968 season.

The following summary of operating results for 1967 and previous years is from information provided by the Company:

	12-Month Periods Ending 31 December		
	1965	1966	1967
Dry tons milled	146,850	120,374	106,189
Daily average, tons	402.3	329.8	290.9
Mill Heads:			
Silver (oz./ton)	33.25	36.56	37.69
Lead (%)	7.06	7.60	7.97
Zinc (%)	6.22	5.61	5.89
Metal Production			
Silver (oz.)	4,701,820	4,235,678	3,804,644
Lead (lb.)	18,753,650	16,647,849	15,469,569
Zinc (lb.)	16,700,565	11,999,953	10,872,074
Cadmium (lb.)	198,140	144,914	128,269
*Metal Sales	\$10,400,117	\$ 8,777,558	\$ 9,112,084
Source of ore treated in mill (%)			
Hector-Calumet mine	53.0	51.0	67.4
Elsa mine	10.9	11.2	10.9
Keno mine	24.4	27.5	19.7
Silver King mine	5.1	-	-
Galkeno mine	0.4	-	-
No Cash Mine	0.8	2.3	-
Onek mine	2.8	-	-
Comstock Keno mine	2.6	4.3	2.0
Ore dumps	-	3.7	-
**Ore Reserves			
Tons	385,780	129,260	124,460
Silver (oz./ton)	32.2	37.2	38.6
Lead (%)	6.4	8.9	7.5
Zinc	6.5	6.5	6.5

*Without deductions for smelter charges, freight, and marketing.

**Additional reserves not presently economic for various reasons total 115,680 tons averaging 38.1 ounces per ton silver, 6.8 per cent lead and 5.4 per cent zinc.

KENO HILL

Cro-Mur Mining Company Limited (63°57'N, 135°18'W)
(Silver-Lead)

Reference: Findlay (1967, pp. 21-22).

This company holds a total of 72 claims west of and downslope from the old Wernecke Mine property on Keno Hill. The property is reached by a short access road leading off the Keno City-Wernecke mine road.

In 1967, owner R. Murdock working with one part time helper and a D-6 bulldozer with ripper attachment continued work on a number of trenches cut across a northeast-striking steeply north-dipping vein break in fine-bedded quartzites and graphitic quartz-mica schists. Mineralization exposed is in narrow seams and is apparently erratic and discontinuous.

A new trench, opened in 1967, is located about 800 feet east of and upslope from last years workings and apparently follows an east-trending contact between greenstone and quartz-sericite-chlorite schist. At several places in the trench minor sulphides (galena, sphalerite, pyrite) associated with quartz lenses in the schists were exposed. A grab sample of this material collected by the writer assayed;* 40.7 ounces per ton silver, 23.6 per cent lead, and trace zinc. Assays of up to 183 ounces per ton silver were reportedly obtained by the owner from other material from this trench.

*Assayed by G. Spalding, Whitehorse, Y.T.

BUNKER HILL

Benito D'Andrea (63°54'N, 135°10'W)
(Silver-Lead)

Benito D'Andrea holds 8 claims and 1 fraction on Bunker Hill about 1½ miles south of Lightning Creek. The property lies ½ mile from the end of the access road leading from Lightning Creek to the Homestake Property on Bunker Hill (see Findlay 1967, p. 22). The main showing is a strong, quartz-filled vein-break that cuts Keno Hill quartzites. The quartz vein as exposed in the lower of two bulldozer trenches

is 10 to 15 feet wide, strikes S 70°E, dips about 75 degrees south and contains minor siderite, scorodite and galena. Although partly obscured by rubble at the time of this writer's visit, sulphide mineralization appeared to be concentrated chiefly in a narrow (1 foot?) band approximately in the centre of the vein structure. Late in 1967 this property was optioned by Coin Canyon Mines Limited which plans further exploration work in 1968.

Mt. Haldane

Fort George Mining and Exploration Company Limited (63°49'N,
(Silver-Lead) 135°49'W)

This company holds 2 claims (Wayne 5 and 6) optioned from L. Chisholm and G. Rich and 32 claims optioned from J. Strebchuck about 1 mile west of the Mayo-Elsa road. The property is reached from the South McQuesten road that leaves the Mayo-Elsa road near Proctor's sawmill.

In previous years J. Strebchuck has done considerable trenching and stripping on the property and in 1967 the present company continued bulldozer trenching from one of Strebchuck's workings. A quartz-siderite vein-break carrying small pods of massive galena with minor pyrite and chalcopyrite was discovered on the Wayne 5 claim and investigated in the course of the 1967 work. The vein strikes about N 15°E and cuts northeast-trending, southeast-dipping quartz-sericite schist containing intercalated blue-grey quartzite bands of the Keno Hill type. Sulphide mineralization appears to be limited in extent and the largest massive sulphide lens observed was about 5 feet long and 6 inches thick. Late in the season a limited short-hole drilling program (200 feet) was carried out to test the depth extension of the structure. The drilling failed to prove a significant size to the sulphide pod. About 7 tons of massive galena ore were reportedly hand-cobbed from the showing and shipped to the Cominco smelter in Trail, B.C.

DAVIDSON RANGE AREA

Stand To Hill

Foley Silver Mines Limited (64°02'N, 135°10'W)
(Silver-Lead)

References: Cockfield (1922, p. 4A; in Bostock, 1957, pp. 479-498); Green and Roddick (1962, p. 19); Findlay (1967, pp. 25-26).

Foley Silver Mines Limited was incorporated in late 1966 to explore a 46-claim silver-lead prospect on Stand To Hill in Davidson Range, about 7 miles north of Keno Hill. The property is reached by an 8-mile access road, built in 1966 and upgraded in 1967 that leaves the McQuesten-Hanson Lakes road 9.4 miles from its junction with the Elsa-Keno road.

Following discovery of a vein system by bulldozer trenching in 1966, limited underground development work was carried out during the 1967 season. Operations were suspended in August 1967 and since that time the company has concentrated its efforts on seeking financial participation for further exploration. Early in 1968 it was announced (Northern Miner, February 8, 1968) that the company had entered into an agreement with Arrow Inter-America Corporation, a subsidiary of W.R. Grace and Company for financial participation in additional exploration and development of the property. A program of underground development is currently being considered for 1968.

The initial discovery on Stand To Hill, above the headwaters of Homestead Creek, was explored by a short adit in 1920 (Cockfield, 1922, p. 498). Following this early work the property was apparently idle until 1961 when J. Foley of Mayo staked the present claims. The property was subsequently optioned in 1962 by the Yukon Consolidated Gold Corporation Limited which carried out surface exploration in the area. During 1963 and 1964 a private company, Foley Yukon Silver Mines Limited was formed to do additional work on the claims. In the course of bulldozer trenching operations during the 1966 season, a new discovery was made just above Homestead Creek and about 300 feet east and 200 feet north of the original adit. The new showing consisted of a vein-break cutting massive greenstone intercalated with fine-bedded quartzite and quartz-mica schist (unit 17, Green and Roddick, 1962). The structure

contained highly fractured, locally gougy reddish brown limonite-stained material carrying subparallel lenses and veins of quartz-siderite with disseminated to massive galena, sphalerite, and minor chalcopyrite. Blasting and trenching of the showing late in the 1966 season confirmed a width of 10 to 12 feet for the break and it was followed for a strike length of 300 feet. Assays averaging 25 ounces per ton silver and 26 per cent lead were reported (Prospectus, Foley Silver Mines Limited, 1966).

In April, 1967 the access road to the property was upgraded and equipment was moved into the site for an underground exploration program. During the early part of the 1967 season about 150 feet of drifting was done in two adits driven along the vein structure. The main adit was driven approximately north for about 130 feet in massive greenstone. As exposed inside the portal the vein appears as a rusty, fractured zone carrying streaks and lenses of quartz and siderite with parallel bands of massive galena from $\frac{1}{2}$ inch to 8-10 inches wide. Fifteen feet from the portal the vein as exposed in the back is about 3 feet wide, strikes approximately north and dips about 75 degrees east. At the portal, the structure appears to be 8 to 10 feet wide. About 50 feet below the main adit, a second adit was collared just below the contact between the greenstone sill and flat-dipping, grey, impure quartzite and quartz-chlorite schist. This adit was driven about 20 feet in a northerly direction and at its face a steeply-east-dipping vein structure about $2\frac{1}{2}$ feet wide is exposed. The structure consists of strongly-fractured rusty quartz-carbonate material carrying sparse galena mineralization. Assays from the face of this adit reportedly yielded 0.5 ounces per ton gold, 27.15 ounces per ton silver, 1.62 per cent copper and 9.25 per cent lead (Financial Examiner, January 27, 1968). Assays from the main adit reportedly yielded values up to 50 to 60 ounces per ton silver and 50 per cent lead (op. cit.). The original (1920) adit was not examined, but assays up to 32.70 ounces per ton silver, 3.40 per cent copper and 6.30 per cent lead were reported from it (op. cit.).

BEAR RIVER AREA

Pacific Giant Steel Ores Limited (64°50'N, 134°18'W)
(Iron)

References: Green and Roddick (1962); Green (1966, pp. 21-23); Findlay (1967, pp. 26-27).

Pacific Giant Steel Ores Limited holds 16 claims covering a hematite showing staked by A. Jellinek and P. Runer in 1962. Between 1962 and 1966 some surface exploration, including minor trenching and ground geophysical work was done, mainly for representation purposes. In April 1967 equipment was moved to the property by 'cat' train via the Wind River trail and an airstrip was constructed in Bear River Valley about two miles from the showing. Between early May and mid-August 1967, a diamond drilling program consisting of 15 holes totalling 4,753 feet was carried out to test the prospect. The drilling showed that mineralization was not continuous to depth, but the results are currently being evaluated to determine if additional work is warranted. A crew of up to 12 men was employed on the property during the 1967 season.

The hematite showing lies at an elevation of about 3,500 feet on the northeast side of Bear River Valley, about 15 miles southeast of the junction of Wind and Bear rivers. It occurs along the southwest side of a small knoll rising above the valley floor in front of the higher peaks (up to 6,000 feet) of the valley wall proper. Along the flank of the knoll, massive hematite outcrops discontinuously over an area about 900 feet long by 500-600 feet wide; the long axis of the exposure area trends northwest. Within this area exposures range from virtually 100 per cent hematite to host rock containing 20-30 per cent hematite and locally, sparse chalcopyrite. The distribution of the massive hematite appears patchy and irregular, and the ores show megascopic replacement features possibly due to remobilization of originally syngenetic iron in sedimentary rocks. The surface exposure is bounded on both extremities (northwest and southeast) by topographic lineaments which may be fault expressions. Downslope to the southwest the extension of the zone is overburden-covered.

The hematite occurs in dark, blocky-weathering argillite or argillaceous grit, locally conglomeritic, that contains lenses and patches of pink carbonate (probably Fe-dolomite) and chert. Adjacent to the ore zone the rock typically contains 15-25 per cent hematite, and this member is referred to locally as 'iron formation'. It is part of the Precambrian unit 1 assemblage (argillite, grey quartzite, slate, phyllite, dolomite and conglomerate) of Green and Roddick (1962). Adjacent to this member, and exposed uphill to the

northeast is buff-weathering, finely-laminated, silty dolomite which appears conformable with the 'iron formation'. These units strike north to northeast and dip steeply northwest, thus, on the basis of its surface expression, the hematite-rich zone is apparently transgressive to structures of the enclosing rocks.

Ground magnetic surveys carried out during the 1967 season outlined a prominent oval-shaped anomaly lying about 1,000 feet south-southwest of the main hematite outcrop. This anomaly was tested with 4 drillholes, 2 of which intersected cherty argillite containing local hematite concentrations up to 30 per cent and, reportedly, some magnetite.

BONNET PLUME RIVER AREA

Mammoth Group (Bonnet Plume River Mines Limited) (64°56.5'N,
(Copper-Cobalt) 133°18'W)

The Mammoth group consists of 108 claims staked in 1967 following discovery of a copper-cobalt showing located about 15 miles east of Fairchild Lake in the Bonnet Plume Range. The showing area, initially discovered by big game outfitter Louis Brown of Mayo, was prospected during the 1967 season with the result that several more copper occurrences were located. In addition to prospecting and reconnaissance mapping, ground geophysical surveys were done over parts of the property. Further work, including a possible diamond drilling program, is planned for 1968.

The area is underlain chiefly by various sedimentary rocks including shale, slate, phyllite and dolomite that are of probable Precambrian age and by minor volcanic rocks, generally brecciated, and ranging in composition from rhyolite to basalt. Work done by the present company in 1967 outlined a number of small acidic intrusions and a large diorite dyke or sill occurs in the main showing area. The sedimentary and volcanic rocks trend approximately west to west-northwest with generally southerly dips.

Three principal mineralized areas occur on the property. The initial discovery consists of a small, irregular zone containing lenses and patches of massive chalcopyrite replacing buff-weathering dolomite. This zone is of minor extent. The main showing lies about $1\frac{1}{2}$ miles north-northwest of

the discovery zone, along the headwall of a west-facing cirque at an elevation of about 5,850 feet. In this area varicoloured (black, green, brown) slates and phyllite, locally limy, contain irregular lenses and stringers of quartz-siderite material carrying disseminated to massive chalcopyrite, and, in a few small localities, cobaltite-chalcopyrite assemblages. Cobaltite-bearing areas are conspicuous due to pink 'cobalt-bloom' staining of the rocks. A grab sample of fairly typical, but localized, copper-cobalt mineralization assayed: * 0.08 ounces per ton gold, 0.30 ounces per ton silver, 4.02 per cent copper, 1.02 per cent nickel and 4.33 per cent cobalt. In addition to the quartz-siderite-chalcopyrite replacement zones, slates and phyllitic rocks commonly show very fine chalcopyrite disseminated along bedding and cleavage planes. The extent and grade of this type of copper mineralization is not known, and will require systematic sampling to assess. A third area of copper mineralization was reportedly discovered on the property subsequent to the writer's visit. This is said to consist of disseminated chalcopyrite associated with a small granodiorite or quartz diorite intrusion lying to the south of the main showing.

*Assayed by G. Spalding, Whitehorse, Y.T.

DAWSON MINING DISTRICT

FORTYMILE AREA

Clinton Mine (Cassiar Asbestos Corporation Limited) (64°27'N,
(Asbestos) 140°42'W)

References: Green and Roddick (1962); Green and Godwin (1964, pp. 19-21); Green (1965, pp. 25-27; 1966, pp. 25-26); Christian (1966); Findlay (1967, pp. 27-28).

The Clinton Creek open-pit asbestos mine, located about 48 miles northwest of Dawson, began production in October 1967 and during the last two months of the year produced 3,000 tons of asbestos fibre from 51,000 tons of ore mined. For the first two full years of operation production plans call for an output of 60,000 tons of fibre, with provision for an increase to 80,000 tons by the third year. The product will be mainly Canadian Group 4 category fibre for use in cement materials.

The mine is reached by a 26-mile access road that leaves the Sixtymile-Boundary road near mile 33 and crosses Fortymile River via a bridge near the mouth of Clinton Creek. The townsite for the mine, expected to have a population of about 600 to 700, will be located on a bench above the north bank of Fortymile River, about 5 miles from the mine. Construction of the townsite has been started but the bulk of the work will not be completed until 1968.

The Clinton Creek deposit was discovered in 1957 and initially explored in 1957 and 1958. In 1963 and subsequent years exploration was intensified and early in 1965 a production decision was announced. The mine and primary ore crushers are located at an elevation of about 1,600 feet on Porcupine Hill, immediately south of Clinton Creek. The mill is on Trace Hill across Clinton Creek valley to the north, and ore is transported from the crusher to the mill via a mile-long aerial tramline with a capacity of about 300 tons per hour.

The Clinton orebody is contained within an irregularly lensoid serpentinite body about 4,500 feet long and up to 1,000 feet wide. The intrusion is one of a number exposed in the area and low-grade asbestos occurs in some of the other bodies but no mineable deposits have been found. The ultramafic bodies have been emplaced in a mixed volcanic and sedimentary assemblage of uncertain age that includes argillite, quartz-sericite-muscovite schist, carbonaceous limestone and chloritic schist derived from volcanic rocks. The Clinton Creek ultramafic lens strikes about west and dips 45-55 degrees north. The principal rock type is aphanitic serpentinite, probably formed from pyroxene dunite. Along its north margin, a brown-weathering quartz-carbonate alteration zone is present. The alteration zone is well exposed in an exploration tunnel driven through the south contact of the body at an elevation of 1,400 feet. There, asbestos stringers in serpentinite have been transformed in situ to quartz-carbonate assemblages, retaining their original fibrous morphology.

SIXTYMILE AREA

Mosquito Creek

CCL Group (Sixtymile Mining Company Limited) (63°55'N, 140°48'W)
(Silver-Lead)

References: Cockfield (1921); Green (1966, p. 28);
Findlay (1967, p. 29).

This group, consisting of 60 claims, is owned by the Sixtymile Mining Company Limited, Edmonton. The property is located about 7 miles south of Glacier Creek P.O. (abandoned) and about 3 miles south of the junction of Sixtymile River and Mosquito Creek, a north-flowing tributary of the river. The property contains two main showings about 3 miles apart. The upper (southern) occurrence lies at an elevation of about 4,500 feet and consists of a northeast-trending, steep-dipping vein structure cutting quartz-feldspar gneiss and carrying massive galena over widths up to 18 inches. Minor chalcocite is present also. This vein has reportedly been traced by bulldozer trenching for a strike length of about 100 feet, but at the time of this writer's visit much of the vein was obscured by sliderock from the uphill wall of the cut. A grab sample of the massive galena material collected by the writer assayed:* 58.5 ounces per ton silver, 63.0 per cent lead, and trace zinc.

The lower showing lies at an elevation of about 3,000 feet and is about 3 miles northwest of the upper locality. It consists of a lens of massive galena with minor chalcocite in a shear structure cutting quartz-feldspar gneiss. The sulphide lens is up to 3 feet wide and has been exposed by trenching over a length of about 40 feet. The shear is bounded on both sides by a 4-5-foot-wide silicified zone and adjacent to the showing are outcrops of syenite porphyry. In 1966 the company mined about 25 tons of high grade material from a cut in the lower showing and shipped it to the smelter at Trail, B.C. The material reportedly contained 67 ounces per ton silver and 67 per cent lead.

In 1967, little work was done on the property, except for some minor bulldozer trenching and limited reconnaissance electromagnetic survey work near the two main showings.

*Assayed by George Spalding, Whitehorse, Y.T.

WHITEHORSE MINING DISTRICT

DAWSON RANGE AREA

Granite Mountain

March Group (Canex Aerial Exploration Limited (62°19'N, 136°
(Copper-Molybdenum) 58'W)

References: Skinner (1961, pp. 36-36); Green (1966, pp.
32-34); Findlay (1967, pp. 29-30).

During 1967 Canex Aerial Exploration Limited continued surface exploration and diamond drilling on its 96-claim March group on Granite Mountain, about 28 miles northwest of Carmacks. The property is reached by an 11-mile tote road that leaves the Carmacks-Laforma road near Mile 33. For the past two seasons the company has been investigating disseminated chalcopyrite occurrences in Coast Range granitic rocks in this area, as well as reinvestigating the nearby Tinta Hill silver-lead showing explored briefly by Conwest Exploration Company Limited in 1959 and 1960 (Skinner, 1961, pp. 35-36). The present company holds 4 claims covering the original Conwest showing. Work during 1966 and 1967 included geochemical soil sampling surveys, I.P. surveys, bulldozer trenching and churn and diamond drilling programs.

In 1967, 6 diamond-drill holes totalling 3,000 feet were drilled in the area of most promising copper mineralization about 1 3/4 miles northwest of the summit of Granite Mountain. The holes penetrated grey to grey-pink, medium- to coarse-grained quartz monzonite composed of quartz (20-25 per cent), K-feldspar (up to 25 per cent), plagioclase (35-40 per cent), hornblende and biotite (10-15 per cent) and accessory magnetite. The rock is generally uniform in texture and composition except for local variations due to alteration (mainly saussurite, chlorite and epidote). Alteration is most pronounced in the upper 200 feet of the section and rusty zones containing minor disseminated pyrite are common. Chalcopyrite with subordinate pyrrhotite and sparse molybdenite occurs erratically in parts of the section. Sulphide content rarely exceeds 1-2 per cent, by visual estimate. Chalcopyrite occurs as subpoikilitic grains around quartz, plagioclase or mafic minerals and as fine coatings along hairline fractures. In places surface exposures show minor malachite stains.

During the 1967 season up to 10 men were employed on the property.

Freegold Mountain

P.F. Guder (62°17'N, 137°09'W)
(Gold)

Reference: Bostock (1936a, pp. 52-53).

Prospector P.F. Guder of Carmacks, the original discoverer of gold on Freegold Mountain in 1930, holds a 22-claim property straddling Cabin Gulch on the southwest slope of the mountain and west of the Laforma Mine. During the 1967 season Guder continued surface exploration of the property, mainly through hand trenching aided by some bulldozer trenching. The property reportedly contains a number of gold-bearing quartz veins cutting Coast Intrusion granitic rocks. The property was not visited in 1967.

Nansen Creek

Mount Nansen Mines Limited (about 62°03'N, 137°07'W to 137°10'
Brown McDade Mines Limited W)
(Silver-Gold)

References: Bostock (1936a); Green and Godwin (1963, pp. 23-24; 1964, pp. 26-28); Green (1965, pp. 32-34; 1966, pp. 34-38); Campbell (1965, ; 1966); Findlay (1967, pp. 30-31).

Mount Nansen Mines Limited and adjacent Brown-McDade Mines Limited hold 299 and 70 claims respectively covering silver-gold properties in the Mount Nansen area, about 30 miles west of Carmacks. Access to the properties is by a newly-constructed (1967 and spring of 1968) 40-mile gravel road that leaves the Carmacks-Laforma road about 1 mile west of Norden-skiold River bridge at Carmacks. The new road follows Rawlinson Creek valley over part of its length.

A silver-gold showing (Webber) was first discovered by G.F. Dickson on the ridge between Nansen and Victoria Creeks in 1962 (Green, 1965). At that time the area was being explored by the Mount Nansen Exploration Syndicate, composed

of Conwest Exploration Company Limited, Central Patricia Gold Mines Limited, Faraday Uranium Mines Limited, Kerr-Addison Gold Mines Limited, Newmont Mining Corporation of Canada Limited, Noranda Mines Limited, J. Rankin, and Rio Tinto Canadian Exploration Limited. In 1963, the members of the syndicate formed Mount Nansen Mines Limited which carried out detailed surface exploration including trenching, sampling and drilling, in the course of which additional showings (Cabin Creek and Heustis) were discovered. In 1964, additional surface work was carried out on the Webber, Heustis, Cabin, and adjacent Brown-McDade vein systems and late in the year underground exploration of the Webber and Heustis showings was begun. Also in 1964, control of the properties (including Brown-McDade) was acquired by Peso Silver Mines Limited. During the period between early 1965 and the spring of 1966 underground exploration was continued on the Webber, Heustis and Brown-McDade veins with the result that 6,192 feet of drifting, crosscutting and raising, and 7,300 feet of drilling was completed (Peso Silver Mines Limited Annual Report for 1966). At the end of this period total ore reserves were estimated at 173,315 tons averaging 0.484 ounces per ton gold and 19.49 ounces per ton silver for the Mount Nansen properties and 110,000 tons averaging 0.61 ounces per ton gold and 5.4 ounces per ton silver for the Brown-McDade property (op. cit.). Operations at the properties were suspended between April 1966 and June 1967 pending financial arrangements directed toward production plans based on a 200-ton-per-day mill. In 1967 ownership of the Mount Nansen and Brown-McDade properties was modified due to the acquisition of Peso Silver Mines Limited and its parent Charter Oil Company Limited and Moneta Porcupine Mines Limited by Canadawide Investments Limited, controlled by the H. Willi interests.

During the 1967 season, Mount Nansen Mines Limited carried out an underground and surface exploration program directed at preparing the property for production in the fall of 1968. A crew ranging from 50 to 100 men (including contractor's men) has been employed during 1967 and early 1968 in underground development, diamond drilling, and construction of mill building and other surface facilities.

The three principal vein systems are the Heustis, Webber and Brown-McDade; the bulk of the initial work has been concentrated on the first two. The vein structures consist of sulphide-bearing quartz lenses, veins and stockworks cutting highly altered quartz-feldspar porphyry (unit 13, Bostock, 1936

a) and quartz-biotite schists and gneisses, probably members of the Yukon Group assemblage (unit 1, op. cit.). The structures range from broken, altered zones up to several feet wide containing irregular discontinuous lenses and stringers of dark grey quartz with fine sulphides, to more competent zones carrying thin quartz veins up to 3 to 4 inches thick. The principal metallic minerals are arsenopyrite, pyrite, galena and sphalerite. Various silver-bearing minerals, including freieslebenite, acanthite, native silver, andorite, and argentiferous tetrahedrite have been identified in the ores (Green, 1966, p. 36).

The Webber property ($62^{\circ}03\frac{1}{2}'N$, $137^{\circ}10'W$) contains two principal veins, No. 1 and No. 2, that have been explored by drifting from an adit in the valley of Webber Creek at an elevation of 4,280 feet, and by drilling from the adit level. The No. 1 vein strikes about $N 35^{\circ}W$ and the No. 2 vein about $N 60^{\circ}W$. Both dip steeply southwest. Previous to 1967 work, the No. 1 vein had been drifted for a strike length of about 830 feet, the No. 2 vein for about 400 feet, and the combined vein southeast of their junction points for about 420 feet. In 1967, 401 feet of drifting, 100 feet of crosscutting, 112 feet of raising and 717 feet of underground drilling (2 holes) was completed. The new crosscutting and drifting was carried out mainly to explore the fault-displaced extension of the No. 2 vein to the southwest of previous workings.

On the Heustis property ($62^{\circ}03'N$, $137^{\circ}09'W$) underground exploration has been concentrated on the No. 12 and No. 13 veins, striking north to $N 45^{\circ}W$ and about $N 35^{\circ}W$ respectively, and dipping 60 to 70 degrees east. The original work was done from an adit collared at an elevation of 4,295 feet ('4300' adit) and involved about 1,350 feet of drifting on the No. 12 vein and about 600 feet on the No. 13 vein. Work completed on this level in 1967 included about 1,000 feet of drifting, mainly on the 12 N (W) drift, two diamond-drill holes from the 13 N and 13 S drifts and about 70 feet of raising above the 12 N drift. This raise will be continued to surface (a total distance of about 130 feet).

In addition to work on the Heustis 4300 level, a new adit (4100) was started on this vein system with the twofold objective of intersecting the downdip extension of the 4300 vein structure and of ultimately connecting with the Webber 4300 level to provide a main haulageway for mining operations on both the Webber and heustis properties. In 1967, 1,363 feet

of crosscutting and 297 feet of drifting was completed in the new Heustis adit. Continuation of this work in 1968 resulted in intersection of the downdip extension of the 4300 level vein.

The Brown-McDade property (62°03'N, 137°07'W) contains a strong shear zone trending about N 20° W and dipping 50 to 70 degrees west cutting granodiorite (unit 10, Bostock, 1936a). Gold and silver values occur in irregular grey quartz lenses containing variable amounts of pyrite and arsenopyrite (Green, 1966, p. 38). Old workings, completed in 1946 and 1947, consisted of a 680-foot crosscut and a total of 1,150 feet of drifting to the north and south of the crosscut-shear intersection. In 1966 a program of short-hole drilling was carried out from the adit level to test the lateral extensions of mineralization (Campbell, 1966). This was followed up in 1967 by about 500 feet of lateral slashing to test vein sections in the walls of the drift. In addition to this, 185 feet of new drifting and 20 feet of raising was completed in 1967.

Elsewhere on the property, a 2,000-foot (7 holes) surface drilling program was carried out to test the Cabin Creek vein structure which lies about 1,500 feet southwest of the Webber zone. This structure is approximately parallel to the Webber vein and appears to dip nearly vertically.

Big Creek

Revenue Creek Copper Prospect (General Enterprises Limited)
(Copper) (62°20'N, 137°17'W)

References: Bostock (1936a); Green and Godwin (1964, p. 29); Green (1966, pp. 31-33).

Copper was originally discovered in the early 1950s by prospector P.F. Guder on the east bank of Revenue Creek about a mile from its junction with Big Creek and about 5 miles northwest of Freegold Mountain. A short prospect adit was driven beneath the original showing by Guder at this time. In 1954 and 1955 Teck Exploration Company Limited carried out ground electromagnetic surveys over the property and did a total of 1,401 feet of diamond drilling (5 holes) on and near the original showing as well as 341 feet (2 holes) on a second showing 6,500 feet to the southwest. Following this work the property reverted to Guder until 1964 when it was optioned by Canex Aerial Exploration Limited which did limited diamond

drilling (3 holes totalling 542 feet) in 1965, based on the results of a geochemical survey. Mineralization intersected was not encouraging and the option was terminated.

During the winter of 1966-67 G. Heitman and F. Whitehead obtained a working option on the property from Guder and carried out a limited amount of open-cutting near the old prospect adit. Results were disappointing and the operation was terminated in February 1967. Later in 1967 General Enterprises Limited, Whitehorse, optioned 15 claims from Guder and constructed a new access road from Seymour Creek to the property, a distance of about 8 miles. Some bulldozer trenching was carried out late in the 1967 season and further work is planned for 1968.

In the Revenue Creek showing chalcopyrite with minor pyrite occurs in disseminated to submassive forms in a highly altered, locally brecciated rock that has not been positively identified. Company personnel who worked on the property in the past described it as "arkose" but Green (1966, p. 33) suggested that it probably was a highly altered variety of Tertiary porphyritic rhyolite breccia (unit 13, Bostock, 1936a).

Casino Creek

Casino Silver Mines Limited (62°43'N, 138°49'W)
(Casino and Canadian Creek Properties)
(Silver-Lead)

References: Cockfield (1928b, pp. 11A-13A; in Bostock, 1957, pp. 576-578); Green and Godwin (1964, pp. 22-24); Green (1965, pp. 34-35; 1966, pp. 39-42); Findlay (1967, pp. 32-34).

Casino Silver Mines Limited holds 211 claims covering several silver-lead showings and a possible copper prospect located near the headwaters of Casino and Canadian Creeks, about 70 miles northeast of Snag Junction and about 190 miles northwest of Whitehorse. A 140-mile winter access road, constructed in 1965-66, connects the property with Burwash Landing on the Alaska Highway, and a gravel airstrip is maintained on the property. Owned until 1967 by L. Proctor and associates of Whitehorse, control of the company was acquired by the Brynelsen Group early in 1968.

The property contains two principal mineralized areas that have been investigated in the past and a third geochemically-anomalous area that was tested by a diamond drilling program in 1967. The main showing, known as the 'Bomber' consists of several strong northwest-trending shears cutting altered granodiorite¹ and carrying several subparallel, steeply-dipping quartz-barite-galena veins with subordinate chalcopyrite, sphalerite and pyrite. The vein system has been investigated in the past by underground workings, involving 1,200 feet of drifting and in 1966 and 1967 extensions of the zone were tested by diamond drilling. During trenching operations carried out in 1965, a total of 48.4 tons of ore averaging 161.1 ounces per ton silver and 68.0 per cent lead were hand-sorted and shipped out for smelter testing. The second principal showing, known as the 'Helicopter' lies 3,400 feet southwest of the 'Bomber' showing and was investigated by bulldozer trenching in 1966 and by diamond drilling in 1967. It too is a strong shear zone in altered granodiorite, locally containing minor visible sulphides, chiefly galena.

Geophysical and geochemical surveys carried out in 1966 outlined several anomalous areas ('C' anomalies) east of Patton Gulch near the headwaters of Casino Creek, and much of the company's 1967 work was directed toward investigation of this area. In particular, a large copper geochemical anomaly, which extends downstream along a small creek that flows into Casino Creek, was tested. This tributary creek contains a pronounced, rusty gossan zone developed in fractured and altered granodiorite or quartz monzonite. During the 1967 season the gossan zone was tested by diamond drilling which encountered minor chalcopyrite mineralization; however indications are that the chief source of the copper anomaly lies farther upslope toward the west and is probably not in the immediate gossan area. Further work is planned in this general 'C' anomaly area in 1968.

¹The granodiorite is probably part of the Cretaceous Coast Intrusion sequence. Potassium-argon age determinations carried out on biotite and hornblende from a drill core sample of fresh granodiorite from the Bomber showing area yielded ages of 95 M.Y. and 99 M.Y. respectively. The age determinations were made in 1968 by the Isotope and Nuclear Geology Laboratory, Geological Survey of Canada.

Snag Area

Beaver and Bonza Claims (62°14'N, 140°42'W)

Reference: Bostock (1952).

The Beaver and Bonza groups, totalling 34 claims were staked in 1965 by P. Versluce and associates to cover a prominent airborne magnetic anomaly that occurs immediately west of Snag Junction near Mile 1186, Alaska Highway (see Geol. Surv. Can. Aeromagnetic Series Map 4261 G - Dry Creek). The anomaly has been known since 1953 when Canalask Mines Limited flew local airborne magnetic surveys in the Kluane area in connection with prospecting for nickel and nickel-copper occurrences associated with ultramafic intrusions. Canalask Mines Limited staked the Snag anomaly at that time but subsequently allowed the claims to lapse following limited prospecting of the area. The area is one of swamp and heavy overburden cover and its geology is poorly known although it is possible that it may be underlain by Triassic to Cretaceous volcanic rocks similar to those south of Shakwak Valley in White River area (Bostock, 1952).

Following restaking of the anomaly in 1965 the property was optioned by Cominco Limited which carried out a ground magnetometer survey, following which the option was terminated. In 1967, Versluce and associates carried out a limited ground electromagnetic survey (Ronka 16) over part of the claim blocks but could not cover the main part of the magnetic anomaly due to swamp conditions. Following this work the Bonza group of claims and some of the Beaver claims were allowed to lapse. In late 1967, Beaver claims 14 and 16 were transferred to a joint venture in which Glacier Exploration Corporation (a wholly-owned subsidiary of Cyprus Mines Corporation) has an 80 per cent interest and Versluce and associates have a 20 per cent interest. The joint venture is under the management of Glacier Exploration Corporation.

GLENLYON RANGE AREA

Detour Lakes

Glenlyon Mines Limited (about 62°40'N, 134°15'W)
(Copper-Lead-Zinc)

References: Campbell (1967); Findlay (1967, pp. 34-35).

Glenlyon Mines Limited holds 318 claims in the Detour Lakes area, approximately 85 miles northwest of Ross River. The area lies in Tintina Valley and is partly underlain by rocks formerly thought to be Mississippian (units 19, 20; Campbell and Wheeler, 1960) but that may be in part correlative with similar rocks of adjacent Tay River area now believed to be of Cambrian age (Tempelman-Kluit, 1968 and p. 17 this report).

Initial exploration of the area was based on reported copper-bearing float discoveries and spurred by discovery of the lead-zinc deposits of the Anvil district in adjacent Tay River area. Following airborne magnetic and electromagnetic surveys and reconnaissance ground exploration carried out in 1966, ground electromagnetic, soil sampling and linecutting programs were completed in 1967. The work outlined a number of coincident geophysical and geochemical anomalies, chief of which are the 'Pine' and 'Hub' zones.

The property was visited late in July, 1967 at which time two bulldozer trenches had been completed across the axis of the 'Pine' anomaly located east of Detour Lakes and northwest of Pelly River. The trenches exposed northwest-trending, steep-dipping green schistose volcanic rocks interlayered with black carbonaceous shale or phyllite (unit 15, Campbell, 1967). The axial zone of the electromagnetic anomaly is underlain by the phyllites and the rocks here contain numerous quartz veinlets and lenses. No sulphide mineralization was observed.

During 1967 additional surface exploration was carried out on other parts of the property and a 2,500-foot airstrip was constructed. A crew of up to 8 men was employed.

In the spring of 1968 the company announced that an option agreement on the Detour Lakes property had been reached with McIntyre Porcupine Mines Limited and that a diamond drilling program would be carried out during the 1968 season on the 'Hub' and 'Pine' anomalies.

ANVIL RANGE AREA

Rose Creek

Faro Property (Anvil Mining Corporation Limited) (61°21.5'N,
(Lead-Zinc) 133°02'W).

References: Chisholm (1957, pp. 269-277); Roddick and Green (1961a); Green and Godwin (1964, pp. 31-32); Green (1965, pp. 36-37; 1966, pp. 47-50); Aho (1966, pp. 127-149); Roddick (1967); Findlay (1967, pp. 35-39); Tempelman-Kluit (1968, pp. 48-52).

During 1967 Anvil Mining Corporation Limited, owned by Cyprus Mines Corporation (60 per cent) and Dynasty Explorations Limited (40 per cent) carried out extensive pre-production work on its Faro open-pit lead-zinc deposit, scheduled to enter production in September, 1969. The deposit, located in the Rose Creek area of Anvil Range about 30 miles northwest of Ross River and 130 air miles northeast of Whitehorse, was discovered by Dynasty Explorations Limited early in the 1965 season following geochemical, geophysical and overburden-drilling exploration in an area west of the original Vangorda Creek lead-zinc discovery of Vangorda Mines Limited (later absorbed by Kerr Addison Mines Limited). The Faro deposit contains calculated reserves of 63,472,940 tons with average grades of 3.405 per cent lead, 5.721 per cent zinc and about 1.2 ounces of silver per ton (Annual Report for 1967, Dynasty Explorations Limited). The deposit will be mined by open-pit methods and mill input will be 5,500 tons per day, with an annual production of 240,000 tons of zinc concentrate (estimated at 54 per cent zinc) and 130,000 tons of lead concentrate (estimated at 69 per cent lead). Concentrates will be trucked from the mine to Whitehorse via the new Carmacks-Ross River road and thence by rail to Skagway via the White Pass and Yukon Route for ocean shipment to Japan. A contract has been signed with two Japanese companies, Mitsui Mining and Smelting Company and Toho Zinc Company for sale of concentrates through the initial 8-year operating period of the mine. To facilitate stockpiling and transshipment of concentrates at Skagway, the White Pass and Yukon Route has undertaken a \$4 million expansion program on its Skagway Terminal. Additional work is also being done to upgrade the narrow-gauge railway between Whitehorse and Skagway.

Work done at the property during 1967 included overburden stripping in the pit area (356,000 cubic yards¹) continuing development diamond drilling (totalling 42,878 feet at the end of 1967¹) and extensive excavation and subsurface construction work for the mill complex. A 500-man construction camp (Ralph M. Parsons Company Limited) was established on the property.

Construction of a new access road system from the Carmacks-Ross River highway to the mine was begun. The new route will include a bridge across Pelly River near the mouth of Vangorda Creek. Initial work on a new townsite ('Faro') located near Vangorda Creek and designed for an eventual population of 1,000-1,500 persons was started. By the end of 1967 it was estimated that about 9 per cent of primary construction work on the total project had been completed (op. cit.).

In addition to work on the Faro property the company continued surface exploration, including diamond drilling on various of its 2,600-claim holdings in the general Anvil-Vangorda district.

The Faro deposits comprise massive pyrite-pyrrhotite-galena-sphalerite assemblages occurring in three principal zones along a strike length of about 4,000 feet. The main zone (Faro No. 1) is a northwest-striking, shallowly southwest dipping, lens about 2,400 feet long by 1,200 feet wide. The plunge of the body ranges from 35° to the southeast to nearly horizontal. Overburden depth ranged from 10 to 30 feet. The ores occur within laminated quartz-chlorite and quartz-biotite phyllitic rocks, originally thought to be Mississippian in age (Roddick and Green, 1961a) but now believed to be Cambrian (Tempelman-Kluit, 1968). The genesis of the deposits is not yet understood but they show some characteristics of both syngenetic and replacement bodies. They have clearly been affected by at least one stage of metamorphism. Tempelman-Kluit (1968, p. 52) has suggested that the deposits of the Anvil-Vangorda area are early (Cambrian?) replacements of quartz-rich tuffaceous sediments that were later (pre-Devonian?) deformed and metamorphosed with resulting recrystallization of sulphides.

¹op. cit.

Anvil Mining Corporation Limited

(General Exploration - Anvil District)

In addition to development work on the Faro property, Anvil Mining Corporation Limited also carried out exploration programs on a number of its properties in the general Anvil-Vangorda district. Properties explored included the Ted Group (62°38'N, 132°54'W), West Ted Group (2 miles west of the Ted Group), Multi Group (62°21'N, 133°42'W), Ram Group (63°31'N, 134°22'W) and Crown Group (62°22.6'N, 133°35'W). Work carried out on these properties consisted principally of geochemical and I.P. surveys. In the Swim Lakes area, a gravity survey was completed over part of the 88-claim Mor Group (62°09'N, 132°53'W) located about 2 miles southeast of the Sea Group (see Findlay 1967, p. 39).

Kim Explorations Limited (62°23'N, 133°29'W)

(Lead-Zinc)

Kim Explorations Limited holds a 30 claim property immediately north of Rose Creek and about 3 miles northwest of the Anvil Mining Corporation Limited Faro airstrip. The property is accessible by a 4-mile tote road from the Anvil airstrip. The property is underlain in part by Cambrian quartz-chlorite schist, sericitic schist and phyllites (Roddick and Green, 1961a). Following geophysical and geochemical surveys carried out during the 1967 season, a diamond drilling program was commenced early in 1968. No details of the drilling have been released.

Rose Mountain

New Far North Exploration Limited (60°24.5'N, 135°40'W)

Consolidated Bellekeno Mines Limited

(Lead-Zinc)

Reference: Roddick and Green (1961a).

These companies hold a total of 50 claims (Joe and Fair groups) located about 10 miles west of the Faro Property of Anvil Mining Corporation Limited and about 3 miles north of

Rose Mountain. Access to the property is by helicopter from the Faro airstrip or from Ross River.

As shown on Map 13-1961 (Roddick and Green, 1961a) the area is underlain by Cretaceous granitic rocks of Anvil Range (unit 11, op. cit.) and quartz-chloritite, quartz-sericite schists and related rocks formerly considered to be of Mississippian and/or Later age (unit 7, op. cit.) but now thought to be, in part, of Cambrian age (see Tempelman-Kluit, this report, page 17). Geological mapping by company personnel has confirmed the presence of unit 7 schists on the property. In addition, outcrops of ultramafic to gabbroic intrusive rocks were mapped.

During the 1967 season, geological, geochemical and geophysical (magnetometer) surveys were carried out over the property.

Vangorda Creek

Pel Group (Western Flintstone Mines Limited) (62°15'N, 133°25'W)
(Fan Tan Mines Limited)
(Lead-Zinc)

The Pel group consists of 53 contiguous claims located along the north side of Pelly River about 40 miles northwest of Ross River settlement and immediately upstream from Vangorda Creek mouth at Pelly River. According to Roddick and Green (1961a) this area is underlain chiefly by quartzitic and micaceous schists and gneisses (unit 9, op. cit.); however it is reported that serpentized ultramafic rocks also outcrop on the property. In 1967 a ground electromagnetic and magnetometer survey was conducted over the property. Magnetic anomalies outlined are probably, in part, due to the ultramafic rocks. The property was not visited.

Swim Lakes

Fox (Frontier Exploration Limited) (62°14'N, 133°54'W)
(Lead-Zinc)

This company holds a total of 64 claims located about 2 miles north of Swim Lakes and 1 mile south of Blind Creek. In 1966 soil sampling and ground magnetometer surveys were

carried out over part of the property. No significant magnetic anomalies were found but some anomalous geochemical values were obtained. In 1967, the company conducted a gravity survey of part of the property lying south of that investigated by the 1966 geochemical survey. The gravity survey outlined a number of small anomalies, one of which is considered significant and which will be further investigated in 1968. Early in 1968, 15 claims and 3 fractions were staked to cover an extension of anomalous areas indicated by gravity surveys. A diamond drilling program is planned to test at least two of the gravity anomalies.

Swim Lakes Property (Kerr Addison Mines Limited)(62°12½'N, 133°
(Lead-Zinc) 02'W)

References: Green (1965, p. 36; 1966, p. 50); Findlay
(1967, p. 40).

Kerr Addison Mines Limited holds 101 claims covering its Swim Lakes "A" group property located about 6 miles southeast of the original Vangorda Creek lead-zinc discovery of Vangorda Mines Limited (Green and Godwin 1964, pp. 31-32). During the 1965 and 1966 seasons an extensive drilling program on the Swim Lakes property delineated a sulphide zone containing about 5,000,000 tons of ore averaging about 9.5 per cent combined lead and zinc and 1.5 ounces per ton silver with minor copper and gold values. In 1967 an extensive soil sampling program was carried out on the Swim Lakes "A" group of mineral claims. On the adjacent "BC" group a limited drilling program (6 holes) was carried out through the ice on Swim Lakes.

The geological setting of the Swim deposit is similar to that of the Faro and Vangorda ore bodies except that according to Tempelman-Kluit (1968 and page 17 this report) graphite is more prevalent in the Cambrian phyllitic host rocks of the Swim deposit than in the rocks of the other two bodies.

Silver Arrow Explorations Limited (about 62°10'N, 132°43'W)
(Lead-Zinc)

Reference: Findlay (1967, p. 40).

This company carried out a 6-hole drilling program (1,424 feet) on its 49-claim property in the Vangorda area

about 4 miles east of Swim Lakes. Drilling was done to test a geophysical anomaly outlined by 1966 work and was started late in 1966 and completed in February 1967. Rock types penetrated included quartz-chlorite schist and granodiorite. A narrow zone of sulphide mineralization was intersected in one hole but assays were not encouraging.

Caribou Lake

Caribou Lake Property (Northern Empire Mines Limited) (62°34'N,
(Copper-Zinc) 133°22.5'W)

This property, consisting of 234 claims, lies mainly north and east of a small lake (known locally as Caribou Lake) located 7 miles southwest of the junction of Anvil Creek and Tay River. The claims surround the Ivan property of Anvil Mining Corporation Limited and are about 15 miles north of the Anvil Faro deposit. The area is underlain chiefly by Devonian sedimentary rocks, including chert, shale, quartzite and limestone (unit 5b, Roddick and Green, 1961).

In 1966, limited exploration work was carried out on the Caribou Lake property by Yukon Copper Limited. This work consisted of airborne magnetometer and electromagnetometer surveys, geological mapping and reconnaissance geochemical surveys. The 1966 work outlined several general areas on the property that were subjected to more detailed work in 1967. In 1967 detailed geochemical and geological surveys were conducted over the selected areas with the result that several geochemical anomalies were outlined. Late in the season, bulldozer trenching revealed disseminated sphalerite, chalcopyrite and pyrite in cherty argillite associated with one of the geochemical anomalies. It was reported (Yukon Daily News, April 4, 1967) that mineralization has been exposed across a width of 100 feet, but that strike length is unknown. Grab sample assays reportedly ranged from 2.8 to 4.5 per cent zinc, 0.04 to 0.18 per cent copper, 0.18 to 0.32 ounces per ton silver and 0.01 to 0.02 ounces per ton gold (op. cit.).

WHITEHORSE AREA

Whitehorse Copper Belt

General Description

References: McConnell (1909); McLean (1914, pp 159-165); Cockfield and Bell (1926, pp. 48-49; 1944, pp. 18-19); Wheeler (1961, pp. 137-142); Green and Godwin (1964, pp. 33-39); Kindle (1964); Green (1965, pp. 33-39; 1966 pp. 50-51); Findlay (1967, pp. 41-43); Hilker (1967).

The Whitehorse Copper Belt is a distinctive metallogenic area lying along the west margin of the Whitehorse Trough (Wheeler, 1961) in southwest Yukon. The first discoveries of copper-iron deposits in this area were made in 1887 by prospectors en route to the Klondike placer gold fields in the Dawson area. Following the initial discoveries (Copper King, Anaconda, Big Chief and Little Chief occurrences) extensive prospecting and staking along the belt resulted in numerous additional discoveries, and by late 1899 most of the 28 presently known major showings had been found. Since the turn of the century the deposits have had an erratic and piecemeal history of exploration development and production. During the period 1900-1920 intermittent production of direct-shipping copper ore totalling 162,440 tons and ranging in grade from 3.5 to 46.4 per cent copper was reported to have been shipped from various of the properties (Kindle, 1964). The bulk of this (140,000 tons) came from the Pueblo Mine near the north end of the belt, which operated intermittently between 1912-1920. Other properties from which minor production was recorded include the Copper King, Carlisle, Valerie, Grafter, Arctic Chief and the War Eagle. After the early 1920s little work was done on the belt until 1947-1948 when Noranda Mines Limited carried out surface exploration and some diamond drilling on the Little Chief, Big Chief and Valerie areas. In 1954, Imperial Mines and Metals Limited began staking and purchasing many of the Copper Belt properties and did surface exploration and diamond drilling on the Arctic Chief and Best Chance claims in 1955-1956. In 1957 this company was reorganized under the name New Imperial Mines Limited and since 1963 it has been engaged in systematic investigation of its Copper Belt holdings. This work resulted in bringing the Little Chief Mine into production in early 1967.

The Whitehorse Trough is a linear structural-stratigraphic unit recognizable from about latitude 62°N in south-central Yukon across the British Columbia-Yukon border into the Atlin District of British Columbia. According to Wheeler (1961) the feature was probably established as a structural depression by late Triassic time and may have initially extended as far southeast as Stikine River area in British Columbia. In the Whitehorse area rocks of the trough are chiefly eugeo-synclinal Upper Triassic sedimentary and volcanic rocks (Lewes River Group) including greywacke, argillite, siltstone, limestone and various tuffs, andesitic to basaltic flows and associated pyroclastic rocks. Overlying the Lewes River rocks, in places disconformably, are dominantly marine sedimentary rocks (conglomerate, greywacke, arkose, quartzite argillite etc.) of the Lower Jurassic Laberge Group. These Mesozoic rocks were folded along generally northwest-trending axes, covered locally by relatively flat-lying mid-Cretaceous volcanic rocks of the Hutshi Group, and intruded, particularly near the western margin of the Trough, by Cretaceous granitic rocks. At various places in the trough, but most commonly in its eastern parts (e.g. Teslin area) ultramafic intrusions of probable Jurassic-early Cretaceous age were also emplaced.

The copper deposits of the Whitehorse Copper Belt are associated with granitic intrusions (Coast Intrusions) cutting Lewes River Group rocks west and southwest of Whitehorse. All of the presently-known occurrences are within a 17-mile by 2- to 3-mile wide area lying west of the Alaska Highway and extending from the northeast flank of Golden Horn Mountain on the south (Cowley Park property) to about 4 miles northwest of Whitehorse on the north (War Eagle property). Although to date no significant showings are known east of Yukon River, geological similarities between this area and the Copper Belt proper, coupled with magnetic maps, led to considerable new staking east of Whitehorse in early 1968 and exploration programs are planned for the 1968 field season.

The copper ores occur mainly in contact metasomatic deposits developed in skarn zones formed near intrusive contacts between granodioritic to dioritic rocks of the Coast Intrusion sequence (unit 8, Wheeler, 1961) and limestone members of the Upper Triassic Lewes River Group (unit 3c, Wheeler, 1961). Two types of ore mineral assemblages occur; disseminated to massive lenses of bornite and chalcopyrite in calcium-magnesium-silicate skarn composed chiefly of diopside, wollastonite, chlorite, epidote, garnet and tremolite; and bornite-

chalcopyrite-magnetite-hematite deposits in calcium-magnesium-iron skarn that contains abundant serpentine and, rarely, asbestos. The latter type appears to be more common in the central part of the belt, such as at the Little Chief, Big Chief, and Arctic Chief properties. Other minerals found at various localities in the belt include: valeriite, chalcocite, tetrahedrite, pyrite, pyrrhotite, covellite, malachite, azurite, chrysocolla, native copper and molybdenite. The high content of magnesium and iron associated with some of the deposits suggests that originally more mafic rocks than are now exposed may have been involved in the skarn-forming process. Small ultramafic bodies were probably originally intruded along the western side of the Whitehorse Trough as well as in its central and eastern parts. Few remnants of such intrusions are now recognized, but invasion by younger and much larger granitic intrusions may have largely destroyed them. This process has been described by Wheeler (1961, p. 88) in the Jubilee Mountain area southeast of Whitehorse where ultramafic rocks near granitic intrusions have been extensively steatized and converted to rocks largely composed of tremolite. One body of serpentinized dunite in this area is bordered by a lens of limestone partly converted to skarn consisting of actinolite, epidote and garnet and containing disseminated bornite, chalcopyrite, specularite, and hematite (op. cit. p. 142). It thus seems possible that such a juxtaposition of limestone, ultramafic material, and granitic intrusion may have been involved in the formation of some of the Copper Belt occurrences. An outcrop of ultramafic rocks has been reported (R.G. Hilker, personal communication) from the Little Chief property of New Imperial Mines Limited.

New Imperial Mines Limited (60°33'N to 60°45'N, 134°53'W to
(Copper-Iron) 135°10'W)

References: Green (1965, pp. 33-39; 1966, pp. 50-51);
Findlay (1967, pp. 41-43); Hilker (1967).

New Imperial Mines Limited commenced milling ore from its Little Chief open-pit mine on 1 May, 1967. This mine, about 2 miles east of MacRae (Mile 911, Alaska Highway) is the first of several Copper Belt properties held by the company to be brought to the production stage. The other principal deposits War Eagle, Arctic Chief, Best Chance, Cowley Park, and Keewenaw are being systematically explored to develop additional tonnage for future production.

The company's Copper Belt operations are being developed in partnership with Sumitomo Metal Mining Company of Japan which has provided part of the development capital and which will purchase all copper, gold and silver concentrates for a minimum 10-year period. The central 2,500-ton-per-day mill located at the Little Chief Mine is designed to eventually treat ores from the other properties also. Mill concentrates are transported by rail and ship to Vancouver via Skagway, Alaska and thence transhipped on ocean carriers to smelters in Japan.

At the Little Chief property, bornite-chalcopyrite and bornite-chalcopyrite-magnetite ores occur in irregular lenses lying near the southwest boundary of a large skarn body that is about 2,400 feet long. The skarn zone is bounded on the east by dioritic intrusive rocks and along its north and northwest sides by massive limestone and locally, diorite. Mining is currently being carried out from an open pit with ultimate design dimensions of 900 feet by 450 feet by 300 feet deep. Early in 1968, after about a year of mining, the pit floor was 150 feet below original surface.

Since the start of open-pit mining a continuing program of deep drilling to outline ore below the projected pit depth has been in progress. This drilling has established the roughly tabular, north-striking, east-dipping (about 55°) nature of the orebody and has outlined 5 million tons of probable underground ore grading 2.0 per cent copper. The depth extension of the orebody is still unknown. Feasibility studies to determine optimum schedules for an underground mining operation were begun late in 1967.

The following summary of operating results and ore reserves was provided by the company and their cooperation in supplying this information is gratefully acknowledged.

Period 1 May-31 December, 1967

Little Chief Mine

Dry tons milled (started May 1)	453,056
Daily average, tons	2.006
Copper concentrate (%)	29.42
Mill Heads:	
Copper (%)	1.17
Silver (oz/ton)	0.198
Gold (oz/ton)	0.0193
Metal Production:	
Copper (lbs)	7,314,203
Silver (oz)	89,786
Gold (oz)	8,753
Metal Sales*	\$4,473,000
<u>Total Ore Reserves</u>	
Open Pit** (tons)	4.6 million
Copper (%)	1.2
Silver (oz/ton)	0.198
Gold (oz/ton)	0.0193
Underground*** (tons)	5.0 million
Copper (%)	2.0
Silver (oz/ton)	0.198
Gold (oz/ton)	0.0193

*Without deductions for smelter charges, freight and marketing costs.

** Includes Little Chief Mine ore reserves (1,071,000 tons at 1.2% cu) supplying current production.

***Little Chief Mine.

During the 1967 season the company also continued surface exploration of its holdings elsewhere on the Copper Belt. The 1967 work was concentrated on the northern part of the belt and included geological mapping on a scale of 1 inch to 200 feet and ground magnetic and electromagnetic surveys. The area covered includes the War Eagle, Pueblo, Copper King and Anaconda deposits and additional detail surveys were conducted over the known deposits. Of these occurrences, the War Eagle is probably the most significant; it contains 1,230,000 tons of probable ore grading 1.29 per cent copper (Hilker, 1967). In addition to this work the company also carried out a limited diamond drilling program on the Arctic

Chief property, about $2\frac{1}{2}$ miles northwest of the Little Chief Mine.

Cowley Park

Alice Lake Mines Limited ($60^{\circ}31'N$, $134^{\circ}55'W$)

This company holds 54 claims in the southern part of the Whitehorse Copper Belt, immediately north of Cowley Lakes. The Carcross-Whitehorse road cuts through the northeast corner of the property. Early in the 1967 season an I.P. survey was conducted over part of the property, and additional I.P. work is planned for 1968.

Marsh Lake

Prado Explorations Limited (about $60^{\circ}31'N$, $134^{\circ}18'W$)

Reference: Wheeler (1961).

This company holds a 153-claim property lying immediately northeast of Marsh Lake near Mile 880, Alaska Highway. During 1967 the company carried out a combined airborne magnetometer and electromagnetic survey over a 120-square-mile area east of Marsh Lake that included the area covered by the claims. Some ground follow-up work was also done. The area is underlain by volcanic rocks of unknown age (unit A, Wheeler, 1961).

Mud Lake

Canzac Mines Limited ($60^{\circ}28'N$, $135^{\circ}38'W$)
(Copper-Nickel?)

Reference: Wheeler (1961).

Canzac Mines Limited holds a 16-claim group covering a pronounced airborne magnetic anomaly (2500 gammas) located about 26 miles southwest of Whitehorse and about 6 miles southwest of Ibex Mountain. The anomaly (105 D/5 - Geol. Surv. Can. Geophysics Paper 3359) is centred over a small shallow lake, (locally known as Mud Lake) that lies in a large glacial debris-filled valley drained by Rose Creek. Bedrock is not

exposed in the area underlying the anomaly, but Lewes River sedimentary rocks (unit 3a, Wheeler, 1961) reportedly outcrop immediately north of the area and Coast Range granitic rocks (unit 8, op. cit.) have been mapped along the south side of Rose Creek valley.

In March 1968, after completing detailed ground magnetic surveys, the company began an exploratory drilling program using a light Winke drill. The first hole penetrated dark green coarse-grained olivine clinopyroxenite containing visible magnetite and undoubtedly the magnetic anomaly is caused by a buried ultramafic intrusion of unknown size. Drilling was continuing in April of 1968.

Lake Laberge

Pine Lake Mining Company Limited (61°04'N, 135°02'W)
(Copper)

References: Bostock (1936c); Findlay (1967, p. 43).

In 1967 this company continued surface and diamond drilling exploration of its 72-claim property covering a copper prospect along the east side of Lake Laberge. The property was optioned from R. Granger of Whitehorse early in 1967 and following ground geophysical work and completion of a 30-mile access trail from Whitehorse a diamond drilling program was begun in May, 1967. Exploration continued on the property until August 1967, but results were disappointing and the option was subsequently terminated.

The property is centred around a small lake that lies about 2 miles inland from the east shore of Lake Laberge opposite the south extremity of Richthofen Island. Between the west shore of the lake and Lake Laberge limestone of the Lewes River Group (unit 5, Bostock, 1936c) is the principal rock type exposed. Cutting the limestone are several small, porphyritic, acidic intrusions that have formed discontinuous skarn zones along their margins. At several localities, calcite-diopside-epidote-garnet-skarn contains minor patchy disseminated copper mineralization, chiefly chalcopyrite, bornite and malachite with pyrite. Elsewhere along the intrusive contacts a fine-grained dark hornfels has been developed, possibly from narrow grit or argillaceous bands within the original limestone. East, north and south of the lake, bedrock is not exposed,

although Bostock (1936c) shows sedimentary rocks of the La-berge Series outcropping in these areas (unit 6, op. cit.).

Ground magnetometer surveys carried out by the company in early 1967 outlined a linear magnetic anomaly extending northeast from the northeast corner of the lake. This anomaly was tested by 6 diamond-drill holes (totalling about 2,400 feet) located along its axis. The drilling intersected sufficient magnetite in the rocks near the core of the anomaly to account for its magnetic expression. The rocks penetrated were mainly volcanic flows of the Hutshi Group (unit 9, op. cit.) and included greenish-grey to reddish fine-grained sub-vesicular basalt, medium-grained equigranular andesite and grey, porphyritic andesite. DDH No. 6, located near the western margin of the anomaly intersected diorite from 120 feet to 280 feet (end of hole).

Following the exploration of the magnetic anomaly, three short holes were drilled near a small porphyritic intrusion to test one of the mineralized skarn areas. One hole remained in the intrusion to total depth and intersected minor chalcopyrite. A second hole was collared in skarn rock adjacent to the intrusion contact and penetrated the intrusion at depth. Minor chalcopyrite was encountered. The third hole penetrated pyritized and brecciated hornfels containing minor chalcopyrite.

WHEATON RIVER AREA

Skukum Copper Property (Yukon Antimony Corporation Limited)
(Copper) (60°11'N, 135°22'W)

Yukon Antimony Corporation Limited holds a 27-claim property on Skukum and Berney Creeks, immediately south of Chieftain Hill, covering a copper prospect discovered in 1966. The property is reached by a 10-mile tote road leading from the main Yukon Antimony Corporation Limited camp near the junction of Wheaton River and Becker Creek. The showing occurs on the north side of Skukum Creek at an elevation of about 5,300 feet and consists of patches of malachite-stained material in highly altered (epidote, chlorite) and fractured hybrid rock which is probably an intrusive breccia along the contact between Coast Intrusion granodiorite (unit 8, Wheeler, 1961) and the Skukum Group volcanic rocks (unit 10, Wheeler, 1961) which forms the cap of Chieftain Hill. The rocks exposed

immediately above the showing area are pale green to white rhyolite breccias.

The showing area trends northwest near the top of the cliff above Skukum Creek and according to company personnel discontinuous mineralization has been traced for about 1,200 feet along strike and over a width along the cliff-slope of about 500 feet. No copper minerals are visible in the malachite-stained brecciated rock, but a fairly typical grab sample of this material, collected by the writer assayed *0.43 per cent copper.

During 1967, the company conducted an I.P. survey over the property and outlined an anomaly above and north of the showing area. A total of 910 feet of drilling (2 holes) was carried out; one hole (750 feet) located to test the I.P. anomaly reportedly intersected some pyrite mineralization. The second hole, located below the showing area, just above Skukum Creek valley was abandoned following difficulties with overburden penetration. Additional work on the property is not planned.

*Assayed by G. Spalding, Whitehorse, Y.T.

Becker-Cochran Property (Yukon Antimony Corporation Limited)
(Antimony) (60°11'N, 135°13'W)

References: Cairnes (1910b, p. 48; in Bostock, 1957, pp. 335-336; 1916, p. 45; in Bostock, 1957, pp. 419-424); Bostock (1941, p. 35); Wheeler (1961, p. 132); Green (1965, p. 42; 1966, pp. 52-55); Findlay (1967, p. 43).

In 1967, Yukon Antimony Corporation Limited carried out I.P. surveys over parts of this property. No further ground exploration work was done in 1967.

Tally-Ho Gulch (Silver Pack Mines Limited)(60°14.5'N, 135°03'W)
(Gold-Silver)

References: Cairnes (1910b; in Bostock 1957, p. 334; 1912, pp. 108-110; 1916, p. 44; in Bostock 1957, p. 419); Cockfield and Bell (1926, p. 43; 1944, p. 15); Wheeler, (1961, p. 123); Findlay (1967, p. 45).

This property, held by Silver Pack Mines Limited, an affiliate company of International Mine Services Limited, is on Tally-Ho Mountain, southeast of Wheaton River. The property (8 Crown Grant claims) includes the original Tally-Ho Gulch gold-silver showing, discovered in the early 1900s and explored intermittently between 1909 and 1912. Mineralization, principally argentiferous galena, occurs in a quartz-impregnated fault-breccia zone cutting Coast Intrusion granodiorite (unit 8, Wheeler, 1961). In the early years the property was explored by means of two adits, one about 700 feet long, the other less than 500 feet. Limited crosscutting and drifting was also done.

In 1966, the present owners, after building an access road to the old workings from Mile 18 on the Carcross-Yukon Antimony road, reinvestigated the old adits and did 1,500 feet of underground drilling from the lower adit. In 1967, limited work was done on the property, including surface diamond drilling (2 holes) and a soil sampling program. Drilling results were not sufficiently encouraging to warrant further work.

CARCROSS AREA

Montana Mountain

Arctic Gold and Silver Mines Limited (60°05'N, 134°32'W)
(Silver-Gold)

References: Cairnes (1906, pp. 24-25; 1908a, p. 14; 1917, pp. 28-36; in Bostock, 1957, pp. 209-217; 245-275; 426-459); Cockfield and Bell (1926, p. 39; 1944, p.12); Wheeler (1961, p. 127); Green (1966, pp. 55-60); Findlay (1967, pp. 46-47).

Arctic Gold and Silver Mines Limited (formerly Arctic Mining and Exploration Company Limited) announced early in June,

1967 that its Arctic Caribou (Big Thing) silver-gold property near Carcross would be brought into production early in the summer of 1968. Initial production is to be at the rate of 200 tons per day with provision for eventual utilization of the mill capacity of 300 tons per day. Gold and silver concentrates are to be shipped via rail to Skagway and thence to Sweden for refining (Bolidens Mining Plant). As of the end of 1967 estimated reserves were 254,920 tons averaging 0.68 ounces per ton gold and 19.70 ounces per ton silver (Annual Report for 1967, Arctic Mining and Exploration Company Limited).

During 1967, work on the property included completion of construction of mine and mill buildings, construction of a new 8-mile all weather access road linking the mine with the mill site (a distance of 3 miles) and the millsite with the village of Carcross, an extensive underground diamond drilling program (about 30,000 feet in 200 holes), and a surface drilling program (19 holes totalling about 3,700 feet). In December 1967 stope development work was begun in the mine. A crew of up to 35 men was employed during 1967.

The Arctic Caribou property consists of 2 Crown Grant Claims (Pride of the Yukon and Caribou) and a further 82 claims, located on Sugarloaf Hill about a mile north of Montana Mountain summit. The first work recorded on the property (then Big Thing) was in 1905 when initial underground exploration of a quartz-sulphide vein structure was begun. (Bostock, 1957, p. 211). During the period 1905-1916 underground work completed included a 450-foot inclined shaft driven into the southwest side of Sugarloaf Hill from an elevation of about 5,800 feet, and about 1,050 feet of drifting on four levels. In addition, a 2,320-foot horizontal tunnel (Peerless Tunnel) was driven northeasterly into the hill from an elevation of about 5,100 feet. This tunnel eventually connected with the inclined shaft workings. In 1910, 1911 and 1925 hand-picked ore shipments totalling 3,000 tons were reportedly made from the property (Annual Report, Arctic Mining and Exploration Company Limited, November, 1965). The ore shipments reportedly graded 1.08 ounces per ton gold and 27.7 ounces per ton silver.

The present company began reinvestigation of the property in 1964 and since October 1965 has completed about 4,500 feet of drifting and about 33,000 feet of underground

drilling. Underground work has been carried out from a main entry (crosscut) driven northwesterly from an elevation of about 5,400 feet (800 level) for about 1,100 feet into the hill. Five main drifts (totalling about 2,300 feet) have been turned off from the main crosscut to explore vein structures. From the portal inwards these are: 835W, 835E, 850E, 848E and 848W drifts. The best ore sections occur in the area of the junction between the 850E drift and the main crosscut and to the south of the latter in the vicinity of the old workings. Stope development will be carried out from a crosscut (847 crosscut) turned off the 848W drift about 60 feet southwest of its junction with the main crosscut.

The gold and silver ores occur in a series of north-east striking quartz veins that cut medium- to coarse-grained, locally porphyritic granodiorite. The granodiorite is part of a larger stock that probably extends north to Carcross (Wheeler, 1961, unit 8). The principal vein systems (No. 1 and No. 2) are fairly consistent but show gentle flexures so that dips range from nearly horizontal to about 40 degrees northwest. Along strike the veins are displaced by two fault systems, one striking across the veins, the other nearly parallel to them. The combination of changes in dip and slicing-off by flat faults has made underground exploration difficult. Sulphide mineralization consists chiefly of pyrite, arsenopyrite, sphalerite, galena and rare chalcopyrite occurring in irregular lenses and shoots within quartz vein material. The vein structures are commonly bordered by a selvage zone of altered granodiorite.

Montana Mine (Arctic Gold and Silver Mines Limited)(60°03'N,
(Gold-Silver) 134°41'W)

References: Cairnes (1908a, pp. 14-15); Wheeler (1961, p. 128).

The Montana Mine, one of the original properties of the Conrad Camp (Cairnes, 1908a) lies about 3 miles south of the Arctic Caribou (Big Thing) property. According to Wheeler (1961, p. 128) the showing consists of a quartz vein carrying galena with subordinate native silver, argentite, pyragyrite, tetrahedrite, pyrite and arsenopyrite. The vein strikes north 10° west, dips 10 to 15 degrees and cuts porphyritic volcanic rocks (unit 7, Wheeler, 1961). Wheeler reported that a grab

sample taken from an ore sack in 1951 assayed 0.08 ounces per ton gold and 110.14 ounces per ton silver.

During 1967 Arctic Gold and Silver Mines Limited carried out about 800 feet of drifting along the Montana vein structure from a new adit located near an old tunnel on the property. The new drift followed a fairly massive quartz vein dipping 25-30 degrees west and up to 5 feet wide. Sulphide mineralization (chiefly pyrite and galena with subordinate arsenopyrite) was found to be weak. Assays up to 15 ounces per ton silver were reportedly obtained but values were generally too low to be of interest.

Jean Claims (Arctic Gold and Silver Mines Limited)(60°04.2'N,
(Silver-Gold) 134°42.2'W)

Reference: Wheeler (1961, p. 127).

The Jean Claims lie about one mile southwest of the Arctic Caribou (Big Thing) property. During the 1967 season the company de-iced an old 210foot tunnel on the property and carried out limited underground drilling (4 holes) from the end of the tunnel. Minor vein material was intersected but assay values were not encouraging.

Peerless Group (60°05'N, 134°42'W)
(Gold-Silver)

Reference: Findlay (1967, p. 48).

Originally part of the old Big Thing property (see Arctic Caribou Mine), the 7-claim Peerless group is now held by Lion Nickel Mines of Canada Limited. The claims encompass the original lower workings of the Big Thing property, including part of the 2,320-foot horizontal tunnel driven from the northwest side of Sugarloaf Hill at an elevation of about 5,100 feet. In 1967 the company rehabilitated the 5,100-level tunnel to a point about 1,260 feet from the portal, where an old drift had been started following what was presumed to be the down-dip extension of the Big Thing No. 2 vein. A new drift was turned off the main tunnel about 100 feet southwest of the old drift and driven to the northeast for about 700 feet, subparallel to the assumed extension of the vein. The objective of the program was to provide access to the vein for

an underground drilling program scheduled for 1968, as well as to intersect the down-dip extension of a second vein (Big Thing No. 1), if it continues to depth.

Bear Molybdenum Property (60°07'N, 134°43'W)
(Molybdenum)

Reference: Findlay (1967, p. 48).

Gui-Por Uranium Mines and Metals Limited held a total of 57 claims straddling the old Carcross-Arctic Caribou access road on the north slope of Montana Mountain. The area is underlain mainly by granitic rocks of the Coast Intrusion sequence (unit 8, Wheeler, 1961). As a result of a copper-molybdenum geochemical survey carried out in 1966 and I.P. surveys conducted early in the 1967 season, two diamond-drill holes totalling about 1,000 feet were drilled to test anomalous areas. Minor copper and molybdenum mineralization associated with a quartz vein cutting granodiorite was encountered, but the results were not considered encouraging and the claims were subsequently dropped.

Venus Property (Venus Mines Limited) (60°01'N, 134°38.2'W)
(Gold-Silver)

References: Cairnes (1908a, pp. 16-17; 1909, p. 31; 1917, pp. 39-41; in Bostock, 1957, pp. 254-255; 282; 447-449); McLean (1914, pp. 194-200); Cockfield and Bell (1926, p. 40); Wheeler (1961, pp. 129-130).

The Venus property comprises 27 claims (including 8 Crown Grants) located along the west side of Windy Arm, Tagish Lake, near the site of the long-abandoned settlement of Conrad City. During the period 1904-1918 this area was under intermittent investigation for gold and silver and numerous properties, including Venus No. 1, Venus No. 2, Venus Extension, Vault, Montana, Mountain Hero, Dail, Fleming and M and M amongst others were worked to varying degrees. A 100-ton mill was built on the lakeshore in 1908 to treat ore from several of these properties, and its remains are still visible. Ore was transported to the mill by an aerial bucket tramway leading from the Venus portal downhill to the mill. Small ore shipments were made intermittently and Cairnes (1917) reported that about 6,000 tons of ore was supposed to have been mined from

the Venus properties, part of which was shipped to smelters.

The gold and silver ores of the Conrad district occur in a series of northerly-trending, shallow-dipping quartz veins cutting volcanic rocks of the Cretaceous Hutshi Group (unit 7, Wheeler, 1961). The Venus vein is one of the most persistent structures and has been traced for more than a mile. It contains coarse crystalline quartz and carbonate carrying irregular bands and lenses of pyrite, arsenopyrite, galena and minor sphalerite and chalcopyrite. The vein strikes north 10° east on the average, dips 35° west and ranges from a few inches to 5-6 feet in thickness. It was explored by underground workings in four adjacent properties - Vault, Venus No. 1, Venus No. 2 and Venus Extension. Although good values were encountered in places (Wheeler, 1961, p. 130) development work showed that gold-silver distribution was erratic.

The present company, Venus Mines Limited, began investigation of the Venus property in May, 1966. From then until the end of 1967 4,290 feet of underground drifting and raising and 1,898 feet of diamond drilling has been completed from an adit located at an elevation of 2,734 feet (2700 level). Of this total, about 2,676 feet was completed in 1967. The underground work consists of a main crosscut to a point about 200 feet from the portal where the Venus vein was intersected; the vein was then followed by drifting north (No. 1-1N drift) to a point about 300 feet beyond the crosscut where it was lost in a complex fault zone. The crosscut was then extended a further 130 feet past the No. 1-1N drift where a second vein was intersected. This structure was followed intermittently by the No. 1-2N drift for a total distance of about 750 feet, only part of which was in ore-grade mineralization. Near the end of this drift, the vein structure was lost in a fault zone, but continuation of the drift through the fault zone resulted in a promising new vein intersection oriented approximately at right angles to the original structure and dipping about 30 degrees north. Work was suspended at this point in the fall of 1966. In April 1967, underground work was resumed and an underground drilling program, consisting of 4 holes fanned out from the face of the 1-2N drift resulted in good intersections to the east of the drift. The No. 1-2A drift was then turned off to follow the vein east, but after about 150 feet the vein turned through nearly 90 degrees and continued on a strike approximately parallel to the original No. 1-2N drift (about north $10-20^{\circ}$ east). During the 1967 underground work the

No. 1-2A N drift was continued for a total distance of about 1,600 feet (from its junction with the No. 1-2N drift). In addition to the work on the No. 1-2A N drift, a second drift (No. 1-2A S) was turned off from the No. 1-2A N and No. 1-2N intersections and advanced a total of about 500 feet, part of which was in ore-grade mineralization. To test updip continuity of mineralization three raises were driven from the No. 1-2A N and No. 1-2A S drifts. One is located on the No. 1-2A S drift about 100 feet west of its junction with the No. 1-2N drift. It was angled south for a distance of 150 feet. The other two raises were driven northeast off the No. 1-2A N drift at locations approximately 350 feet and 900 feet beyond its junction with the No. 1-2N drift.

According to reports released by the company, 12 ore shoots ranging in length from 15 to 105 feet and totalling 609 feet have been established by the work on the No. 1-2A N and 1-2A S drifts. (Northern Miner, October 19, 1967 and November 24, 1967). Ore grades range from 0.185 ounces per ton gold and 22.0 ounces per ton silver over a width of 5.4 feet (15-foot ore shoot) to 0.329 ounces per ton gold, 10.36 ounces per ton silver, 2.12 per cent lead and 1.92 per cent zinc over 5.4 feet (105-foot ore shoot (op. cit.)). Probable ore reserves are estimated at 49,800 tons with a gross value of \$39.61 per ton (op. cit.).

As exposed in the No. 1-2A S and 1-2A N drifts the vein is a strong, fairly persistent structure ranging from about 1.5 to 6 feet in width and composed of massive white quartz streaked with bands and lenses of sulphides, chiefly arsenopyrite, pyrite and subordinate galena. The contacts with the wall-rock (pale grey to greenish grey, fine-grained silicified andesite or dacite) are usually sharp, locally knife-edged. Disseminated pyrite mineralization commonly continues into the wall-rock for 2 feet or more.

The company plans additional extensive underground exploration in 1968, including a second adit which will be located about 150 feet vertically below the present 2700 level.

UPPER WHITE RIVER AREA

Micro and Per Groups (Discovery Mines Limited (61°57'N, 140°
(Nickel-Copper) Rayrock Mines Limited 32'W)
Consolidated Canadian
Faraday Mines Limited)

References: Campbell (1960); Muller (1958, 1967); Findlay
(1967, pp. 13-16; pp. 50-51).

This property, totalling 54 claims is held by a consortium of companies comprising Discovery Mines Limited (50 per cent), Rayrock Mines Limited (25 per cent) and Consolidated Canadian Faraday Mines Limited (25 per cent) under option agreement from P. Versluce and associates, Whitehorse. The claims lie on the east and west banks of White River and cover the old nickel-copper occurrence of Canalask Nickel Mines Limited. The property is reached by a 2.8-mile access road that leaves the Alaska Highway at about Mile 1167½. During the 1967 season, a surface exploration program, including geophysical surveys, bulldozer trenching and diamond drilling, was carried out under the direction of Discovery Mines Limited.

The Canalask property has a similar geological setting and exploration history as the Wellgreen nickel-copper property of Hudson Bay Mining and Smelting Company Limited. Nickel-copper sulphides were first discovered on the east bank of White River in 1952 by Prospectors Airways Company Limited, which did about 5,322 feet of surface diamond drilling on the property during the 1952-1953 seasons. In 1954 the property was acquired by Canalask Nickel Mines Limited and between 1954 and 1958 this company completed an extensive surface and underground exploration program involving 8,785 feet of surface drilling, 1,700 feet of underground drifting and about 1,500 feet of underground drilling. Work was suspended in the spring of 1958, at which time ore reserves of 550,000 tons averaging 1.68 per cent nickel had been indicated. The underground work was carried out from a 420-foot adit driven east from the east bank of White River at an elevation of 2,700 feet. A total of about 1,000 feet of drifting and crosscutting was completed on this level. A 336-foot winze sunk from the No.2 North crosscut connects the 2,700 level with a second 2,400 level. About 375 feet of drifting was done on the 2,400 level.

In 1964, P. Versluce and associates staked the original property, as well as additional claims on the west bank

of the river. Surface exploration during the 1966 season, including blasting, hand trenching and bulldozer trenching, disclosed several new mineralized areas, some of which were further investigated in 1967.

Sulphide mineralization (pyrrhotite, pentlandite, sphalerite, pyrite, marcasite and chalcopyrite) occurs mainly as fine-grained, patchy disseminations, less commonly as small massive lenses, in fine-grained altered intermediate volcanic rocks, members of the Lower Permian unit 10 assemblage of Muller (1967). These rocks have been variously described as 'cherty tuffs' 'silicified andesite' and 'albitized volcanics'. For the most part they are dense, competent rocks, in places finely laminated, and locally intensely fractured or shattered. Silica-rich zones and bands are common, and it is probable that the unit is largely of tuffaceous origin. The main sulphide zone lies about 400 feet to the north of a steeply north-dipping, north 20° west-trending peridotite intrusion. According to Campbell (1960) the intrusion is at least 2,600 feet long and up to 250 feet wide. A discontinuous section through the intrusion is exposed along the east bank of White River, to the south of the adit portal. Its footwall consists of a 100-foot-wide zone of altered anorthositic olivine gabbro. Adjacent to this to the north is aphanitic serpentinized dunite containing minor disseminated pyrrhotite. The contact with the footwall gabbro is not exposed. The ultramafic part of the intrusion grades from the basal (?) serpentinized dunite through feldspathic peridotite into a fine- to medium-grained picrite at its north margin. Both the latter rock types contain visible pyrrhotite. The total width of the ultramafic zone in this area is about 600 feet.

There is little doubt that sulphide mineralization was associated with emplacement of the ultramafic intrusion. The mineralogical and lithological characteristics of the intrusion, in particular the presence of feldspathic ultramafic rocks, and associated gabbroic rocks are typical products of a gabbroic or basaltic magma that at some stage in its differentiation history separated a sulphide-rich phase. The Canalask occurrence is however different from the other principal sulphide occurrence associated with an ultramafic intrusion in the Kluane belt (Wellgreen property, see Findlay 1966, pp. 52-53) in that the sulphides occur chiefly in disseminated form and are localized at some distance from the ultramafic contact rather than being in massive form along the contact. It has been suggested (Findlay 1966, p. 16) that this may be

a function of the nature of the enclosing rocks. In the case of Canalask, the dense, hard volcanic host-rocks would probably behave competently under stress, allowing the development of strong fracture networks for access of sulphides dispersing from a source. It should be noted however, that the sulphide zone at Canalask, based on present evidence (see below) appears to be dipping toward the ultramafic contact, and the possibility of massive sulphide occurrences at depth along the contact should not be discounted.

As outlined by the original surface and underground exploration work done by Canalask Mines Limited, the main sulphide zone trends approximately west, dips about 75° south, has a length of 310 feet and an average width of about 49 feet. It is approximately conformable to south-dipping structures in the host volcanic rocks and may converge with the north-dipping peridotite contact at depth. Continuity of the zone to a depth at least 150 feet below the adit level (2700) was indicated by drilling and by development work on the 2400 level and this was confirmed by surface drilling carried out by Discovery Mines Limited in 1967. This latter drilling also indicated that the west end of the zone is truncated by a north-south-trending fault, about parallel to White River (locally referred to as the White River Fault). In addition to the main zone, two other mineralized areas are known. One lies about 150 feet north of the main zone and is approximately parallel to it. It is locally up to 70 feet wide but the nickel content is generally lower than the main zone. A third mineralized zone, of undetermined extent, lies below the 2400 level workings and west of the White River Fault. This zone, originally intersected by old drilling and confirmed by 1967 drilling, is the first indication that economic mineralization exists west of the White River Fault, beneath White River.

Work carried out by Discovery Mines Limited in 1967 consisted of ground magnetic, electromagnetic, and I.P. surveys, extensive bulldozer trenching, and two surface diamond-drill holes totalling 1,311 feet. The I.P. surveys outlined several anomalies, one of which reflects the main sulphide zone. Four trenches, trending approximately north-south, were cut across the axis of the main sulphide zone at distances of about 300 feet, 600 feet, 1,200 and 1,500 feet east of White River. Rusty volcanic rocks carrying disseminated sulphides are exposed in each of these trenches. A grab sample taken by this writer from the most heavily mineralized part of the

lower trench assayed:* 0.72 per cent copper; 0.38 per cent nickel. A similar sample from the 2nd from the upper trench over the extension of the North Zone assayed:* 0.25 per cent copper; trace nickel. Results of surface diamond drilling were encouraging, despite difficulties experienced in completing the program due to poor ground conditions and labour shortages. The first hole, collared just above the east bank of White River about 300 feet south of the 2700 level adit gave a 24-foot intersection through the main sulphide zone averaging 1.74 per cent nickel and 0.23 per cent copper (Northern Miner, October 12, 1967, p. 1). The second hole, collared on a gravel bank in White River, about 25 feet from the east bank and about 100 feet west of the first hole, penetrated the mineralized zone west of White River Fault and provided a 36-foot intersection averaging 1.55 per cent nickel and 0.16 per cent copper (Northern Miner, December 7, 1967, p. 10). Ore reserves, recalculated to incorporate the results of 1967 work, are now estimated by the present company as 500,000 tons averaging about 1.5 per cent nickel (op. cit. October 12, 1967, p. 10). Additional work, including rehabilitation of the underground workings and an underground drilling program, is planned to commence in March, 1968. The company has acquired the old Canadian National Telecommunications repeater station camp at Mile 1167 on the Alaska Highway to use as a base for future operations.

*Assayed by G. Spalding, Whitehorse, Y.T.

Canyon City

United Pemetex Limited (Silver City Mines Limited) (61°47'N,
(Copper) 140°47.5'W)

References: Findlay (1967, pp. 51-52)

This property, formerly the Marc Group of Silver City Mines Limited, is on the east side upper White River about 18 miles south of Mile 1168 on the Alaska Highway. The property includes the old Discovery Copper Grant on which native copper with minor chalcocite and chalcopyrite, occurring in Triassic amygdaloidal basalt, was discovered about 1905 (Cairnes, 1915, pp. 139-141). Subsequently, the original discoveries were investigated by short adits and hand trenching and several large slabs of native copper were found. One large

slab, weighing approximately 3,000 pounds is now displayed outside the Yukon Historical Society McBride Museum in Whitehorse.

During the 1967 season, Silver City Mines Limited carried out a surface exploration program over parts of the property. The work included geochemical and geophysical surveys, geological mapping, and prospecting. Late in the season a bulldozer trenching program was carried out, largely based on the geochemical results. Trenching uphill from one of the original adits (caved) and about 300 feet above the east bank of White River, uncovered a significant new copper showing. The showing consists of a 39-foot wide zone in fractured, dark green, locally amygdaloidal Triassic Mush Lake Group basalt (unit 13, Muller, 1967). Copper mineralization occurs principally as clusters of narrow veinlets, stringers and lenses of steely chalcocite with subordinate native copper and minor bornite. A prominent fracture zone trending about north 20° east appears to be a control of mineralization and the zone dips steeply or vertically. Published assay values across the zone as exposed by the initial trenching were: eastern 9 feet - 0.76 per cent copper; western 30 feet - 3.53 per cent copper and 0.2 ounces per ton silver (Northern Miner, January 11, 1968). Two chip samples taken by this writer across two 12-foot sections of the main zone assayed:* 2.99 per cent copper 0.04 ounces per ton silver and 4.88 per cent copper and 0.22 ounces per ton silver, respectively.

Subsequent to the new discovery in the fall of 1967 Silver City Mines Limited entered into an agreement with Central Del Rio Oils Limited and a private company called United Pemetex Limited was formed to further explore the property. In February, 1968 equipment and supplies for a drilling program were transported to the property via a 20-mile tote-road that follows the east bank of White River from the access road leading to the old Canalask Nickel property (Discovery Mines Limited) about 2 miles south of Mile 1168, Alaska Highway. By early March, 1968 the drilling program had commenced and the initial two holes, located about 50 feet west of the surface showing, penetrated good mineralization at depths of 35 feet and 85 feet below surface. Assays reported were: hole No. 1, 25.0 feet averaging 2.3 per cent copper and hole No. 2, 27.0 feet averaging 4.97 per cent copper (Northern Miner, March 14, 1968). Subsequent drilling through the spring of 1968

*Assayed by G. Spalding, Whitehorse, Y.T.

(11 holes) intersected ore-grade mineralization in places but the overall grade and distribution of copper minerals has proven erratic and the structure of the mineralized zone is apparently complicated by numerous faults. Continued exploration of the property, including an Induced Polarization survey in the showing area, is planned for the 1968 season.

Quill Creek

Quill Creek Mines Limited (Newmont Mining Corporation Limited)
(Copper) (61°27'N, 139°26'W)

References: Findlay (1967, p. 53); Muller (1967).

Quill Creek Mines Limited was formed by arrangement between P. Versluce and associates of Whitehorse and Newmont Mining Corporation Limited to explore copper prospects in upper Quill Creek area, Kluane Range. The property comprises 153 claims and is reached from the Wellgreen Mine (Hudson Bay Mining and Smelting Company Limited) access road that leaves the Alaska Highway near Mile 1111. At about Mile 6 on this road a rough 5-mile access road leads along upper Quill Creek to Ram Creek and thence into Ram Basin, the location of one of the main showing areas on the property. The property was optioned by Newmont Mining Corporation Limited in 1966 and in 1967 the new company, Quill Creek Mines Limited carried out extensive exploration in the area, including airborne magnetic surveys, geochemical and geological surveys, bulldozer trenching and diamond drilling.

Copper mineralization in Triassic Mush Lake Group volcanic rocks has long been known at various localities in the Kluane Range (Muller, 1967). Between 1954 and 1956, Hudson Bay Mining and Smelting Company Limited carried out surface exploration including limited diamond drilling on several copper showings in the Quill Creek-Ram Creek area but none of these occurrences proved economically significant. In 1966 P. Versluce and associates discovered several new copper occurrences in Ram Creek area and Quill Creek Mines Limited was formed to explore these new discoveries.

The 1967 work was concentrated principally on three showing areas, Ram Showing, located in Ram Basin, an overburden-covered hollow drained by Ram Creek, a tributary of upper

Quill Creek, and the Linda and Fossil showings, located on the ridge immediately north of Ram Basin above the headwaters of two northwest-flowing tributaries of Quill Creek known locally as Linda and Fossil creeks.

Copper mineralization occurs in the Ram Creek-Quill Creek area as scattered, patchy disseminations of chalcocite, bornite, subordinate native copper and rare chalcopyrite in malachite-stained fractured Triassic Mush Lake volcanic rocks. The volcanics range from purplish amygdaloidal basalt with prominent vesicles filled with calcite and zeolites to pale-green, massive andesitic-looking varieties. The latter are probably the equivalent of Muller's (1967) "spilitic basalt". Copper minerals occur disseminated through the matrix of the volcanics, with quartz, calcite and zeolites as vesicle-fillings, and along epidotized fracture and shear surfaces in more deformed rocks. Mineralization is generally of erratic and discontinuous distribution. In the Ram Creek-Fossil Creek-Linda Creek area the Mush Lake volcanic rocks are overlain by sedimentary rocks, including silty limestone, argillite, shale, coral limestone and chert pebble conglomerate, presumably of Permian (Cache Creek) age. According to detailed mapping by company geologists the Cache Creek rocks overlie the Mush Lake rocks unconformably and are separated from the latter by a shallowly southwest-dipping thrust fault.

The Ram showing lies at an elevation of about 5,500 feet and occurs in well-fractured, locally amygdaloidal, basalt. The rocks of the immediate area are intensely sheared, altered and crumpled and chalcocite, bornite and rare chalcopyrite occur in malachite-stained irregularly-distributed patches in the sheared and altered volcanics. Extensive bulldozer trenching in this area during the 1967 season traced the mineralized zone for more than 1,000 feet along strike, but the width of the zone and the grade of mineralization proved erratic. A diamond-drill hole was sunk to a depth of 196 feet in this area to test the Ram zone at depth. Mineralization was encountered in the hole but the grade was not sufficient to be encouraging.

The Linda and Fossil (No. 1 and No. 2) showings are located about 3,200 and 4,800 feet respectively northeast of the Ram showing and lie at elevations of 5,700 to 5,900 feet. They are exposed on steep, partly scree-covered slopes making sampling and trenching difficult. Mineralization is similar to that of the Ram showing and is apparently concentrated in

the volcanic rocks close to the tectonic contact with overlying Cache Creek rocks (limestone). Detailed mapping and sampling of these occurrences showed the mineralized zones to be of patchy and irregular distribution and of insufficient overall grade to be economic. Three diamond-drill holes were located in Cache Creek rocks between the Fossil No. 1 and No. 2 showings in an attempt to investigate the Mush Lake volcanics beneath the thrust fault separating the two units, but difficulties were experienced in drilling, core recovery was unsatisfactory, and the holes had to be abandoned before reaching target depths.

Burwash Creek

Alice Lake Mines Limited (Glen Property)(61°17.5'N, 139°19'W)
(Nickel-Copper)

Alice Lake Mines Limited holds a 64-claim group covering an old nickel-copper showing on Burwash Creek, just above the mouth of Tetamagouche Creek. The property is accessible by a rough 6-mile road that leads from Mile 1104 on the Alaska Highway to the placer mining operations of Burwash Mining Company Limited.

Minor nickel-copper sulphides (pyrrhotite, pentlandite and chalcopyrite) reportedly occur along the west contact between an ultramafic intrusion and altered Cache Creek sediments (Muller, 1967, unit 11). As exposed along Burwash Creek, the intrusion is about 800 feet wide, but this may represent only a tongue of a larger body. The principal rock type is dark green, nonpoikilitic serpentized peridotite, but near its western (upstream) margin the peridotite is pyroxene-rich and there are local zones of olivine pyroxenite. Cache Creek rocks in contact with the peridotite to the west are fine grained, thinly-laminated argillite containing siliceous bands. They strike westerly and dip moderately north. Rocks exposed east (downstream) from the peridotite contact are buff-weathering, cream to white, porphyritic volcanics, probably of rhyolitic composition. A narrow zone containing disseminated nickeliferous sulphides and small lenses and patches of sub-massive sulphides (pyrrhotite, pyrite, chalcopyrite) is reported to occur on the north bank of Burwash Creek about 600 feet upstream from the mouth of Tetamagouche Creek, but this was not observed by the writer.

Previous work has been done on this property, and core from three old drillholes is present at sites above the north bank of Burwash Creek. The drilling was presumably done to test the sulphide showing noted above, but details of this work are not known.

The Glen property was acquired by the present company in 1967 and late in the 1967 season a program of surface exploration was initiated. Ground magnetometer and electromagnetic surveys were carried out over part of the property, as well as some geological mapping. The electromagnetic surveys outlined a number of conductive anomalies, most of which are apparently related to contacts of the ultramafic intrusion. Late in September, 1967 a diamond drill was positioned on the property and two short holes (totalling about 600 feet) were completed before freezing conditions terminated operations. Further drilling is planned for the 1968 season.

Geophoto Services Limited

(General Exploration - Kluane - White River Areas)

In 1966 this company carried out a general, helicopter-supported, reconnaissance geochemical survey over parts of Kluane and White River areas. In this program Geophoto Services Limited was acting in a managerial capacity for a joint venture composed of Alcon Petroleum Limited, Canadian Industrial Oil and Gas Limited and Imperial Oil Enterprises Limited.

As a result of the 1966 work a number of claim groups were staked and additional surface exploration was carried out on these properties by Geophoto Services Limited in 1967. On the 30-claim Lep Group (61°51'N, 140°33'W) geological and ground geophysical (electromagnetic and magnetic) surveys were made in the vicinity of small copper and zinc occurrences discovered in 1966. The main showing reportedly consists of massive pyrite and sphalerite occurring in silicified marble near the contact with a mafic intrusion. Two small copper showings reportedly occur nearby. A limited packsack drilling program (6 holes totalling 107 feet) was carried out to test the property but results were apparently unfavourable.

West of the junction of Burwash and Tetamagouche creeks some work was done on the 28-claim Cork Group (about 61°23'N, 139°25'W) where minor copper mineralization was reported. In the same area a magnetic survey and a soil sampling

program were carried out on the 32-claim Mike Group (about 60°09'N, 137°19'W) to follow up anomalous copper values obtained from a tributary to Fraser Creek during the 1966 reconnaissance program.

Quiet Lake

Trans Yukon Exploration Limited (60°55.5'N, 133°04'W)
(Nickel?)

References: Lees (1936); Mulligan (1963).

This company holds a total of 236 claims in 2 blocks covering a prominent airborne magnetic anomaly (Geol. Surv. Can.; Geophys. Paper 1345 (105 C/14)) located immediately south of Quiet Lake and about 3 miles east of Mile 45 on the Canol Road. The property, originally staked by R.J. Lindsay of Whitehorse, was briefly optioned in 1967 by Newmont Mining Corporation Limited which carried out ground geophysical work and a reconnaissance soil sampling program. The latter company terminated its option in the summer of 1967 and the present company was subsequently formed to carry out exploration of the property in 1968.

Little is known of the geology of the property because of paucity of outcrop but it is probably partly underlain by schists and gneisses of the Big Salmon Complex (unit 1, Mulligan, 1963) and possibly in part by Cretaceous granitic rocks of the Coast Intrusion sequence (unit 13, op. cit.). The magnetic anomaly is similar in character and intensity to those associated with ultramafic intrusions elsewhere in Teslin area (c.f. Lone Tree Creek northeast of Mile 816, Alaska Highway). Although ultramafic intrusions are not shown by Mulligan (1963) in Big Salmon Complex rocks, Lees (1936) noted several small serpentinite occurrences in these rocks (called Yukon Group by him) near Mount Murphy and Sidney Creek west of the south end of Quiet Lake. It seems probable that the metamorphic rocks of Mulligan's Big Salmon Complex are in part equivalent to similar rocks of the Quiet Lake area to the north (units A, B and C, Wheeler, Green and Roddick, 1960) that do contain ultramafic intrusions, and thus their occurrence in these rocks south of Quiet Lake would not be anomalous. On the Trans Yukon Exploration Limited property the reported occurrence of anomalous nickel values in soil samples may

support the inference that buried ultramafic rocks are present in the area.¹

¹Subsequent surface exploration carried out in 1968 was successful in locating outcrops of serpentinized peridotite.

WATSON LAKE MINING DISTRICT

PELLY MOUNTAINS AREA

Ketza River

Silver Key Mines Limited (about 61°33'N, 132°10'W)
(Silver-Lead)

References: Wheeler, Green and Roddick (1960a); Skinner (1961, pp. 39-40; 1962, p.36); Green (1966, pp. 64-68); Findlay (1967, pp. 56-58).

Silver Key Mines Limited, holding a total of 125 claims and 7 fractions covering numerous silver-lead showings in upper Ketza River area, did not work on its own holdings in 1967 but instead carried out a joint operation with adjacent Stump Mines Limited on the latter company's newly-discovered A-1 silver-lead prospect (see below).

Stump Mines Limited (61°31.5'N, 132°11'W)
(Silver-Lead)

Reference: Findlay (1967, p. 58).

During 1967 Stump Mines Limited carried out a bulldozer trenching and sampling program on its A-1 silver-lead prospect discovered in late 1966 as a result of a geochemical survey carried out jointly with adjacent Silver Key Mines Limited. The showing lies at an elevation of about 5,500 feet and is about 1½ miles south of Cache Creek. The F-3 showing of Silver Key Mines Limited (see Findlay 1967, p. 58) lies between Cache Creek and the A-1 zone and is apparently on strike with it.

The A-1 showing consists of a prominent north-striking fracture zone cutting fine-bedded silty limestone, grey,

sericitic phyllite and graphitic argillite (unit 2, Wheeler, Green and Roddick, 1960) containing local quartz bands and lenses. Over part of its length the structure contains disseminated to massive steel galena with siderite gangue material over widths up to 4-5 feet. Locally, a band of massive galena, up to 14 inches thick, is present within the zone. The mineralized zone dips about 60 degrees west and has been traced by means of a series of bulldozer trenches for a length of over 1,000 feet with ore-grade mineralization present over a strike length of 810 feet on surface. Surface samples averaged 24.9 ounces per ton silver and 22.2 per cent lead over a 4-foot width. A chip sample collected by the present writer across 5 feet near the north end of the vein exposure assayed: * 0.04 ounces per ton gold, 25.3 ounces per ton silver, 23.9 per cent lead and trace zinc.

Late in the 1967 season a diamond drilling program (5 holes totalling 950 feet) was conducted on the showing to test the depth extensions of the vein. The drilling results were encouraging and in April 1968 equipment and supplies were moved to the property for an underground exploration program. The adit was collared at an elevation of about 5,350 feet on the bank of a small gulley south and east of the showing. The vein was intersected in the adit (cross-cut) about 400 feet from the portal and early in the summer of 1968 drifting was continuing along the vein.

*Assayed by G. Spalding, Whitehorse, Y.T.

Northwest Explorers Limited (about 61°30'N, 132°07.5'W)
(Lead-Silver)

Northwest Explorers Limited holds a total of 153 claims adjacent to and south of the properties of Silver Key Mines Limited and Stump Mines Limited. The property was initially staked in early 1967 following discovery of the new A-1 vein zone on Stump Mines Limited ground. The geology of the property is similar to that of the general Ketz River area, with various sedimentary rocks (quartzite, phyllite, schist, limestone and dolomite) of probable Cambrian to (?) Mississippian age exposed (Wheeler, Green and Roddick, 1960a).

During the 1967 season surface exploration work, including prospecting and a reconnaissance soil sampling pro-

gram, was carried out. Several geochemically anomalous zones were outlined and further work is planned for the 1968 season. Float containing lead-silver mineralization was reportedly discovered near several of the geochemical anomalies.

Groundhog Creek

Canol Mines Limited (61°39'N, 132°48'W)
(Silver-Lead)

Reference: Wheeler, Green and Roddick (1960a).

Canol Mines Limited holds 68 claims covering a silver-lead prospect between Seagull Lakes and upper Groundhog Creek about 26 miles southwest of Ross River. The property is reached by a 12-mile access road, that leaves the Canol Road near Lapie Lakes (Mile 98) and follows the valley of Groundhog Creek for much of its length.

The property is underlain by Cambrian to Silurian and Devonian sediments, principally blue-grey dolomite, and graphitic phyllite and argillite containing limy sandy and cherty layers (units 2 and 4, Wheeler, Green and Roddick, 1960a). The sedimentary rocks are gently folded with strikes generally west to northwest and dips ranging from 45° to steep south.

The main showing lies at an elevation of 6,100 feet on the west slope of a peak immediately west of lower Seagull Lake. It consists of a north-trending, steep to vertically-dipping break in blue-grey dolomite (unit 2, op. cit.) that is locally brecciated and impregnated with quartz veins and stockworks. The break is heavily oxidized, up to 4-5 feet thick, and contains siderite with massive, coarse-grained galena and minor pyrite in lenses and bands exposed along a strike length of about 200 feet. The massive sulphide mineralization is locally up to 24 inches thick. A chip sample across 3 feet of the vein (including 15 inches of massive galena) collected by this writer from the central part of the exposure assayed:* 0.07 ounces per ton gold, 24.5 ounces per ton silver, 45.2 per cent lead, and 5.1 per cent zinc.

*Assayed by G. Spalding, Whitehorse, Y.T.

Downslope to the south and west of the main showing a number of bulldozer trenches have been cut to bedrock to follow up geochemical soil sampling results. Most of the trenches exposed grey to black graphitic and phyllitic rocks, commonly limy and in places containing siliceous bands and layers. These are probably Cambrian sediments (unit 2, op. cit.) and it appears that the principal mineralized areas known on this property to date lie near the contact between the unit 2 phyllitic rocks and the dolomites of probable Silurian-Devonian age (unit 4, op. cit.). Trenching has exposed minor rusty oxidized material containing some disseminated galena in at least one of the cuts (Trench No. 6).

Work done on the property in 1967 consisted principally of geochemical soil sampling and bulldozer trenching. Late in the season, a limited diamond drilling program was carried out on the main zone, involving 5 short holes for a total of 741 feet. Since the writer's visit to the property (early September, 1967) it was reported (Financial Examiner, March 16, 1968) that a new area of heavy galena float had been discovered. Representative samples of one thousand pounds of the float material reportedly averaged 60.65 ounces per ton silver and 76.70 per cent lead.

Fyre Lake

Fyre Lake Property (Atlas Explorations Limited)(61°13.5'N,
(Copper) 130°31'W)

References: Wheeler, Green and Roddick (1960b); Skinner (1961, p. 42; 1962, pp. 39-40); Chisholm and Brock (1967); Findlay (1967, pp. 59-60).

This property (167 claims) covering copper prospects near Fyre Lake on North River and about 6 miles north of Tintina Trench was investigated by Atlas Explorations Limited during 1966 (see Findlay, 1967, pp. 59-60). Late in the 1966 season a diamond drilling program (5 holes totalling about 3,000 feet) was begun on the original Cassiar Asbestos Corporation Limited showing (called 'Dub' No. 2 by Atlas) located about 3 miles northeast of Fyre Lake, but the program was not completed before freeze-up. Early in 1967 the drilling equipment was moved to the 'Dub' No. 1 area about 1,200 feet east of the southeast corner of Fyre Lake and 3 holes totalling about 1,200 feet were drilled to test coincident geochemical

and geophysical anomalies outlined by 1966 work. The drilling failed to explain the anomalies and no further work was carried out on the property during 1967.

Hoole River

El, Hoo, Leo, Z (Northlake Mines Limited)(61°20'N, to 61°32'N;
(Lead-Zinc-Copper) 130°50'W to 131°37'W)

Northlake Mines Limited reduced its 1966 holdings in Hoole River area from 824 claims to 416 claims. The present holdings comprise several groups located north of Hoole River approximately between the mouth of McNeil River and Grass Lakes. The property is about 45 miles southeast of Ross River settlement and access is provided by means of a rough tote-road that leaves the Watson Lake-Ross River highway at Mink Creek. The access road is navigable only by tracked vehicle. The general area is underlain chiefly by chloritic and quartzitic schists of uncertain age (unit A, Wheeler, Green and Roddick, 1960b), probably partly of volcanic origin, that have been intruded by serpentized ultramafic rocks (dunite, peridotite). More detailed mapping on the property by company personnel has reportedly distinguished a variety of schistose and gneissic rocks, including graphitic schist, micaceous quartzite, chlorite and feldspar schist, argillite, limestone, and granitic and feldspathic gneisses.

In 1967, exploration activity on the property was concentrated chiefly on following up areas of interest outlined by last season's more generalized exploration. Work included geological mapping, ground E.M. surveys, detailed geochemical surveys, trenching, and diamond drilling. Detailed work was focussed mainly on a part of the El property where a significant lead-zinc geochemical anomaly was outlined associated with minor visible sulphide mineralization in schistose rocks. This zone was tested with 4 diamond-drill holes totalling 1,064 feet; one of the holes intersected minor lead-zinc mineralization. In addition to this work one area containing minor known copper mineralization and one with minor lead mineralization were investigated.

PELLY PLATEAU AREA

Pike Lake

Pike Group Property (Atlas Explorations Limited)(about 62°11'N,
(Copper-Silver) 130°41'W)

References: Roddick and Green (1961b); Chisholm and Brock
(1967); Findlay (1967, pp. 60-61).

Disseminated copper-silver mineralization occurs within and along the south contact of a small Tertiary (?) acidic intrusion located about 8 miles west-northwest of Traffic Mountain and west of Pelly River (see Findlay, 1967 for a detailed description of the property). A large area surrounding these occurrences was staked by Atlas Explorations Limited in 1965 and 1966 and during the 1966 season extensive surface exploration, including prospecting, geochemical and geophysical surveys was carried out by the company over its then total of 776 claims in the area. In addition, the immediate mineralized area (Pike Lake) was investigated through detailed geophysical, geochemical and geological surveys, bulldozer trenching and limited packsack diamond drilling. This work showed that the mineralization was erratic and generally of low grade and it was considered that further detailed exploration was not justified.

During the 1967 season no work was done on the original Pike showings, but additional detailed geochemical and geophysical surveys were carried out to the south of Pike Lake. Magnetic and electromagnetic anomalies outlined in this area are believed to be related to graphite- and magnetite-bearing schists.

Oxo Group (Napoli Explorations Limited)(62°12'N, 130°45'W)

Napoli Explorations Limited holds a 52-claim group adjacent to, and immediately west of, the Pike Lake property of Atlas Explorations Limited. During the 1967 season initial exploration including prospecting, and reconnaissance geochemical and magnetometer surveys were carried out. The property was not visited.

Pelly Lakes

Bill and Pelly Groups (Atlas Explorations Limited)(62°03'N,
(Lead-Zinc) 130°14'W)

Reference: Roddick and Green (1961b).

Atlas Explorations Limited holds a 44-claim block adjacent to and immediately south of Pelly Lakes. The abandoned trading post of Pelly Lakes, used as the company's base camp, lies in the extreme northwest corner of the claim group. The property was staked late in the 1966 season following discovery of anomalous copper, lead and zinc geochemical values during a reconnaissance soil sampling program in the area. During the 1967 season ground magnetometer and electromagnetometer surveys, prospecting, and detailed geological mapping was done over parts of the property. Two small lead-zinc occurrences associated with faults cutting dolomite and limestone of probable Devonian-Mississippian age (unit 5, Roddick and Green, 1961b) occur on the property. The property was not visited.

Fortin Lake

Pay Property (Atlas Explorations Limited)(61°59'N, 130°30'W)
(Zinc)

Reference: Wheeler, Green and Roddick (1960b).

Atlas Explorations Limited holds a total of 265 claims lying adjacent to and immediately east of Fortin Lake in the extreme northeast corner of the Finlayson Lake map-sheet (105 G). The claims were staked and optioned in several blocks during 1966 and 1967 following discovery of lead, zinc and gold-bearing arsenopyrite mineralization at several localities in the area and on the basis of a regional reconnaissance geochemical survey carried out by the company in 1966. Early in 1967 a tote road was constructed from a point on the Watson Lake-Ross River road near Campbell Creek to Atlas Exploration Company Limited's base camp at the abandoned trading post at Pelly Lakes. The purpose of this road was to provide winter access for transport of materials and supplies to the company's operations at Pike Lake and Pelly Lakes-Traffic Mountain area. This road crosses the Pay property immediately east of Fortin Lake about 25 miles north of the Watson Lake-Ross River high-

way. It is not passable in summer.

During the 1967 season the company concentrated much of its exploration efforts on the Pay property and carried out detailed geophysical (magnetometer and electromagnetic), geochemical and geological surveys as well as hand and bulldozer trenching operations and packsack diamond drilling on the claims. This work outlined a strong linear zinc geochemical anomaly trending about west-northwest through the property and follow-up prospecting and trenching revealed interesting zinc and lead-zinc mineralization associated with the anomaly. Operations on the Pay property were conducted from a base camp located on the southeast shore of Fortin Lake and from a second small lake (locally called Pay Lake) about 3 miles east of Fortin Lake. Further exploration, including diamond drilling is planned for the 1968 season.

The geology of this part of Finlayson Lake area is incompletely known due to the paucity of outcrop in the immediate vicinity of Fortin Lake, however, based on exposure areas east and southeast of the lake, much of the Pay property is probably underlain by various sedimentary rocks (phyllite, limestone, chert and shale) ranging in age from Middle and Upper Cambrian to Silurian-Devonian or younger (units 2 to 5, Wheeler, Green and Roddick, 1960b). Detailed mapping by company personnel during the 1967 season has confirmed this in general and shown that the sedimentary assemblages strike generally northwest and have been open-folded and cut by two principal fault sets, one striking generally west to northwest, the other northerly.

The main showing is about 2 miles east of Fortin Lake and lies near the axis of the zinc geochemical anomaly. Outcrop is sparse but two bulldozer trenches and numerous hand-dug pits have exposed bedrock and rubble above bedrock at several places. The discovery outcrop is a small knoll of grey-weathering, blue-grey, silicified limestone or dolomitic limestone, locally brecciated and impregnated with fine quartz and carbonate stockworks. In places replacement lenses and patches of sphalerite with minor galena occurs in the brecciated host rock. A grab sample of galena-bearing stockwork material collected by the writer assayed:* 0.10 ounces per ton gold, 3.64 ounces per ton silver, 17.2 per cent lead, and trace

*Assayed by G. Spalding, Whitehorse, Y.T.

zinc. Immediately east of the discovery outcrop a 150-foot long bulldozer trench was cut across the axis of the outcrop ridge, exposing stockwork-bearing, silicified limestone in the northern part of the trench and banded phyllite with argillaceous and impure quartzitic layers in its southern part. The phyllitic rocks strike northwest and dip about 45° northeast. The silicified limestone contains numerous patchy rust zones carrying fine, resinous sphalerite.

About 1,000 feet west of the discovery zone a second bulldozer trench across the axis of the geochemical anomaly did not reach bedrock but exposed stockwork-bearing silicified limestone rubble. Mineralized (sphalerite) float was reportedly found in hand-dug pits and trenches in this area. During the latter part of the field season a total of 16 packsack-drill holes were drilled at various locations along the geochemical anomaly axis but difficulties with overburden penetration limited the usefulness of the program. Minor sulphide mineralization was encountered in one hole.

CASSIAR MOUNTAINS AREA

Logjam Creek

Logjam Silver Property (Pure Silver Mines Limited)(60°01'N,
(Silver-Lead) 131°35'W)

References: Poole, Roddick and Green (1960); Skinner (1962, p. 36); Green and Godwin (1964, pp. 47-48); Green (1966, pp. 75-76); Findlay (1967, pp. 66-68).

Formerly Logjam Silver Mines Limited, this property was reorganized under the name Pure Silver Mines Limited late in 1966. The property comprises 19 claims located near the headwaters of Logjam Creek, about 10 miles north of Mile 748, Alaska Highway. It is reached by a 16-mile tote-road, that leaves the highway near Mile 758. In summer months the road is passable by truck for the first 9 miles; the remainder is traversable only by tracked vehicle.

Following discovery of the silver-lead showings by W. McKinnon of Teslin in 1944, the Logjam property has been intermittently explored by various companies, prior to 1965, mainly through surface exploration and minor diamond drilling.

In 1965, Logjam Silver Mines Limited commenced underground exploration by means of an adit (crosscut) driven from an elevation of 5,150 feet southwest into the steep northeast-facing slope on which the showings occur. As a part of the program six holes, totalling 2,607 feet, were drilled from the main crosscut.

Silver-lead mineralization occurs in quartz-bearing veins and lenses that cut a steep-dipping diorite sill which intrudes banded siliceous sediments of Devonian age (unit 8, Poole, Roddick and Green, 1960). The sediments are of uncertain derivation but near the present workings they include argillaceous quartzite, more massive quartzitic members, and probably silicified limestone. The diorite is a fine- to medium-grained rock composed of plagioclase, dark hornblende, clinopyroxene, biotite and a little quartz. It is locally saussuritized. The diorite-sediment contact, as exposed in the underground workings, and as shown by drill core intersections, is marked by a narrow, fine-grained, greenish hornfels zone. Diorite adjacent to the hornfels looks partly chilled. Eight principal veins are known on the property. The veins average 2-3 feet wide and consist of quartz and carbonate gangue material carrying arsenopyrite, pyrite, pyrrhotite, galena, sphalerite and some lead-antimony sulphosalts. The vein structures show two principal attitudes, one set strikes north 60° east and a second about north 30° east; dips are generally steep.

Prior to the start of the 1967 season, underground development consisted of 970 feet of cross-cutting and 340 feet of drifting carried out from the 5150 adit. Work here was concentrated on the No. 4 vein, intersected by a west-heading drift turned off from the crosscut about 360 feet from the portal, and on the No. 6 vein intersected about 880 feet from the portal on the main crosscut. The No. 6 vein, developed in diorite, proved the most encouraging and 270 feet of drifting was carried out on the structure. Assays of this vein reportedly averaged, 0.10 ounces per ton gold, 15-22 ounces per ton silver, 3-5 per cent lead and about 3 per cent zinc. A chip sample taken by the present writer across 2.5 feet on the No. 6 vein 70 feet south of the main crosscut intersection assayed: * 0.34 ounces per ton gold, 28.9 ounces per ton silver, 17.6 per cent lead and 8.1 per cent zinc.

*Assayed by G. Spalding, Whitehorse, Y.T.

Early in 1967 a total of 315 feet of underground drilling was carried out by the company to test the extension of the No. 4 and No. 6 veins. Between late June and mid-July 1967, additional drifting (180 feet) was done on the No. 6, No. 4 veins and on the No. 4 crosscut. In mid-July work was started on preparation of a new portal site at an elevation of 5,600 feet, directly above the 5150 adit. Between mid-August and mid-October underground work was concentrated in the new 5600 adit and a total of 720 feet of drifting was completed, of which 590 feet was on vein structures. The new work included 410 feet of drifting on the No. 5 vein and 170 feet on the No. 6 vein. Assays from part of the No. 5 vein explored reportedly ranged from 8 to 18 ounces per ton silver and 3-7 per cent combined lead and zinc over widths of three feet (Northern Miner, Sept. 21, 1967; Sept. 28, 1967). Operations on the property were suspended for the season in mid-October.

HYLAND PLATEAU AREA

Quartz Lake

Redfort Prospecting Syndicate (about 60°30'N, 128°00'W)
(Lead-Zinc-Silver)

Reference: Findlay (1967, p. 66).

This syndicate, composed of Redstone Mines Limited, Rayrock Mines Limited, and Fort Reliance Minerals Limited, holds 192 claims located about 40 miles northeast of Watson Lake and surrounding the MacMillan property of Liard River Mining Company Limited (Green, 1966, pp. 72-74). Late in the 1967 season part of the property was flown with an airborne electromagnetic survey to complete data obtained from last year's airborne geophysical and ground geological and prospecting programs.

MACMILLAN PASS AREA

Tom Group (Hudson Bay Exploration and Development Company Limited)
(Zinc) (63°10'N, 130°09'W)

Reference: Green (1965, pp. 47-48).

Hudson Bay Exploration and Development Company Limited

ed carried out a diamond drilling program during the 1967 season on its 144-claim Tom Group located southeast of the Canol Road and about 6 miles southwest of the Northwest Territories-Yukon Territory boundary. The property is accessible by a 2-mile road that leads from the Canol Road to the company camp on the property. A short (1,200 feet) airstrip located near the Canol Road has been used in the past for exploration in the area but more recently company operations have been expedited from a float plane-serviced base camp at Jeff Lake 13 miles southwest of the property.

The original zinc showing was discovered in 1951 by A. Lindsay and L. Saville (Green, 1965, p. 47). Between 1951 and 1953, surface exploration including 17,834 feet of diamond drilling (39 holes) delineated an ore zone containing about 10,470,000 tons averaging about 5 per cent zinc (op. cit.). Following 1953 the property was idle until 1966 when a small crew carried out a geochemical soil survey program and additional geological mapping and prospecting in the area. In 1967 additional geochemical work and surface exploration was done as well as about 5,500 feet of diamond drilling (10 holes). The results of this work were encouraging and in March, 1968 the company began moving equipment, fuel and supplies up the Canol Road from Ross River using cat-trains in preparation for additional drilling during the 1968 season.

Two principal mineralized zones occur on the property. The discovery (West) zone lies at an elevation of about 5,500 feet on the northeast side of a cirque-valley containing a small northwest-flowing tributary of South MacMillan River. The showing outcrops discontinuously along a steep scree-slope for about 200 feet. It consists of a buff to rust coloured, well-laminated, barite-rich carbonate bed containing disseminated sphalerite and galena along bedding planes and as replacement assemblages in the rock. The carbonate zone is contained within a thick sequence of finely-banded argillite and cherty argillite. The sediments trend about northwest; dips are variable but generally steeply southwest. A few hundred feet southeast of the discovery zone, the argillite is in contact with a distinctive chert-rich rock that contains angular to subrounded fragments of grey chert and argillite in a gritty siliceous matrix. This unit has been called 'chert pebble conglomerate' but the broken and dislocated nature of the fragments, the fact that only chert and argillite fragments are observed, and the indigenous nature of the matrix suggest

that it is an intraformational breccia formed within chert-rich horizons in the argillite during deformation of the latter. Drill core from the vicinity of the mineralized zones shows small-scale examples of such structures where severe crumpling locally accompanied by dislocation is preserved in siliceous bands between argillite layers. Green (1965, p. 47) suggested that the rocks exposed on the Tom Group are similar to strata lying to the southwest in Sheldon Lake map-area (Roddick and Green 1961b) and that they are probably Ordovician to Silurian in age.

Geological mapping by company personnel along with information obtained by drilling, suggests that the mineralized zones lie along the southwest limb of a large fold in the argillite sequence. The main (West) zone has been traced discontinuously by drilling for a strike-distance of about 5,000 feet, but only the southern part of the zone appears to contain ore-grade mineralization. The width of the zone ranges from less than 50 feet to about 125 feet. Uphill from the main zone and about 800 feet northeast of it a second narrower mineralized zone has been outlined. It is subparallel to the West zone and has been traced discontinuously for about 800 feet. Although thinner than the West zone (generally less than 50 feet) total sulphide mineralization is locally heavier than in the former and the galena and silver content appears higher.

Sulphide mineralization varies from massive, very fine-grained, galena-sphalerite lenses to cherty argillite zones containing frequent thin galena-sphalerite laminations. In all ore sections and in the host rocks adjacent to mineralized zones fine-grained pyrite is prominent. Commonly, pyrite forms massive bands or lenses within galena-sphalerite sections. Company personnel consider that ore mineralization has replaced a limestone horizon in the argillite and some drill core sections contain remnants of a soft, banded rock probably containing limy bands.

MACKENZIE (NORTHWEST TERRITORIES)
AND MAYO MINING DISTRICTS

MACMILLAN PASS AREA

MacMillan Pass Tungsten Showing (American Metal Climax Incorporated) (63°17'N, 130°09'W)
(Tungsten)

References: Green and Godwin (1963, p. 19); Green (1965, pp. 48-50).

This company holds a total of 70 claims (36 in Yukon Territory and 34 in Northwest Territories) covering a tungsten showing located about 5 miles northwest of MacMillan Pass. The showing was staked in 1962 by Southwest Potash Corporation then a subsidiary of American Metal Climax Incorporated. Limited surface exploration was carried out in 1963 and 1964, following which the property was idle until 1967. In 1967 reconnaissance geochemical and geological mapping and prospecting was carried out and further work is planned for 1968.

The main showing occurs along the northeast face of a cirque at an elevation of 6,100 to 6,200 feet. It consists of disseminated pyrrhotite-scheelite mineralization in green, diopside-tremolite-garnet skarn bands formed through alteration of a limestone member ('Sherwood Limestone') within a variable sedimentary assemblage that includes chert, phyllite, hornfels and argillite. Green (1965, p. 49) suggested that these rocks were probably Ordovician to Silurian but company geologists believe that at least the lower part of the sequence may be Cambrian. Skarn development is patchy and erratic within the limestone member and several varieties have been recognized. The skarn zone is adjacent to the southwest contact of a small granodiorite stock that is exposed near the base of the cirque wall and on the valley floor. The main mineralized zone averages about 45 feet in thickness and has been traced along strike for about 1,800 feet. Based on the original surface sampling done in 1963 and 1964 it is estimated to contain about 2 million tons grading about 0.90 per cent WO₃. Work done in 1967 outlined a second mineralized skarn zone lying above the main zone. Its extent has not been fully delineated but it is believed to be thicker than the main zone and probably of lower overall grade.

NAHANNI MINING DISTRICT

DISTRICT OF MACKENZIE, NORTHWEST TERRITORIES

SELWYN MOUNTAINS AREA

Upper Flat River

Canada Tungsten Mining Corporation Limited (61°57'N, 128°15'W)
(Tungsten-Copper)

References: Green and Roddick (1961); Brown (1961);
Skinner (1961, pp. 43-46; 1962, pp. 41-43); Green and
Godwin (1963, pp. 34-37; 1964, p. 48); White (1963,
pp. 390-393); Green (1965, pp. 50-51; 1966, p. 85);
Findlay (1967, pp. 68-69).

The Canada Tungsten Mine is located near the headwaters of Flat River about 130 miles north of Watson Lake, Yukon. An allweather road links the mine with the Watson Lake-Ross River road at about Mile 71 on the latter. The deposit was discovered in 1954 and has been in production since 1962, except for a period between September 1963 and May 1964 when the price of tungsten was depressed, and again during the period January-November 1967 following a serious fire at the property in late 1966.

The tungsten orebody lies in the floor of a small cirque at an elevation of about 5,000 feet, and is mined by open-cut methods. The mine is connected to the mill and townsite by a switch-back haulage road that descends 1,300 feet in 3 miles. The deposit consists of a shallowly southwest-dipping lens about 300 feet wide and up to 65 feet thick that lies mainly within a lower Cambrian 'ore limestone' member. A diopside-garnet-epidote skarn developed within the limestone hosts the ore. Ores occur in two forms; as fine scheelite disseminated in a massive to heavily-disseminated pyrrhotite-chalcopyrite matrix; and, in coarse quartz-calcite-scheelite veins and lenses cutting the massive sulphides. Minor native bismuth is also present.

From the start of production in 1962 to 1966 about 456,343 tons of ore grading 2.4 to 2.85 per cent WO_3 and 0.4 to 0.45 per cent copper have been milled. Most of 1967 was occupied with reconstruction of the mill and concentrator plants that were destroyed by fire on 26 December, 1966; in

addition 43,800 tons of ore were mined and stockpiled and 148,000 tons of waste were removed from the pit area. Production resumed in December 1967 and 7,778 tons of stockpiled ore averaging 2.36 per cent WO_3 were milled to produce 13,380 STU* WO_3 and 49,030 pounds of copper.

* 1 short ton unit = 20 lb.

Lucky Lake

Lucky Lake Property (Eagle Exploration Corporation) (61°34'N,
(Lead-Zinc) 127°26'W)

References: Skinner (1961, p. 46); Gabrielse, Roddick and Blusson (1965).

This property, consisting of 92 claims is held by a joint venture in which Eagle Exploration Corporation (a wholly-owned subsidiary of Cyprus Mines Corporation) has a 75 per cent interest and D.E. Taylor and B.I. Nesbitt have a 25 per cent interest. The joint venture is under the management of Eagle Exploration Corporation. The property lies just on the Northwest Territories side of the Yukon-Northwest Territories boundary on the northeast flank of Logan Mountains. It is about 112 miles northeast of Watson Lake and about 40 miles southeast of the Canada Tungsten Mine.

Lead-zinc mineralization was reportedly first discovered in this area in 1954 and in 1955 Northwestern Explorations Limited carried out surface exploration on the showings, before allowing the claims to lapse. In 1959 the property was restaked by the Mackenzie Syndicate which did intermittent exploration there during the 1959 and 1960 seasons. Following this, the property was idle until 1965 when it was restaked by D.E. Taylor of Watson Lake. In 1966 the property was optioned by Cyprus Mines Corporation and subsequently transferred to Eagle Exploration Corporation, following which additional staking was done around the original 48 claims.

The Lucky Lake property is underlain by Cretaceous granitic rocks (granodiorite, quartz monzonite) and Middle and (?) Upper Cambrian sediments, including limestone, siltstone and minor argillite and shale (Gabrielse, Roddick and Blusson, 1965). Disseminated galena, sphalerite and subordin-

ate chalcopyrite occur locally in a pyroxene-garnet-epidote skarn developed near contacts between feldspar porphyry dykes and limy sedimentary rocks, within a contact aureole adjacent to the granodiorite pluton. There are two principal showings, about $3\frac{1}{2}$ miles apart; in addition numerous other smaller disseminated sulphide occurrences are known on the property. Skinner (1961, p. 46) reported that some of these averaged 15 to 20 per cent combined lead and zinc.

During the 1967 season the present owners carried out detailed geological, electromagnetic and magnetic surveys, in addition to surface trenching and blasting work around the known showings. A limited diamond drilling program involving 8 short holes totalling 522 feet was carried out on the main showing. Sulphide intersections were encountered in several of the holes, but details of the drilling results have not been released. A crew of 7 men was employed in the 1967 field program.

PLACER MINING

DAWSON MINING DISTRICT

KLONDIKE AREA

The Yukon Consolidated Gold Corporation Limited

References: Skinner (1961, pp. 6-9; 1962, pp. 5-8); Green and Godwin (1963, pp. 41-44; 1964, pp. 50-53); Green (1965, pp. 52-57; 1966, pp. 86-89); Findlay (1967, pp. 69-72).

The Yukon Consolidated Gold Corporation Limited was formed in 1923 from eight companies with interests and holdings in the Klondike placer fields. Until the fall of 1966 mining was carried out on various creeks in the Klondike, principally Dominion, Sulphur, Bonanza and Hunker, by means of large electrically-driven dredges and by bulldozer-sluicing plants. The company's Klondike operations were terminated at the end of 1966 because profitable extractable placer gold reserves were depleted. Over the past two years, in anticipation of closure of its operations, the company has gradually released much of its placer ground holdings in the district, and as of January 1, 1968 property retained in good standing consisted of 293 claims. Two hydraulic leases (Boyle and Anderson

Concessions) were relinquished in late 1967 and early 1968, respectively. The company headquarters at Bear Creek, 8 miles east of Dawson, was closed in late 1966 and during 1967 much of its equipment and stores were disposed of through sale to the public. The North Forks 15,000 h.p. hydro-electric power plant on the Klondike River, which formerly supplied power to the dredges and to Dawson City, was operated by the company until May, 1967 under contract with the Northern Canada Power Commission. Subsequently, this plant was replaced by a new diesel generating station constructed in Dawson by the latter agency.

Ballarat Mines Limited

References: Skinner (1961, p. 10; 1962, p. 10); Green and Godwin (1963, pp. 47-48; 1964, pp. 53-56); Schmidt (1964); Green (1965, pp. 56-57; 1966, pp. 89-91); Findlay (1967, pp. 72-73).

With the termination of the Yukon Consolidated Gold Corporation's Klondike operations in 1966, Ballarat Mines Limited, owned by Mr. and Mrs. H.H. Schmidt of Dawson, became the largest placer producer in Yukon. Total 1967 production of this company was 2,703 ounces of crude gold.

During 1967, a maximum crew of 8, including manager H. Schmidt was employed in the company operations on Quartz and Dominion Creeks, but a shortage of labour hampered operations intermittently and over parts of the season only 5 men were employed. Much of the following information on the company's 1967 operations was provided by the owners, and their co-operation is gratefully acknowledged.

Dominion Creek (63°49'N, 138°39'W)

Ballarat Mines Limited owns 2 creek claims and leases 60 contiguous claims extending downstream from the mouth of Caribou Creek to the adjacent property of the Yukon Consolidated Gold Corporation Limited. The company has operated a bulldozer-sluicing plant on the left limit bench of Dominion Creek since 1959. During 1967 about 80,000 bedrock square feet involving about 16,000 cubic yards of material were sluiced on claims 35 and 10 Dominion Creek. In addition, 15,000 cubic yards of overburden-stripping by bulldozer and about 70,000 cubic yards of black muck was removed with water

(sprinkler system) to prepare new ground for mining. Exploration on Dominion Creek included test drilling on claim 176, below the location of the Yukon Consolidated Gold Corporation's Dredge No. 10.

Quartz Creek (63°47'N, 139°06'W)

The company began mining on Quartz Creek early in the 1966 season, following preparation of ground in this area during 1965. During the 1967 season the company concentrated most of its mining efforts on the Quartz Creek ground, and a total of 131,000 bedrock square feet involving 55,000 cubic yards of material was sluiced. Mining was carried out on right limit ground upstream from the mouth of Calder Creek and from last year's workings. The ground currently being mined contains a White Channel Gravel section, variable in thickness but locally up to 15 feet. Hydraulic stripping was carried out on a right limit bench about 500 feet upstream from last year's mined ground and involved the removal of about 70,000 yards of material. Some test drilling was also done on Quartz Creek holdings.

The bulldozer-mounted conveyor-belt system and coupled elevated mobile sluicing plant tested last year, was used in the Quartz Creek operation and proved satisfactory. The system permits rapid transport of gravel from the mining area to the sluice box via a 100-foot conveyor belt, and the elevated sluicing plant enables semi-automatic tailing stacking without the use of an additional bulldozer for this purpose.

Bonanza Creek

Consolidated Mines (Yukon) Limited (63°55.3'N, 139°18'W)

Reference: Findlay (1967, pp. 73-74).

Consolidated Mines (Yukon) Limited, owned by L.M. Ross and T. Matson, leases claims 1 to 10 Above, Upper Bonanza Creek, from the Yukon Consolidated Gold Corporation Limited. During the 1966 season Ross stripped on claim 6 Above in preparation for mining and in 1967, working with one helper, he mined about 27,000 bedrock square feet from a right limit cut. Pay values proved erratic and total production was 189 ounces of crude gold. In about mid-August, 1967, the company transferred its operation to Gold Run Creek (see Page 101).

The area stripped and partially mined on Bonanza Creek (claim 6 Above) is of historic interest because it included part of the former townsite of Grand Forks, an important community during the heyday of Bonanza and Eldorado Creek operations at the time of the Klondike Gold Rush. Stripping and mining during 1967 uncovered numerous remains of old building foundations and underground workings beneath the former townsite.

The section exposed by stripping on the right limit of Upper Bonanza Creek, claim 6 Above, is as follows (top to bottom).

Feet

- 0 - 1.5-2 - soil
- 1.5-2 - 8-10 - poorly sorted gravel, overburden rock fragments, and slide rock debris. Zone contains lenticular clay and sand streaks and some cobble bands. Slates and boulders up to 1 foot are common. Principal rock type is quartz-sericite schist (Klondike schist).
- 8-10 - 15 - An irregular, lensey zone containing black and grey muck bands, clay and sand streaks and minor poorly sorted gravel.
- 15 - 20 - Coarse, cobble-to boulder gravel streaks with subordinate sand lenses. Gravel constituents are rounded and well-washed. Quartz cobbles and boulders are dominant.
- 20 - Floor of stripped area.

E.M. Lintick and S. Berg (64°00'N, 139°22'W)

References: Green (1966, p. 93); Findlay (1967, p. 74).

E.M. Lintick and S. Berg of Dawson hold 8 claims on Bonanza Creek near Sourdough Hill. During the period 15 June to mid-September, 1967, Lintick and Berg mined about 15,000 bedrock square feet from a left-limit bench cut on Cinnamon claim. Production was about 263 ounces of crude gold. Equipment includes a D-7 bulldozer and a pump and monitor system

utilized for stripping operations. Water for the operation is pumped from Bonanza Creek.

A.T. Fry (63°57'N, 139°22'W)

References: Green (1966, pp. 94-95); Findlay (1977, p. 75).

A.T. Fry of Dawson holds claim 32 Below Discovery on Bonanza Creek and leases claims 20, 21, 27, 30 and 36 Below from the Yukon Consolidated Gold Corporation Limited. In addition, Fry holds hill claims opposite 30 and 31 Below on Bonanza Creek, on the right limit of Boulder Creek opposite claim 2 Above, and 2 claims on either side of Monte Cristo Gulch. Other holdings include 2 right limit bench claims opposite 50 and 51 Below on Bonanza Creek.

In 1967, Mr. and Mrs. Fry worked mainly on claim 28 Below, Bonanza Creek and on the No. 2 Monte Cristo Hill claim. On claim 28 Below a shallow cut about 300 feet by 400 feet and averaging 2 feet deep was mined on a near-bedrock bench covering ground that had been hydraulicked in the past by the Yukon Gold Company. Bedrock in this area is quartz-sericite and quartz-chlorite schist (Klondike schist) containing small barren white quartz veins and lenses. A chip sample from one of the veins near Fry's present workings assayed: gold - trace*.

On the No. 2 Monte Cristo Hill claim a second shallow cut, about 200 feet by 100 feet and averaging 4 feet deep was mined. Production from 1967 operations, covering the period 5 May to mid-September, was 241 ounces of crude gold, obtained from sluicing a total of about 140,000 bedrock square feet. Equipment includes a D-7 and a D-6 bulldozer.

*Assayed by G. Spalding, Whitehorse, Y.T.

H.C. and D.F. Boutillier (63°56'N, 139°21'W)

References: Skinner (1961, p. 9; 1962, pp. 9-10); Green and Godwin (1963, p. 46; 1964, p. 57); Green (1965, p. 58; 1966, p. 95); Findlay (1967, p. 75).

H.C. and D.F. Boutillier own 11 creek claims on Adams

Creek and 2 bench claims on Adams Hill about 8 miles up on the left limit of Bonanza Creek. In past years the owners have operated a hydraulic plant on Adams Hill and a bulldozer-sludging plant on Adams Creek. In 1966 mining was completed on Adams Hill and in 1967 mining operations were conducted on Adams Creek only. During the period 1 July to 10 September one left limit cut on claim 7 Above, Adams Creek, and two cuts on claim 13 Above, totalling about 15,000 bedrock square feet, were mined. Production was about 9 ounces of crude gold, but much of the gold recovered from these claims was jewelry grade and not included in this total. In addition to work on claims 7 and 13, new ground was stripped on claim 9 Above, in preparation for mining next year. Equipment used in the operation includes a TD-40 tractor.

J. and R. Archibald (63°58'N, 139°21'W)

J. and R. Archibald lease claims 37, 38, 39 and 40 Below on Bonanza Creek from R.S. Troberg of Dawson. In 1966 the first year of operation the partners prepared right limit ground on claim 37 Below and, near the end of the season, sluiced about 3,000 bedrock square feet from which about 41 ounces of crude gold was recovered.

During the 1967 season the owners continued working on the right limit cut near the mouth of Mosquito Gulch. The cut extends from the east rim of Bonanza Creek, where bedrock is overlain by 1 foot-2 feet of sandy soil and about 4 feet of slabby gravel with a sandy matrix, to the edge of old workings in the creek bottom, about 100 feet from the rim. At its deepest part, bedrock is about 18 feet below the former surface and is overlain by up to 6-7 feet of gravel, up to 8 feet of black muck containing fine sandy layers, and about 2 feet of mixed sandy and black organic soil. Using a monitor and pump system aided by a TD-40 tractor, the owners sluiced an area of about 4,500 bedrock square feet and recovered about 82 ounces of crude gold. In addition new ground adjacent to and downstream from the present workings was prepared for mining next year.

Victoria Gulch
(Tributary of Upper Bonanza Creek)

F. Perret (63°55'N, 139°12'W)

References: Skinner (1962, p. 10); Green and Godwin (1963, p.47; 1964 p. 58); Green (1965, p. 59; 1966, p. 96); Findlay (1967, p. 76).

F. Perret owns claims 30, 37 and 39 Above on Bonanza Creek and formerly leased claims 43 and 44 Above on Victoria Gulch from the Yukon Consolidated Gold Corporation Limited. In past years Perret has operated a bulldozer-sluicing plant at the mouth of Victoria Gulch, but in 1967 mining was completed on Victoria Gulch and the leased claims there have now been relinquished. Operations in 1967 were hampered due to low water conditions in Victoria Gulch and Perret was not able to commence mining until 26 August. A right limit cut totalling about 4,000 bedrock square feet was mined on claim 44 Above, Victoria Gulch, and yielded 76 ounces of crude gold. On Bonanza Creek, a 600-foot supply ditch leading to a reservoir and automatic trip-gate was constructed to provide water for stripping ground on claim 37 Above in preparation for next year's mining operations. Perret's equipment includes 2 TD-18 tractors.

Eldorado Creek

Franklin Enterprises Limited (63°53'N, 139°15'W)

References: Green (1966, pp. 89-90); Findlay (1967, pp. 73-74).

Franklin Enterprises Limited is owned by G.D. Franklin of Dawson City, Y.T., formerly a partner with H.H. Schmidt in Ballarat Mines Limited. Since 1961 a bulldozer-sluicing plant has been operated on Eldorado Creek, until 1966 by Ballarat Mines Limited. In 1966, Franklin Enterprises assumed responsibility for the Eldorado Creek operation. The present company owns claims 29, 30 and 43-0A and leases claims 28, 31 to 46A on Eldorado Creek.

During 1966 and 1967 mining was carried out from right and left limit cuts on claims 27 and 28 Above. In 1967 Franklin, working with two helpers, mined a series of right

limit cuts through claims 27 and 28 Above totalling about 70,000 bedrock square feet. Left limit ground in this same area was prepared for future mining by stripping to within 4 to 5 feet of bedrock. In addition to work in this area, some mining was carried out near the mouth of Gay Gulch (claims 35 and 36 Above) and also on claim 42 Above. Production from 1967 operations was about 1,500 ounces of crude gold.

F. Chudy (63°55'N, 139°18'W)

References: Green (1966, p. 94); Findlay (1967, pp. 74-75).

F. Chudy of Whitehorse holds Eldorado Creek claims 2, 3, 4 and 5 up from the junction with Bonanza Creek. During the period April 25 to September 30, 1967, Chudy working in partnership with R.L. Graham of Whitehorse, and with one helper mined a total of about 10,000 bedrock square feet from two right limit cuts on claims 4 and 5. Production was 158 ounces of crude gold. Equipment included a TD-18 tractor and D-8 Cat.

G. Heitman (63°54.6'N, 139°18'W)

References: Skinner (1962, p. 8); Green and Godwin (1963, pp. 44-45; 1964, p. 56); Green (1966, pp. 92-93); Findlay (1967, p. 74).

G. Heitman relinquished his holdings on Bonanza Creek (Cripple Hill, Trail Hill and Trail Gulch) where he has been mining in previous years, and in 1967 began prospecting new ground on Eldorado Creek near the mouth of Irish Gulch. Working with one helper and two bulldozers Heitman mined a small cut on claim 8 Above, leased from Mrs. P. Dorval. The ground proved lean and total recovery was about 3½ ounces of crude gold.

M. Senisizuk and J. Rankin (63°54.5'N, 139°18'W)

M. Senisizuk and J. Rankin hold Eldorado Creek claims 9 and 10 and part of 8, up from the junction with Bonanza Creek. In 1967 the partners prospected these claims and late in the 1967 season began hand-mining from a small left limit cut on claim 9. Details of production for 1967 are not available.

Hunker Creek

P. Brady (63°56'N, 138°53.5'W)

References: Green (1966, p. 97); Findlay (1967, p. 76).

P. Brady holds claims 23, 24, 6 and 7 Below and 2, 30 and 30A Above on Upper Hunker Creek. During the period 1 May to mid-September, 1967, Brady recovered 8 ounces of crude gold hand mining on claim 30 Above, Hunker Creek.

Last Chance Creek

(Tributary of Hunker Creek)

J. and I.C. Bremner (64°00'N, 139°07'W)

References: Skinner (1961, p. 10; 1962, pp. 10-11); Green and Godwin (1963, p. 48; 1964, p. 59); Green (1965, p. 59; 1966, pp. 97-98); Findlay (1967, pp. 76-77).

J. and I.C. Bremner own 29 bench and hill claims on Lower Last Chance Creek, a main tributary of lower Hunker Creek. In 1967, I.C. Bremner, working with one helper, continued mining upstream from last year's operation, a cut in White Channel gravels on Discovery Hill. In this area the White Channel gravel horizon is about 15 feet thick. Production was 160 ounces of crude gold from about 9,000 bedrock square feet of sluicing.

Gold Bottom Creek

(Tributary of Hunker Creek)

O. Lunde (63°55'N, 138°59'W)

References: Skinner (1961, p. 12; 1962, pp. 11-12); Green and Godwin (1963, pp. 49-50; 1964, p. 60); Green (1965, p. 60; 1966, pp. 98-99); Findlay (1967, p. 77).

O. Lunde holds claims 8 to 17 up from the mouth of Gold Bottom Creek, a main tributary of Hunker Creek that rises on the northwest slopes of King Solomon Dome. During the period 5 May to 1 September, Lunde recovered a total of 315 ounces of crude gold, mainly from a 14,000-bedrock square foot cut on claim 8, but also from a smaller (11,000 bedrock square feet)

right limit cut on claim 12, opposite the mouth of Twelve Pup (64 ounces of crude gold). In addition, Lunde continued stripping operations on claims 11, 12, 13 and 14, using an automatic trip-gate operating on claim 14. Equipment includes a D-6 bulldozer.

B. Bratsberg and M. Crockett (63°54'N, 138°59'W)

References: Skinner (1961, p. 10; 1962, pp. 11-12); Green and Godwin (1963, p. 50; 1964, pp. 60-61); Green (1965, p. 60; 1966, p. 99); Findlay (1967, p. 77).

Until mid-1967, B. Bratsberg owned claims 29 to 38 above the mouth on Gold Bottom Creek, as well as the upper 500 feet of Discovery Claim. In past years, Bratsberg has operated a bulldozer-sluicing plant on the creek, and has carried out prospecting operations between Discovery Claim and West Gold Bottom Creek (claims 3 to 12 Above). In August, 1967, Bratsberg transferred his holdings on Gold Bottom Creek to M. Crockett. Between 15 August and 21 September, 1967, the latter, with Bratsberg's help mined about 10,000 bedrock square feet on claim 31, from ground previously prepared by Bratsberg. Details of production are not available. Equipment includes a D-8 bulldozer.

Dominion Creek

A. and N. Burgelman (63°49'N, 138°49'W)

References: Skinner (1961, p. 11; 1962, p. 12); Green and Godwin (1963, p. 52; 1964, pp. 61-62); Green (1965, p. 61; 1966, p. 100); Findlay (1967, p. 77).

Mr. and Mrs. Burgelman own claims 2, 3, 5 to 10 and 20 on Caribou Creek, a right limit tributary of Upper Dominion Creek. In addition, they own claims 117 to 122, and 130, 131A, 131B and 132 Below on Dominion Creek. Between 15 May and 30 September, 1967 the owners mined a total of about 23,000 bedrock square feet from three left limit cuts on claim 122 Below and an additional 12,000 bedrock square feet from a right limit cut on claim 117 Below. Total 1967 production was about 298 ounces of crude gold. In addition to mining operations, stripping was carried out on claims 118 and 119 in preparation for mining next year.

I. Norback (63°47.8'N, 138° 36.2'W)

I. Norback leases claims 71, 72, 73, 74 and 75 Below Lower Discovery from the Yukon Consolidated Gold Corporation Limited and owns claim 77 Below Lower Discovery and near the mouth of Nevada Creek. In addition he holds a prospecting lease covering ground formerly held by the Yukon Consolidated Gold Corporation Limited as claims 143 to 150 Below Lower Discovery. In 1965 and 1966 Norback worked this latter ground under lease agreement with the company, but in 1967 he transferred his operations to claims 74 and 75 Below Lower Discovery. During the period 1 June to 1 September 1967, Norback, working alone, recovered 160 ounces of crude gold from a shallow, 500 feet by 225 feet cut covering parts of claims 74 and 75. In addition, new ground was prepared for mining on claims 75 and 77. Equipment includes a TD-18A tractor.

Gold Run Creek
(Tributary of Dominion Creek)

Gold Run Placers Limited (63°43.5'N, 138°41'W)

References: Green and Godwin (1963, pp. 51-52; 1964, pp. 62-63); Green (1965, p. 62; 1966, pp. 100-101); Findlay (1967, p. 78).

Gold Run Placers Limited, owned and operated by J. Lamontagne and E. Schink, leases claims 36 to 51 on Gold Run Creek from the Yukon Consolidated Gold Corporation Limited. The property is accessible from the Dominion Creek road by a 3-mile road along the east side of Gold Run Creek. Using bulldozer sluicing methods, the present operators have recovered a total of about 4,784 ounces of crude gold during the period 1962 to 1966, inclusive. In 1967 production was 1,254 ounces of crude gold recovered from a total of about 125,000 bedrock square feet in a series of right limit cuts on claims 36 and 44. New ground was prepared on claim 39 for mining next year. Equipment includes 2 D-6 bulldozers.

Consolidated Mines (Yukon) Limited (63°42'N, 138°36'W)

Consolidated Mines (Yukon) Limited, owned by L.M. Ross and T. Matson, leases claims 8 to 32 Above on Lower Gold Run Creek. In past years some work was done by the Yukon Con-

solidated Gold Corporation Limited on this ground, however, the operation was unsuccessful due to the flat gradient of the creek bottom and the difficulty of providing drainage from the working area. The present company is attempting to circumvent this problem by means of a 4,500-foot drainage ditch extending from a point below the Dominion Creek road bridge across Gold Run Creek, to claim 12 Above. Ditch excavation was started following completion of mining on Bonanza Creek (see page 93) in mid-August, 1967 and by the end of the season (late September) about 3,000 feet had been completed. Equipment includes a 1½ yard dragline and 3 D-8 bulldozers.

Quartz Creek

A. Sailer (63°47'N, 139°06'W)

References: Green (1965, p. 62; 1966 p. 102); Findlay (1967, p. 79).

A. Sailer leases hill claim 27 (right limit) on Quartz Creek from O. Lunde and since 1964 has operated a bulldozer-sluicing plant on this property. Total production from 1964 to 1966 inclusive was 238 ounces of crude gold. During the 1967 season, Sailer, assisted by his wife, sluiced about 15,000 bedrock square feet from a right limit cut on this claim and recovered 107 ounces of crude gold. Mining was carried out during the period 9 September to 25 September, and preparation of ground commenced about 15 July. Equipment includes a D-6 bulldozer.

Sailer also owns claims 81 and 82 Below Lower Discovery, and hill claims opposite 81 to 86 inclusive Below Lower Discovery on Dominion Creek. In addition he holds 4 claims on Hunker Creek above the mouth of Last Chance Creek. During the 1967 season stripping was carried out on both the Dominion and Hunker Creek properties in preparation for mining next year.

Ballarat Mines Limited

Quartz Creek operations are described in the general report on the company.

Allgold Creek
(Tributary of Flat Creek)

K and S Placers (63°56'N, 138°37.5'W)

References: Skinner (1962, p. 14); Green and Godwin (1963, p. 56; 1964, p. 66); Green (1965, pp. 63-64; 1966, pp. 103-104); Findlay (1967, p. 79).

K and S Placers, owned by M. Kinakin, Whitehorse, leases Discovery claim and claims 1 to 10 Above on Allgold Creek from Consolidated Brewis Minerals Limited. In addition, Kinakin owns claims 11 to 30 Above. A camp is maintained on Allgold Creek about ½ mile upstream from the abandoned settlement of Flat Creek on the Dawson-Mayo Road. The company has operated a bulldozer-slucing plant since 1961 and total production to the end of 1966 was about 4,242 ounces of crude gold.

In 1967, no mining was done on the Allgold Creek property, but some stripping and ground preparation was carried out for next year.

SIXTYMILE GOLDFIELD

References: McConnell (1905, pp. 33A-37A; in Bostock 1957, pp. 37-48); Cockfield (1921); Bostock (1936b, p. 1; 1939, pp. 3-4; 1941, pp. 3-4); Skinner (1961, p. 13); Green and Godwin (1964, pp. 69-71); Green (1965, pp. 66-67; 1966, pp. 105-107); Findlay (1967, p. 80).

The Sixtymile Goldfield lies near the Alaska border about 40 miles west of Dawson. Access to the area is by one of two 10-mile secondary roads that leave the Sixtymile-Boundary road near Miles 49 and 59 respectively. The area includes several formerly important placer creeks, notably Miller, Glacier and part of Big Gold. Parts of the valley of the Sixtymile River were also mined.

Following discovery of placer gold in 1892, the Sixtymile field became a significant producer, with a total recorded recovery up to 1962, the last year of extensive operations, of 213,600 ounces of fine gold. Various methods have been used in mining, including hand mining, bulldozer-slucing plants, and two dredge operations (Sixtymile River and

Glacier Creek). Since 1962 mining has been restricted to a few small operations and total production has been less than 600-700 ounces of crude gold. For a more complete historical description of the Sixtymile area, the reader is referred to Green (1966, pp. 105-107).

Sixtymile River

O. and D. Medby (64°00'N, 140°47'W)

References: Green and Godwin (1964, pp. 69-71); Green (1965, pp. 66-67; 1966, p. 108); Findlay (1967, p. 80).

O. Medby holds Discovery claim and 14 placer claims on a right limit bench of Sixtymile River, beginning about $\frac{1}{4}$ mile upstream from Miller Creek. During 1967, Medby mined on Discovery claim, Sixtymile River and recovered about 67 ounces of crude gold. In addition new ground was prepared for mining next year on the bench above Sixtymile River upstream from Miller Creek. Equipment includes a D-6 and a D-8 bulldozer.

Glacier Creek

M.G. Grenier, E. Foucher and L. Guimard (64°02.2'N, 140°49'W)

Messrs. Grenier, Foucher and Guimard hold 15 claims on Glacier Creek, starting at a point about $\frac{1}{2}$ mile upstream from Glacier Creek P.O. (abandoned). Early in the 1967 season the partners put in a left limit creek cut (6,000 bedrock square feet) about $\frac{1}{2}$ mile upstream from their camp which is located just off the Glacier Creek road about $1\frac{1}{2}$ mile upstream from Glacier Creek P.O. About 22 ounces of crude gold were recovered from this cut, but the ground was considered too lean for further mining. Later in the season, operations were transferred downstream, where a left limit bench cut (about 6,000 bedrock square feet) was mined, immediately behind the camp. Water for the bench-mining operation was obtained from a $1\frac{1}{2}$ -mile-long diversion ditch that taps Glacier Creek near the upstream end of the property. Total production from this property in 1967 was about 89 ounces of crude gold.

J. Lynch (64°02'N, 140°53'W)

Reference: Green (1965, p. 67).

J. Lynch holds claims 8 Below to 1 Above and part of 2 Above on Glacier Creek, as well as Discovery claim and 1 and 2 Above on Big Gold Creek. For the past three years Lynch has operated a bulldozer-sluicing plant on Glacier Creek. During 1967, Lynch mined from two right limit cuts totalling about 19,500 bedrock square feet on claim 8 Above, Glacier Creek. Production for 1967 was about 194 ounces of crude gold.

KIRKMAN CREEK-STEWART RIVER AREA

Brewer Creek

K. Djukastein (63°11'N, 139°00'W)

References: Green (1965, p. 68; 1966, p. 109); Findlay (1967, p. 81).

K. Djukastein completed his fourth season of mining on Brewer Creek, a left limit tributary of Stewart River, about 3 miles downstream from Barker Creek. In past years Djukastein has held a one-mile prospecting lease on the creek, but last year the lease was dropped and only the 1,500-foot Discovery Claim is now retained.

During the period 18 May to 5 October, 1967, Djukastein, working with one helper, mined 38,000 bedrock square feet and produced about 320 ounces of crude gold plus about 30 ounces of jewelry grade gold. Equipment includes a D-4 bulldozer. The property was not visited.

MAYO MINING DISTRICT

HAGGART CREEK AND DUBLIN GULCH AREA

Haggart Creek

Spruce Creek Placers Limited (64°01'N, 135°51'W)

References: Skinner (1961, p. 15; 1962, p. 18); Green and Godwin (1963, pp. 57-58; 1964, pp. 74-75); Green (1965, pp. 70-72; 1966, pp. 110-112); Findlay (1967, pp. 82-83).

This company, owned by J.M. Acheson, F.M. Wilson and W.L. Drury, holds a 22-claim lease from the E.H. Barker estate on Haggart Creek, between Dublin Gulch and Fifteen Pup. The company also holds 1-mile and 3-mile left limit prospecting leases downstream from Dublin Gulch and Fifteen Pup, respectively. Access to the property is by a 25-mile road from about Mile 268 on the Mayo-Elsa road.

Spruce Creek Placers Limited has mined this ground since 1961, using bulldozer sluicing operations. Cumulative production to the end of the 1966 season was about 4,466 ounces of crude gold.

During the 1967 season, work was concentrated mainly on excavation of a 4,000-foot-long ditch required to provide drainage for mining new ground on claim 5 Below Discovery. This area was tested by a churn drilling program last year (Findlay, 1967, p. 83). Preparation of this ground, which extends downstream from last year's left limit cut, required removal of overburden to depths up to 35 feet, and to provide adequate drainage, the ditch had to be cut into bedrock (quartzitic schists and quartz-chlorite-graphite schists) to depths up to 15-18 feet in places. Ditching was accomplished with a 1½ yard dragline aided by 2 D-8 bulldozers and a hydraulic ripper equipped D-7E tractor. In conjunction with the ditch excavation, a large (500 feet by 350 feet) area was stripped at the upstream end of the ditch, requiring removal of about 21,000 cubic yards of overburden, and late in the 1967 season (September) mining commenced from a cut along the west side of the stripped area. Production was about 370 ounces of crude gold from 20,722 cubic yards sluiced. A crew of three men was employed, including manager J. Acheson.

W.S. Moore Company Limited (64°01'N, 135°51'W)

Reference: Findlay (1967, p. 83).

During the 1966 season this company, under option agreement with Spruce Creek Placers Limited, carried out a churn drilling test program on claim 5 Below of the latter company's holding. This agreement was subsequently terminated, and further development of the ground is being carried out by Spruce Creek Placers Limited (see Spruce Creek Placers Limited, above).

Dublin Gulch

F. Taylor (64°02'N, 135°50'W)

References: Skinner (1961, p. 14; 1962, p. 17); Green and Godwin (1963, pp. 59-60; 1964, pp. 76-77); Green (1965, pp. 72-73); Findlay (1967, p. 83).

F. Taylor owns 7 claims extending upstream from the mouth of Dublin Gulch and accessible by a rough road leading up the north side of the gulch about one mile past the camp of Spruce Creek Placers Limited.

Taylor has mined the Dublin Gulch property intermittently since 1937. Cumulative production to the end of 1966 was 9,357 ounces of crude gold (including jewelry grade gold) and 10 tons of tungsten (scheelite) concentrate. During 1967, Taylor mined a total of 54,000 cubic yards and recovered 573 ounces of crude gold during the period May to early October. Production during 1967 was mainly from 3 cuts on claim 3 Above, opposite last year's cut. The 1967 cuts totalled about 600 feet long by 90 feet wide, and averaged about 27 feet deep. Typically, the section in the cuts consisted of about 15 feet of silt, sand, clay and black muck, and about a foot of gravel and boulders. Gravels in this area have a distinctive reddish iron-stained matrix. Bedrock, consisting of quartzite, quartz-chlorite schist and graphitic schist, is mined to depths ranging from a few inches to 3 to 4 feet. In the 1967 workings bedrock depth mined averaged about 3 feet.

HIGHET, JOHNSON CREEK AND MINTO LAKE AREA

Highet Creek

E.C. Bleiler (63°45.5'N, 136°09'W)

References: Skinner (1961, pp. 15-16; 1962, p. 19); Green and Godwin (1963, pp. 60-61; 1964, pp. 78-79); Green (1965, pp. 73-76; 1966, pp. 113-114); Findlay (1967, pp. 83-84).

E.C. Bleiler holds 34 placer claims on Highet Creek, a main tributary of Minto Creek. The property is accessible from the Highet Creek-Johnson Creek road that leaves the Minto Lake road about 12 miles west of the Mayo-Elsa road. Bleiler's current workings are 4.9 miles up from the junction of the Minto Lake and Highet Creek roads.

During 1967 Bleiler and his son mined about 35,000 cubic yards from a centre cut (150 feet by 220 feet by an average of 27 feet deep) near the mouth of 80 Pup, a left limit tributary of Highet Creek. Production was 1,098 ounces of crude gold, about double last year's output. Mining was carried out during the period 24 May to 7 September. Equipment includes a Traxcavator 955 H front-end loader and a TD-14 bulldozer.

The ground currently being mined by Bleiler includes a 5- to 6-foot capping of old tailings. Below this is a 10- to 20-foot section of interlayered sand, sandy clay and minor gravel horizons, containing lenses of blue clay up to 18 inches thick. Between this and bedrock is 6 to 8 feet of heterogeneous, poorly-sorted gravel containing numerous angular fragments. Bedrock is shallow dipping quartz-sericite schist that is mined to depths of up to 4 feet. Stripping and excavation of nonproductive gravel is accomplished by a monitor system using water routed through a flume that taps Highet Creek upstream from the working area.

W. and J. Gordon (63°44'N, 136°07.5'W)

Reference: Findlay (1967, p. 84).

Mr. and Mrs. W. Gordon of Mayo hold a 1-mile placer

lease and 2 placer claims on Hight Creek about 2 miles above the mouth of Bennett Creek. Access is by the Hight Creek-Johnson Creek road.

During the 1967 season Gordon put in a prospect hydraulic cut on a right limit bench above Hight Creek using water supplied through a 3,400-foot ditch and flume system leading from a storage dam located upstream on Hight Creek. The section exposed in the cut consists of an upper 3-4-foot subsoil sand layer overlying about 25 feet of well-sorted, cobble-sized gravel with a sandy matrix. Lying below this on bedrock is a thin zone of poorly-sorted, subangular gravel. Bedrock is quartz-sericite schist, dipping shallowly to the southwest. The 1967 cut area lies west of and above present Hight Creek and is separated from it by a prominent bedrock ridge or 'high'. It is possible that the gravels of the working area represent deposits by a former tributary of Hight Creek that entered it from the northwest.

Production from 1967 operations was 4 ounces of crude gold.

Johnson Creek

Barduson Placers Limited (63°47'N, 136°22'W)

References: Cairnes (1916, pp. 25-26; in Bostock, 1957, pp. 398-399); Green (1965, pp. 76-78, 1966, pp. 115-116); Findlay (1967, pp. 84-85).

This company, owned by H. Barchen, Mayo, has operated a bulldozer-slucing plant since 1958 on Johnson Creek about $\frac{1}{4}$ mile below the mouth of Sabbath Creek. Access is by about $5\frac{1}{2}$ miles of rough road leading from upper Hight Creek and passable only by 4-wheel drive vehicle.

Total production from 1958 to 1966 inclusive from the Johnson Creek operation was about 7,419 ounces of crude gold. During 1967, Barchen produced about 31 ounces of crude gold from mining carried out between 15 May and 1 July. After 1 July, 1967, Barchen transferred his operations to Thunder Gulch (see page 111 this report) and all holdings of the company on Johnson Creek have subsequently been dropped.

Minto Lake

F. Erl (63°42'N, 136°07.5'W)

References: Green and Godwin (1963, p. 61); Green (1965, p. 76; 1966, p. 114).

F. Erl holds a 1-mile prospecting lease along Minto Creek extending downstream from its head at the east end of Minto Lake, and one placer claim on the northeast corner of the lake adjacent to Minto Creek outlet. During the 1967 season, Erl, working on a part-time basis mined about 700 cubic yards from a shallow cut just above the lakeshore. Production was 10 ounces of crude gold. Equipment includes a D-8 and D-4 bulldozer. Water for mining operations is pumped from the lake.

Gold occurring along the northeast side of Minto Lake is unusual in habit in that it is present throughout the beach gravels from just below topsoil to at least as deep as the present lake level. Depth of gravel below present lake level is not known. The gold occurs in extremely fine flakes and this characteristic makes recovery of the metal difficult because much of the gold is lost in tailings during sluicing operations. Erl has been experimenting with more efficient recovery methods using a vibrator table, but to date only a small table has been tried and the operation is still in the pilot stage.

In addition to his Minto Lake and Minto Creek holdings, Erl also owns 4 claims on Hight Creek, a short distance above the mouth of Rudolph Pup. Parts of this ground were mined intermittently between 1961 and 1965 inclusive and a total of 260 ounces of crude gold were produced. During the 1967 season Erl did additional prospecting on the Hight Creek property.

McLagen Creek

C.J. and H. Klippert (63°42'N, 136°14'W)

References: Green (1966, pp. 116-117); Findlay (1967, p. 85).

The Klippert brothers of Mayo hold a total of 22 placer claims on McLagen Creek, a small tributary of Minto

Lake. The property is reached by a 3-mile tote-road from the end of the Minto Lake road. Early in the 1967 season a deep prospect cut was excavated in the creek bottom, about 800 feet upstream from last year's unsuccessful cut. The cut exposed a thick section of coarse (up to several feet in diameter) boulders that is probably in part of glacial origin. No economic pay zone was encountered in the cut, and, later in the season, operations were transferred to Carlson Creek, about 3 miles west of McLagen Creek. The Klipperts hold a 2-mile prospecting lease on this creek and in August 1967, some prospect stripping was begun on this ground.

Bear Creek

J.J. Van Bibber (63°31'N, 136°21'W)

References: Green and Godwin (1964, p. 80); Green (1966, pp. 117-118); Findlay (1967, p. 86).

J.J. Van Bibber continued part-time mining on his Bear Creek holdings (5 claims) during 1967. A total of 13½ ounces of crude gold were recovered. The property was not visited.

SOURDOUGH HILL AREA

Thunder Gulch

Barduson Placers Limited (63°54.5'N, 135°15'W)

H. Barchen, owner and operator of Barduson Placers Limited (see also page 109, this report) began mining on Thunder Gulch, a tributary of Lightning Creek in mid-July, 1967. The company owns 8 claims on Thunder Gulch and during 1967 mining was carried out on claim 2 Above Lightning Creek. The property is accessible by a road that leaves the Keno City-Keno Hill road, crosses Lightning Creek, and continues east along the south side of Lightning Creek valley past Thunder Gulch mouth.

During the 1967 season Barchen mined a total of 11,000 bedrock square feet from 2 centre cuts averaging about 15 feet deep. Production was 300 ounces of crude gold, some of which was jewelry grade. The gravel in Thunder Gulch is

coarse and poorly-sorted and contains much sliderock in the upper horizons and many large boulders up to several feet across. The pay zone extends down from a hardpan layer 3-4 feet above bedrock and a 2-3-foot-depth of bedrock is mined. Bedrock is dominantly greenschist with intercalated quartz-sericite schist.

WHITEHORSE MINING DISTRICT

KLUANE LAKE AREA

Burwash Creek

Burwash Mining Company Limited (61°22.5'N, 139°17'W)

References: Cairnes (1915, pp. 22-24; in Bostock, 1957, pp. 367-371); Skinner (1961, pp. 17-18; 1962, pp. 20-21); Green and Godwin (1963, p. 63; 1964, pp. 82-83); Green (1965, p. 80; 1966, pp. 120-121); Findlay (1967, pp. 86-87).

Burwash Mining Company Limited, owned and operated by H. Besner holds 22 claims on Burwash Creek, a tributary of Kluane River. Access to the property is by a rough secondary road about 6 miles in length, leading from Mile 1104 on the Alaska Highway.

Burwash Creek was extensively mined from 1904 to about 1915, with a total estimated production of \$30,000 to \$40,000 in gold (Green, 1966, p. 120). The present operator has mined on the creek since 1945, working a stretch from near Burwash Canyon upstream to the mouth of Tetamagouche Creek, a distance of slightly over 4 miles. Production to the end of 1966 was about 23,190 ounces of crude gold.

In 1967, Besner, working with 2 helpers, spent the first part of the season mining on Tetamagouche Creek at its junction with Burwash Creek. A centre cut (about 12,000 bedrock square feet) was mined, with recovery about the same as from Burwash Creek gravels. About mid-August, operations were transferred to Burwash Creek and a 600-foot-long centre cut was mined, finishing about 500 feet upstream from the mouth of Tetamagouche Creek. Although the benches of Burwash Creek in this area have been mined in the past, the creek bottom is virgin ground. Depth to bedrock is 8 to 15 feet and material

is excavated with a 3/4-yard diesel shovel. About 30,000 bed-rock square feet was mined in this operation. Total recorded 1967 production from Burwash and Tetamagouche creeks was about 325 ounces of crude gold.

Bullion Creek

H. Thorsen (about 60°58.5'N, 138°39'W)

References: Skinner (1961, p. 17; 1962, p. 21); Green and Godwin (1963, pp. 62-63); Findlay (1967, p. 87).

Bullion Creek flows into Slims River about 4 miles above the latter's mouth at the south end of Kluane Lake. Placer gold was discovered on the creek in 1903 and in subsequent years parts of it were mined intermittently.

During the period 1958-1961, Action Mining Company operated a bulldozer sluicing plant on the creek and produced a total of about 6,150 crude ounces of gold. Since then, the creek has been mined intermittently by various individuals. At present, H. Thorsen holds 5 claims located on Lower Bullion Creek, downstream from the mouth of Wolf Creek. Production from 1967 mining operations was about 235 ounces of crude gold. The property was not visited.

COAL MINING AND EXPLORATION

WHITEHORSE MINING DISTRICT

Carmacks Area

Tantalus Butte Mine (62°08'N, 136°16'W)

References: Cairnes (1910a, pp. 52-53); Bostock (1936a, pp. 59-62); Wheeler (1961, p. 74); Skinner (1961, p. 30; 1962, p. 30); Green and Godwin (1963, p. 65; 1964, pp. 83-84); Green (1965, pp. 82-84; 1966, pp. 121-122); Findlay (1967, p. 88).

The Tantalus Butte Mine of the Yukon Coal Company Limited has been the only producing coal mine in Yukon for many years. The mine is owned by Territorial Supply Company Limited, a subsidiary of Cassiar Asbestos Corporation Limited and United Keno Hill Mines Limited. It has been operated by the latter company to provide a supply of heating fuel for its establishment at Elsa, Y.T. Located at Carmacks, the mine has operated since about 1923, except for the period 1939-1948. Between 1948 and 1966 annual production has ranged from less than 4,000 tons to a maximum of 14,113 tons (1954). With the conversion of heating machinery to oil-fired units at Elsa demand for Tantalus Butte coal has decreased over the past few years and in 1967 the mine operated only intermittently, with a total production of about 2,000 tons¹. The mine was officially declared closed as of January 1, 1968. and placed on a caretaker basis.

The Tantalus Butte coal is of the high-volatile Bituminous Group. It occurs in the Tantalus Formation, which contains conglomerate with subordinate sandstone and shale and a few coal seams (Bostock, 1936a, p. 28). Wheeler (1961, p. 74) considered the Tantalus Formation to be of Upper Jurassic (?) and Lower Cretaceous age. In the Tantalus Butte Mine the main coal seam ranges in thickness from 8 to 20 feet, strikes about north-northwest and dips 50-55° southwest. It has been mined by room-and-pillar methods from a main entry that follows the hanging wall of the seam for about 2,600 feet from a portal at an elevation of 2,056 feet, about 350 feet above Yukon River.

¹revised figure

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