



GEOLOGICAL
SURVEY
OF
CANADA

DEPARTMENT OF MINES
AND TECHNICAL SURVEYS

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PAPER 66-31

THE MINERAL INDUSTRY OF YUKON TERRITORY
AND SOUTHWESTERN DISTRICT OF MACKENZIE
1965

L. H. Green

MANUSCRIPT AND
CARTOGRAPHY

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SECTION



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ABSTRACT

The paper deals with developments in the mineral industry of Yukon Territory and southwestern District of Mackenzie during 1965. It is the sixth of an annual series. Brief descriptions of most of the active lode and placer properties are given. In addition, descriptions of some inactive lode properties are given in order that a record of these may be available in published form.

The mineral industry has formed the backbone of the economy of Yukon since the discovery of the Klondike Gold Fields in 1896. In 1965, the estimated value of mineral production of Yukon was \$13,341,266. Most of this was from silver, lead, and zinc produced by United Keno Hill Mines Limited.

In lode mining, a small gold mine was brought into production and production plans were announced for an asbestos mine and a copper mine. In lode exploration, the most important event of the year was the discovery of major base metal deposits in the Vangorda area, near Ross River. Announcement of the discovery precipitated a major staking rush in the district which was still in progress early in 1966. Elsewhere in Yukon many of the previously known showings were restaked for the first time in many years. During the season, underground exploration was done on a number of showings.

In placer mining, production in 1965 decreased markedly over previous years. The Yukon Consolidated Gold Corporation continued dredging operations in the Klondike area and a number of independent operators were active throughout the Yukon.

MINERAL INDUSTRY OF YUKON TERRITORY
AND SOUTHWESTERN DISTRICT OF MACKENZIE, 1965

INTRODUCTION

This is the sixth of an annual series of papers on developments in the mineral industry of Yukon Territory and the southwestern District of Mackenzie. Most of the report is based on visits by the author to the properties described. Additional information was obtained from personal communications with individuals and companies, press releases and technical papers, and from reports by the Mining Recorders at Dawson, Mayo, Waston Lake, and Whitehorse.

The idea of a "Mineral Resource Inventory" of Yukon has received considerable publicity in recent years, and descriptions of a number of inactive properties are included in this report in the hope that they may be a small but concrete contribution to this project. Many of these properties were active in the period between 1941 and 1959, inclusive, when no published record is available.

The author is grateful for the many kindnesses received from the various property owners or their representatives. Thanks are also due to a number of individuals and companies for supplying operational and technical data.

Earlier reports on mining developments in the Yukon are contained in the Annual and Summary Reports of the Geological Survey for the period 1898 to 1933. Many of the original reports are now out of print, but most of the information dealing with the Yukon has been compiled by Bostock (1957). The latter publication is invaluable as a ready reference on many of the early discoveries in the Yukon. Mining developments in the period 1934 to 1940 are described in a series of reports by Bostock (1935, 1936b, 1937, 1938, 1939, and 1941), 1960 to 1961 in reports by Skinner (1961, 1962), 1962 to 1963 by Green and Godwin (1963, 1964), and 1964 by Green (1965).

Earlier reports on the Yukon Territory that are reprinted in G.S.C. Memoir 284 (Bostock, 1957) are indicated in the text with an asterisk.

TRANSPORTATION

The city of Whitehorse, capital of the Yukon Territory, is the centre of distribution for the Territory, and is supplied mainly from Vancouver and Edmonton. Most freight is brought to Whitehorse by boat and rail from Vancouver, although truck, bus, and scheduled aircraft provide alternate services from Vancouver, Edmonton, and Alaska.

Within the Territory freight and mineral products are transported year-round by truck along three main routes; the Alaska Highway, the Whitehorse-Keno Road, and the Stewart Crossing-Dawson Road. A number of other roads provide access to these routes. In addition, freight-ing by trucks on winter roads has been very successful, notably for oil exploration beyond the Dempster Highway in the Peel Plateau area. Both the Federal and Territorial governments participate in construction costs of roads to potential resource-exploiting projects, including mining, forestry, and agriculture.

Operators of fixed-wing aircraft maintain bases at Whitehorse, Watson Lake, Dawson, and Mayo, and light aircraft, either float-, ski-, or wheel-equipped, are available throughout the year. One helicopter operator maintains a year-round base at Whitehorse, but in the middle of the 1965 field season all machines were under contract. However, most of the companies and individuals using the machines were extremely cooperative in releasing them for short jobs on an hourly basis. In recent years, the use of helicopter transport has played an increasingly important role in exploration and has made it possible for operations to be extended into areas formerly considered virtually inaccessible.

A comparison of transportation costs is given in Table I

TABLE I

Representative Transportation Costs for Yukon Territory, 1965

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 Supplies - North Vancouver to Whitehorse
Commodity Rate on 10,000 lb. carloads \$2.98 per 100 lbs.

TRUCK

Basic rates, Whitehorse from Edmonton and Vancouver

Pounds	100	5,000	10,000
From Edmonton			
(Dollars per 100 lbs).....	6.90	5.50	5.35
From Vancouver			
(Dollars per 100 lbs).....	6.50	5.50	5.00
(Commodity rates in effect for many items)			

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

AIR - (daily except Sunday)

Air Express and Air Freight, Whitehorse from Edmonton and Vancouver

	Edmonton to Whitehorse	Vancouver to Whitehorse
Air Express		
Minimum.....	\$ 1.50	\$ 1.50
Dollars per lb.....	.43	.49
Air Freight		
Minimum.....	5.25	5.25
Dollars per lb.....	.21	.21
Dollars per 100 lbs.....	18.00	18.00

CHARTER AIRCRAFT

Type	Rate per Hour	Rate per Mile
Fixed-Wing		
Cessna 180.....	\$ 60.00	\$ 0.50
Beaver.....	75.00	0.75
Helicopter		
Bell G -2.....	103.00	Not applicable
Hiller 12-E.....	130.00	Not applicable

MINERAL PRODUCTION OF YUKON

The mineral industry has formed the backbone of the economy of Yukon since the discovery of the Klondike Gold Fields in 1896. The greatest value of mineral production was attained in the year 1900 when over 22 million dollars worth of gold and silver were produced. The value of mineral production dropped below 10 million dollars a few years later and did not rise above this until 1952 when the operations of United Keno Hill Mines Limited on Galena and Keno Hills came into full production. The value has subsequently remained in excess of 10 million dollars. Mineral production for the Yukon, both cumulative and for the years 1963 to 1965, is given in Table II.

The only large lode producer in the Yukon during 1965 was United Keno Hill Mines Limited on Galena and Keno Hills. In the 12 month period ending 31 December 1965, the company sold silver-lead-zinc concentrates valued at \$10,400,117 before the deduction of smelter charges, freight, and marketing expenses. The Yukon Coal Company Limited, which is affiliated with the above company, produced 8,806 tons of coal from their mine at Carmacks.

Placer gold production in 1965 is listed in Table III, which is compiled from information supplied by operators and by Mining Recorders' reports. Most of the production was by the Yukon Consolidated Gold Corporation. This company operated 5 dredges and a bulldozer-sluicing plant in the Klondike area, and produced 33,268 ounces of fine gold and 7,326 ounces of silver with a total value of \$1,167,326. Other small-scale placer operations throughout the Yukon produced about 14,850 ounces of crude gold. Many placer operators receive assistance under the Emergency Gold Mining Assistance Act.

TABLE II

Mineral Production of Yukon Territory^a

Mineral		1963	1964	1965 ^b	Cumulative Total (1886 to Dec. 31, 1965)
Gold	fine oz. \$	55,211 2,084,215	57,844 2,183,611	46,878 1,768,707	11,054,551 259,844,652
Silver	fine oz. \$	6,106,037 8,450,755	5,638,712 7,894,196	4,495,121 6,288,674	141,839,300 115,504,688
Lead	lb. \$	16,978,607 1,867,647	20,418,415 2,744,235	17,015,000 2,637,325	464,691,584 50,677,074
Zinc	lb. \$	11,850,706 1,514,520	13,094,653 1,855,512	14,000,000 2,114,000	229,914,836 30,748,844
Cadmium	lb. \$	135,885 326,124	132,222 428,399	152,000 422,560	2,531,091 4,861,340
Copper	lb. \$				14,372,285 3,101,783
Tungsten	lb. (WO ₃) \$				32,169 27,499
Platinum	fine oz. \$				19 ^c 1,553 ^c
Coal	tons \$	8,231 123,675	7,229 98,150	9,000 110,000	271,354 2,428,325
Total	\$	14,366,936	15,204,103	13,341,266	467,286,758 ^d

^aFigures from Dominion Bureau of Statistics (1957; and later releases).

^bPreliminary figures.

^cProduced in 1960.

^dAntimony valued at \$173 has also been produced and is included in the total.

TABLE III

Yukon Placer Gold Production, 1965

District	Area	Number of Operators**	Approximate Production of Crude Gold (ounces)
Dawson	Klondike: Y.C.G.C.*	1	40,593
	Other	15	9,530
	Sixtymile River	1	149
	Kirkman Creek and		
	Stewart River	3	1,280
Mayo	Haggart Creek and		
	Dublin Gulch	2	1,639
	Hight Creek		
	Johnson Creek and		
	Minto Lake	4	1,328
Whitehorse	Kluane Lake	1	696
Other			228
Total		27	55,443

* The Yukon Consolidated Gold Corporation, Limited.

**with production in excess of 30 crude ounces.

LODE EXPLORATION IN YUKON

The year was an active one with many companies, small syndicates, and individuals carrying out exploration in the vicinity of known showings and prospecting in new areas. The discovery of major base metal deposits in the Vangorda area, near Ross River, precipitated a staking rush which was still in progress early in 1966. This and continued high metal prices resulted in renewed interest elsewhere in Yukon and by early 1966 most of the previously known showings had been re-staked, some after being open ground for many years.

In the Vangorda area, base metal discoveries were announced by Dynasty Exploration Syndicate and Kerr Addison Mines Limited. The former company's Faro group, is about 9 miles NW of the original Vangroda showing and the

latter's Swim group about 6 miles SE. The Faro group is currently being drilled by Anvil Mining Corporation Limited, successor to Dynasty Explorations Limited and further drilling is planned for the Swim group. In the same area, Dynasty Explorations Limited drilled a number of other anomalous areas without finding commercial values.

In the Dawson mining district, Cassiar Asbestos Corporation Limited, continued drilling their Clinton Creek asbestos deposit and are preparing the property for production. In addition, an interesting silver-lead discovery was made in the Sixtymile area.

In the Mayo mining district, United Keno Hill Mines Limited carried out a large helicopter-supported exploration program testing a number of areas staked as a result of geochemical surveys carried out by the Geological Survey of Canada (Gleeson et al, 1965, a-n). Otherwise, there was little activity.

In the Whitehorse Mining District, in addition to the Vangorda area, there was activity in the Dawson Range, Whitehorse, Wheaton and Carcross areas. In the Dawson Range area, Discovery Mines Limited brought the Laforma gold property into production, Mount Nansen Mines Limited carried out underground exploration on their ground and the Brown-McDade gold-silver properties and Casino Silver Mines Limited mined a small tonnage from the surface of the Casino Creek silver-lead showing and later started underground development work. In the Whitehorse Copper Belt, New Imperial Mines Limited continued drilling their properties and late in the year announced that they would be brought into production. In the Wheaton River area, Yukon Antimony Corporation Limited staked and explored a number of old showings, including underground work on the Becker-Cochran antimony showing. In the Carcross area, Arctic Mining and Exploration Limited did surface exploration on the Big Thing gold-silver property and late in the year commenced an underground exploration program.

In the Watson Lake Mining district, there was activity in the Cassiar Mountain area, The Ketz River area, and the Frances Lake - Hyland River area. In the Cassiar Mountains area, Logjam Silver Mines Limited carried out an underground diamond drilling program on their silver property. In the Ketz River area, Silver Key Mines Limited hold a number of the known silver-lead showings in the area and did surface exploration on a number of them. In the Frances Lake-Hyland River area, Norquest Joint Venture carried out a helicopter-supported exploration program and another group, Pacific Prospecting Syndicate, organized by one of the discoverers of the original Norquest showing, was also active in the same area.

TABLE IV

Mineral Claims Recorded, Yukon Territory

(Figures supplied by Department of Northern Affairs and National Resources)

Mining District	1961	1962	1963	1964	1965
Dawson	202	135	283	48	441
Mayo	618	1269	347	607	1026
Watson Lake*		758	1046	349	690
Whitehorse	1642	1002	1052	1819	5456
Total	2462	3164	2728	2823	7613

*District established 27 April 1962.

PLACER EXPLORATION IN YUKON

Very little exploration was done for new placer deposits during 1965 and at year-end when 323 placer claims in the Klondike area were dropped by the Yukon Consolidated Gold Corporation only a few were re-staked in the following few months. Dredging operations by the former company are expected to be completed in 1966. Aside from dredging, the introduction of the bulldozer-sluicing plant in the late 1930's made it possible to mine many areas formerly considered uneconomic. However, new ground suitable for the installation of bulldozer-sluicing plants is becoming increasingly difficult to obtain, particularly in the Klondike area and the number of operations of this type will probably decrease in the next few years. The operators of these plants are faced with the problem of the fixed price of gold, spiralling costs of mechanical equipment and wages, and insufficient resources to finance the year or more of preparatory work needed to bring new ground into production. Developments that could make additional ground economic for mining include any increase in the price of gold, new methods of materials-handling, the use of sprinkler systems for thawing and removal of deep sections of frozen muck, and the exploration of remote areas using new techniques of winter road building and of rapid drilling.

MINERAL PRODUCTION AND EXPLORATION,
NAHANNI MINING DISTRICT, DISTRICT OF MACKENZIE

Canada Tungsten Mining Corporation Limited reopened their tungsten property in the Flat River area during 1964. During 1965, the company mined 127,000 tons from the open cut during the summer months and milled 108,000 tons averaging 2.53 per cent WO_3 .

During 1965, 48 mineral claims were recorded in the Nahanni Mining District. The Mining Recorder's office for the district is in Watson Lake, Yukon.

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LODE MINING AND EXPLORATION

MAYO MINING DISTRICT

GALENA AND KENO HILLS AND ADJACENT AREAS

(Silver-Lead-Zinc)

United Keno Hill Mines Limited (About 63°55'N, 135° 29'W)

Selected References: Boyle (1956, 1957, 1965); Green and McTaggart (1960); McTaggart (1960); United Keno Hill Mines Limited (1961); Kindle (1962); 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); Gleason, C.F., et al 1965, 1966).

United Keno Hill Mines Limited is Canada's largest silver mine and operates the only large-scale lode mines in the Yukon. The gross value of concentrates sold in the year ending 31 December 1965 was \$10,400,117. In recent years the value of production has far exceeded other industries in the Yukon and directly or indirectly the company supports much of the economy. Operations during 1965 were hampered by a serious shortage of skilled labour.

Keno Hill Mining Company Limited was formed in 1945 to take over a number of properties in the district including those of the Treadwell Yukon Corporation Limited. In 1948, the capitalization of the company was altered and the name changed to United Keno Hill Mines Limited. Total production from 1947 to 31 December 1965 was 2,627,489 tons of ore, from which 96,403,489 ounces of silver, 350,363,373 pounds of lead, 262,004,313 pounds of zinc, and 3,454,265 pounds of cadmium were recovered. As of 31 December 1965, the company owned 1,077 claims in the Galena Hill-Keno Hill area and an additional 391 claims staked in the general area following publication of geochemical information by the Geological Survey of Canada (Gleason et al, 1965). Employees at year-end totalled 527 in the Elsa-Calumet area plus a number employed elsewhere in the Yukon.

The company's principal properties are accessible by all-weather roads. Concentrates, totalling 25,720.3 tons in 1965, are trucked 290 miles to Whitehorse, Yukon, from whence they are transhipped to Vancouver, B.C., via railway and coastal steamer.

Freight from Whitehorse, and coal from the Yukon Coal Company Limited mine at Carmacks are handled on the return haul.

The first discovery in the camp was the Silver King property in 1906, but lode mining did not begin until 1913. Interest in the camp increased following the discovery of the No. 9 vein on Keno Hill in 1919 and with a few interruptions, notably between 1942 and 1946 inclusive, there has been almost continuous production.

During 1965, production came from the Hector-Calumet, Elsa, Keno, Silver King, and Comstock Keno Mines with small amounts of development ore from the No Cash, Onek, Galkeno and Birmingham mines. The following summary of operating results is from annual reports of the company:

	12-Month Period Ended 30 September 1963	15-Month Period Ended 31 December 1964	12-Month Period Ended 31 December 1965
Dry tons milled	186,721	227,845	146,850
Daily average, tons	511.5	497.5	402.3
Mill Heads:			
Silver (oz./ton)	34.03	33.37	33.25
Lead (%)	5.44	6.38	7.06
Zinc (%)	4.69	4.92	6.22
Metal Production			
Silver (oz.)	5,978,075	7,270,911	4,701,820
Lead (lb.)	16,751,012	26,304,902	18,753,650
Zinc (lb.)	14,759,821	19,995,295	16,700,565
Cadmium (lb.)	199,708	245,543	198,140
Metal Sales ^a	\$10,110,038	\$14,609,549	\$10,400,117
Source of ore treated in mill			
Hector-Calumet mine (%)	64.96	53.81	53.0
Elsa Mine (%)	15.44	13.00	10.9
Keno Mine (%)	6.73	19.85	24.4
Silver King Mine (%)	10.80	10.45	5.1
Galkeno Mine (%)	0.08	0.25	0.4
No Cash Mine (%)	1.00		0.8
Onek Mine (%)		0.48	2.8
Comstock Keno Mine (%)	0.99	2.07	2.6
Ore Reserves			
Tons	493,955 ^b	459,000	385,780
Silver (oz./ton)	34.58	34.1	32.2
Lead (%)	6.59	6.9	6.4
Zinc	5.50	6.2	6.5

^a Without deductions for smelter charges, freight, and marketing.

^b Exclusive of the Onek property

The principal production of the camp is won from erratic ore shoots developed along vein faults. During 1965, there was 13,254 feet of drifting and crosscutting, 4,214 feet of raising, 142 feet of shaft sinking, 8,715 feet of underground diamond drilling and 3,733 feet of surface diamond drilling. In addition, an extensive surface exploration program was carried out, both on Keno and Galena Hills and in the general area. Much of the following is taken from Annual Reports of the Company.

At the Hector-Calumet mine (United Keno Hill Mines Limited, 1961 and Boyle, 1965, pp. 6-67) production has come from numerous ore shoots developed in a branching and joining vein system, which has been explored to the 1,165 level by means of internal shaft. The various vein structures are referred to by numbers. The general strike of the vein system is $N45^{\circ}E$ and the dip $65^{\circ}SE$. Three major cross-faults striking northwest and dipping $45^{\circ}SW$ cut and displace the vein systems. Principal development work at this mine consisted of driving the 6-50-S drift to explore the area beyond the Jock Fault and extending the 1100 level to develop this area under known ore shoots on the 1000 level. A total length of 102 feet of ore grading 40.3 ounces of silver per ton was indicated during the year.

At the Elsa mine (United Keno Hill Mines Limited, 1961 and Boyle, 1965, pp. 72-74) a vein system has been traced for 2,300 feet laterally. Among the more important veins are the 2 vein (striking $N70^{\circ}E$ and dipping $65^{\circ}S$), the 5 vein (striking $N60^{\circ}E$ and dipping steeply south), the 15 vein (striking $N10^{\circ}E$ and dipping $30^{\circ}W$), and the 17 vein (striking $N20^{\circ}E$ and dipping $60^{\circ}S$). The main production has come from ore shoots along the junction of the 5 and 15 veins beneath the Porcupine Creek fault. This fault strikes east and dips about 30 degrees to the south, and is almost a bedding fault. To the southwest, the 2 vein is cut off by the Brefalt Creek fault, which strikes northwest and dips $50^{\circ}SW$.

Development work during 1965 was concentrated on the 17 vein and 141 feet of ore grading 33.7 ounces of silver per ton were developed. Unless favourable results are obtained in the development of the 17 vein on the 650 level or new ore is found this mine will cease to be a major ore source beyond the end of 1966.

The Keno Mine, near Keno Summit, was brought into production in October 1963 after a number of years of development work. In the Keno Summit area, three parallel longitudinal vein faults strike east-northeast and dip steeply south and are referred to from north to south as the Main Break (Fault), the No. 6, and the No. 14 or Porcupine. Numerous transverse vein faults that strike northeast and dip steeply southeast occur between the Main Break and the No. 6 longitudinal fault; these have been referred to as the No. 2, 3, 4, 5, 7, 8, and 9 vein faults (Boyle, 1965, Fig. 9). Both the longitudinal and transverse vein faults are cut by later faults that lie close to the bedding of the enclosing quartzite. Virtually all production has been from ore shoots on the 9 vein and exploration work has been concentrated on it. The company has built a camp on the south slope of Keno Hill, and most of the work in recent years has been done from two levels driven on this face of the hill. The 700 level near the camp was driven at an elevation of 4,831 feet above sea-level to investigate the Porcupine, No. 6, and No. 9 faults. These workings have been connected underground to the 200 level, which was driven a few years earlier on the same face of the hill to the upper part of the No. 6 and No. 9 vein faults. Development work has been done on a number of intermediate levels. During 1965, the internal shaft from the 700 level was completed to a depth of 1,121 feet although the 1075 level has yet to be developed. Lateral development of all levels totalled 4,468 feet and a total length of 103 feet averaging 42.3 ounces of silver across an average width of 5.9 feet was exposed.

At the Silver King Mine (Boyle, 1965, pp. 68-72) productive orebodies occurred along two joining vein faults. The No. 1 vein (204 of Boyle) strikes $N50^{\circ}E$ and dips 70° southeast, and the No. 2 vein (202 of Boyle) strikes $N75^{\circ}E$ and dips 70° southeast. Ore shoots occurred on both veins near the junction and on the No. 1 vein beneath Galena Creek, about 600 feet to the southwest. The company has carried out underground development work on the property since 1961 but at the end of 1965, following 348 feet of exploratory development in which no ore was found, the workings were abandoned and allowed to flood.

The No Cash mine is located about 9,000 feet northeast of Elsa, close to the station on the Elsa-Calumet aerial tramline. Boyle (1965, pp. 75-76) reported that the drifts expose a complex fractured zone, ranging in width from 5 to 15 feet with a general dip of 60° southeast. Small tonnages of hand-sorted ore were shipped from the property prior to 1936, and some 4,600 tons of ore containing over 70 ounces of silver to the ton was mined by United Keno Hill Mines in the course of development work during the period 1948-52. Development work between 1961 and 1962 involved rehabilitation of the 100 level adit, sinking a winze to the 225 level. The 500 adit, about 1,579 feet long, cutting the No Cash vein about 250 feet below the 225 level was subsequently completed. Work done during 1965 included 3,839 feet of drifting and cross-cutting on the 200, 300 and 500 levels and the completion of an ore and waste pass system connecting the 250 and 500 levels. A total of 108 feet of ore averaging 45.6 ounces of silver per ton was developed. Operations have since been suspended pending an increase in available manpower.

The Galkeno mine, originally developed as the Mackeno mine (Boyle, 1965, pp. 58-60), was purchased by United Keno Hill Mines in 1958. Work carried out in 1965 included deepening the Sime shaft 60 feet to establish the 500 level and a total of 1,631 feet of drifting and cross-cutting on the 26 vein. No ore shoots were developed in this work.

and operations have subsequently been suspended because of the manpower shortage.

The Onok mine (Green, 1965, p. 11) was rehabilitated in 1964, a small tonnage was produced before operations were suspended in May 1965.

The Comstock Keno Mines Limited's group of 10 claims on Keno Hill was leased by the Company on 19 December 1961. The Comstock-Porcupine longitudinal vein fault (Boyle, 1965, pp. 42-43) as exposed in the Comstock Keno drift, dips 70 to 85 degrees southeast and is a breccia zone 8 to 10 feet wide that contains pods of galena in places a foot or more in width. Rehabilitation of old workings commenced in the summer of 1963. During 1965, a total of 3,702 tons of ore grading 46.95 ounces of silver per ton, 12.8 per cent lead and 5.2 per cent zinc was mined from the property. In addition, a total of 205 feet of development work was completed but no ore was found. An internal ore pass to the 700 level of the Keno Mine has been completed and the property can now be worked on a year-round basis.

Surface exploration included both work on Keno and Galena Hills themselves and prospecting of a number of claim blocks staked following publication of geochemical information by the Geological Survey of Canada (Gleeson et al, 1965). In both, considerable use is made of geochemical methods and company has operated their own geochemical laboratory since 1963. When required, results of analysis can be made available to field parties within 24 hours.

In the Keno and Galena Hills area, the program of surface exploration begun in 1963 was continued. Work included detailed prospecting, soil sampling, geophysical surveys, overburden and diamond drilling. An overburden drill operating mainly on Galena Hill in the vicinity of the Silver King, Elsa, and Birmingham properties, completed 85,890 feet of drilling in 1965 - total overburden drilling since 1963 is 160,802 feet. Drill holes were completed to bedrock and the cuttings split, panned, and tested geochemically for lead, zinc and copper.

Following publication of geochemical maps (Gleeson et al, 1965) 21 groups, totalling 263 claims were staked within a 30 mile radius of the camp. During the field season, helicopter-supported parties prospected the groups by conventional and geochemical methods. As a result of this work an additional 98 claims were staked. A showing on the G group was examined by the author.

G Group (United Keno Hill Mines Limited) ($64^{\circ}00\frac{1}{2}'N$, $135^{\circ}38\frac{1}{2}'W$)

The G group of 34 claims was staked to cover geochemical anomalies indicated on geochemical maps (Gleeson et al, 1965, Maps 30 & 31-1965). A later geochemical map (Gleeson, 1966) shows anomalous lead values from stream sediments in this area. On prospecting the group, a showing was located on the ridge south of the junction of Lynx Creek and Skate Creeks at an elevation of about 4,100 feet. The showing is readily accessible by helicopter but would be difficult to reach by other means. Country rock of the showing is schist and limestone of probable Precambrian age (unit 3, Green and Reddick, 1962). Mineralization, consisting of pale buff siderite, much altered and heavily iron and manganese-stained with minor galena, sphalerite, pyrite, a grey antimony-bearing mineral, probably jamesonite, and quartz, has been traced in two trenches. It appears to be sheet-like in form and to lie parallel to the bedding of the enclosing schist with the exception of small siderite and galena bearing veinlets cutting the overlying schist. Probable bedding is shown by limestone, about 20 feet thick and lying about 20 feet stratigraphically below the showing which, despite considerable variation, appears to have a general strike of about $N40^{\circ}E$ and dip of $25^{\circ}NW$. The upper trench, about 25 feet long and 10 feet deep, exposes a mineralized zone about 20 feet long and 4 feet thick and the lower trench, about 60 feet down the slope and 50 feet long and 6 feet deep, exposes a zone about 35 feet by 4 feet. In addition to the two main pits, a number of smaller test pits have been sunk on the showing. A composite sample of altered siderite with

some galena taken from the upper cut assayed*: 0.4 ounces of gold and 7.56 ounces of silver per ton, 1.9 per cent lead and 3.7 per cent zinc and a similar sample from the lower cut assayed*: 0.03 ounces of gold and 6.80 ounces of silver per ton, 3.7 per cent lead and 3.1 per cent zinc.

Galena Hill

(Silver-Lead)

Paddy Group (A.A. Smith) ($63^{\circ}57'N$, $135^{\circ}23\frac{1}{2}'W$)

Reference: Boyle (1965, figure 2).

The Paddy group of 13 full and fractional claims, held by A.A. Smith of Mayo, Yukon, is located on the north face of Galena Hill below the Elsa-Keno road at an elevation of about 2,400 feet. Extensive bulldozer stripping and ground sluicing has been carried out over two seasons and float of vein material has been found in some of the cuts. However, the area has a deep cover of glacial material and very little bedrock is exposed with the exception of a greenstone 100 to 150 feet thick in the lower part of the stripped area. When visited late in the field season, an adit had been driven approximately 25 feet in the greenstone following a fault zone trending about south and dipping vertically. At this time the right side of the face showed about 35 inches of greenstone with scattered rusty breaks and the left 34 inches of rusty gouge containing scattered remnants of altered greenstone and stringers of quartz with minor calcite to 6 inches in length. A chip sample of the right side assayed*: trace of gold, 0.32 ounces of silver per ton, trace of lead, and 0.3 per cent zinc and of the left side: trace of gold, 0.18 ounces of silver per ton, trace of lead and 0.2 per cent zinc. Some galena was found in the rusty gouge as the adit was being driven but none was visible in the face sampled.

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

About 50 feet west of the adit a pit approximately 5 feet deep has been sunk in another rusty break which widens to 36 inches at the north end of the pit. A chip sample across this width assayed*: trace of gold, 1.20 ounces of silver, 1.0 per cent lead and 1.4 per cent zinc.

While the assay values obtained from both showings are low, the faults are relatively strong and occur in a thick competent greenstone that might be expected to hold openings that could be filled with vein material in contrast to the incompetent Lower Schist formation enclosing the greenstone lens. The entire greenstone, both along the faults and in the wall rock, appears to have been altered to secondary minerals, principally chlorite and calcite.

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

Sourdough Hill

(Silver-Lead)

Ram and Tundra claims ($63^{\circ}54'N$, $135^{\circ}15\frac{1}{2}'W$)

Reference: Boyle (1965, pp. 47-49)

J. Holmstrom leases the Ram and Tundra claims from Mayburn Mines Limited. During 1965, he shipped about 35 tons of silver-lead ore recovered from the old workings. The claims, located on Sourdough Hill, are reached by a steep road, about 2 miles long, leading from the village of Keno Hill.

Keno Hill

(Silver-Lead)

Gold Queen Property (Rio Plata Silver Mines Limited) ($63^{\circ}57'N$,
 $135^{\circ}10'W$)

References: Boyle (1965, p. 52); Green (1965, pp. 13-14).

Late in September 1965, Rio Plata Silver Mines Limited drove a short adit into the vein from a site along the access road about 120 feet from the stripping done in 1964 (Green, 1965). The adit cut the vein at 75 feet after which one round was driven in each direction on the vein and the faces sampled. The vein is reported to be 5.9 feet in width. The property was not visited in 1965.

Mount Haldane

(Silver-Lead-Zinc)

Lookout (Mount Haldane) Property (63°52'N, 135°53'W)

References: Cockfield (1919, pp. 4B-6B; 1920, pp. 5B-6B)*;

Green (1965, pp. 16-18).

No further work was done on the property during the summer of 1965.

South McQuesten River Valley

(Silver-Lead-Zinc)

Shanghai Property (63°56'N, 135°39'W)

References: Bestock (1947); Green and Godwin (1963, p. 9; 1964, p. 16); Green (1965, pp. 19-20).

The Shanghai property, on ground held by Silver Titan Mines Limited, was developed in 1964 by Peso Silver Mines Limited under an agreement with the former company. No work was done on the property during the summer of 1965. On 25 November 1965, a further agreement between the two companies superseded that under which Peso Silver Mines Limited did development work on the property and future work will be done by Silver Titan Mines Limited.

McQUESTEN AREA

Scheelite Dome

(Antimony)

Hawthorne Showing ($63^{\circ} 46' N$, $136^{\circ} 15' W$)

Reference: Bostock (1964).

Early in 1965, A.H. Moisey, of Edmonton Alberta, purchased 25 claims covering the showings from J. Hawthorne of Mayo, Yukon. During the field season, a road suitable for four-wheel drive vehicles was built to the main showing from the divide between Hight and Sabbath Creek on the Johnson Creek road and a considerable amount of bulldozer trenching done on the property.

The main showing straddles the ridge south of Scheelite Dome, just west of the head of Swede Gulch, and is at an elevation of about 5,100 feet. The showing consists of a quartz vein with stibnite that has been traced in a bulldozer cut for a distance of about 400 feet. The vein strikes NW and appears to dip steeply NE. When visited the cut had sloughed to some extent but the vein appears to be more or less continuous and to vary from one foot or less to 10 feet in width. The country rock is brownish weathering phyllite and phyllitic quartzite of probable Precambrian age (Bostock, 1964). Numerous granodiorite stocks occur in the vicinity and some of the metamorphic rocks contain considerable amounts of fine-grained, purplish-brown biotite.

The widest portion of the vein consists of a "blow-out" about 40 in length and up to 10 feet in width composed of quartz and stibnite with massive stibnite along the SE side. A composite sample of quartz with fine stibnite assayed*: 17.9 per cent antimony, 1.3 per cent arsenic, 0.4 per cent lead, 0.04 ounces of gold and 2.00 ounces of silver per ton. Considerable oxidation of stibnite to secondary oxides, possibly stibiconite, has occurred and a composite sample of this material assayed*: 0.80 per cent antimony, 1.0 per cent arsenic, trace of lead, 0.08 ounces of gold and 1.20 ounces of silver per ton.

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

About 40 feet to the SW of the centre of the "blow-out" the vein has a width of 3 feet where it is exposed in a small trench and a chip sample across it assayed*: 6.6 per cent antimony, 0.94 per cent arsenic, 0.1 per cent lead, 0.02 ounces of gold and 7.86 ounces of silver per ton.

The lower showing, about three-quarters of a mile south SE of the main showing, is located on a small tributary of Harvey Gulch at an elevation of about 3,800 feet. When visited, a bulldozer cut about 20 feet deep had uncovered blocks of quartz with stibnite, apparently occurring in chloritic quartzite and phyllite. A sample of stibnite-rich material taken from this showing in 1963 assayed*: 50.5 per cent antimony, trace of both lead and zinc, 0.05 ounces of gold per ton and 1.26 ounces of silver per ton.

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

SNAKE RIVER AREA

(Iron)

Crest Exploration Limited (about 65°15'N, 133°00'W)

References: Bamber et al. (1963); Green and Gedwin (1963, pp. 15-18; 1964, pp. 16-17); Green (1965, pp. 22-23).

No work was done on the property in 1965.

BEAR RIVER AREA

(Iron)

Pacific Giant Steel Ores Limited (64°50'N, 134°17'W)

Reference: Green and Reddick (1962).

Pacific Giant Steel Ores Limited own 16 claims covering an iron showing staked by A. Jellinek and P. Runer in 1962. Representation work and some geophysical prospecting has been done on the showing.

The showing is located on a small knoll on the north side of Bear River valley at an elevation of about 3,500 feet. Transportation to the showing is normally by helicopter as Gillespie Lake, about 10 miles SE, is the nearest lake suitable for float-equipped aircraft. The Wind River winter road, between Elsa and Orest Exploration Limited's Snake River iron property, passes within 12 miles to the northwest of the showing. A brief visit was made to the property in July 1965.

The deposit occurs near the point of a thin wedge of bright orange-weathering silty dolomite of Precambrian age (unit 2, Green and Roddick) that is enclosed by underlying dark argillite and argillaceous quartzite (unit 1).

In the author's opinion, rocks in the wedge, striking about east and dipping steeply north, overlie those of unit 1 conformably to the south and are in fault contact along the northern edge, the wedge widening in the cirque to the east.

On the top of the knoll, a small outcrop contains hematite with lenses of pale pink chert to several mm in size, interbedded with brown weathering, grey-green dolomite and dark green argillite. A draw trending southwest, approximately at right angles to the strike, exposes brown-weathering rock, principally dolomite but containing some hematite, pink chert, and traces of chalcopyrite for a distance of about 500 feet across the strike. Down the slope on the north side of the knoll, a face consists principally of a pink chert conglomerate with some dark green argillaceous rocks and some hematite in the matrix. The amount of hematite increases towards the base of the knoll. About 1,000 feet west of the top of the knoll a paced section included about 450 feet of iron-rich rock, with fine specular hematite as the major constituent, and farther to the south beyond a 200 foot covered interval about 100 feet of hematite-rich pink chert conglomerate and shale. Continuing west, the deposit passes beneath the cover of

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the valley floor although the company reports that specular hematite was found in test pits sunk in the area subsequent to the author's visit. Little more can be learned about the deposit without drilling.

The hematite in the showing is in the form of dense fine grained specularite. The orange weathering, grey-green, silty dolomite of unit 2 consists principally of ferroan dolomite (N. about 1.690) and minor quartz.

Small showings of both hematite and chalcopyrite have been reported (Green and Roddick, 1962, p.20) elsewhere in the area, commonly in Precambrian rocks (units 1 and 2 near the unconformity with the overlying Palaeozoic carbonate (unit 8). Hematite showings of this type, located along the east side of Wind River valley, about 11 miles east of the present property, sparked a small staking rush in 1958.

Deposits of this type have a markedly different geologic setting and are distinct from the sedimentary iron ores of the Crest deposit, located about 45 miles to the northeast.

DAWSON MINING DISTRICT

FIFTEENMILE RIVER AREA

(Silver)

Silver City Property ($64^{\circ}18\frac{1}{2}'N$, $139^{\circ}52'W$)

References: Cockfield (1928a, pp. 8A-10A)*; Green and Roddick (1962); Green and Godwin (1963, p. 20, 1964, pp. 18-19); Green (1965, pp. 23-25).

Silver City Mines Limited (N.P.L.), formed by some of the backers of the 1962 and 1963 work, has optioned 7 claims from J. Risco of Dawson, Yukon, covering the original showing and holds an additional 41 claims in the area. The showing, on the north bank of the river, is about $2\frac{1}{2}$ miles downstream from the mouth of Fifteenmile River. The property is an old one and has been prospected intermittently since about 1900. Cockfield (1928, p. 9A) reported that a shipment of 5 tons was

made from material that occurred as float on the beach of the Camp Bird claim, the site of the present work.

Ore on the property consists of quartz carbonate rock, believed to have formed through the alteration of basic or ultrabasic rocks (Green, 1965, p. 24-25), that contains small amounts of sulphide minerals, particularly galena and argentiferous tetrahedrite. This rock consists of sugary white dolomite, buff iron-bearing dolomite, quartz, and streaks of green nickel-bearing material. It is not known whether the silver-rich ore occurs as vein, pods, or disseminated throughout the quartz-carbonate rock.

During the summer of 1965, a crew of up to 6 men continued the hydraulic operation commenced in 1963, built a road from the camp at the river to a new portal site about 425 feet above the river, drove an adit 185 feet in length, and drilled two diamond drill holes from the adit. The adit was driven on a bearing of N 4° E from a point about 125 feet east of the original tunnel driven by J. Riscoe.

Both phyllite and quartz carbonate rock are exposed in the adit plus some pale buff highly sheared rock composed mainly of carbonate but containing numerous lens of altered phyllite. The latter rock may have formed in part through the carbonate alteration of phyllite as some of it contains considerable fine mica. No unaltered basic or ultrabasic rocks were cut nor was any mineralization encountered in place. A diamond drill hole, drilled for 93 feet at an elevation of plus 10 degrees along the line of the adit, did not cut mineralization. The core contained much greenstone, in part altered to quartz carbonate. One particularly fresh piece consisted of gabbro containing labradorite and clinopyroxene, with most of the latter altered to fine-grained secondary amphibole.

FORTY MILE AREA

(Asbestos)

Clinton Creek Property ($64^{\circ}27'N$, $140^{\circ}42'W$)

References: Green and Reddick (1962); Green and Godwin (1964, pp. 19-21); Green (1965, pp. 25-27); Christian (1966).

Cassiar Asbestos Corporation Limited holds 179 claims covering the property, discovered in 1957. The company did exploration work on the property in 1957 and 1958 and from 1963 on. Early in 1965, the company announced that the property would be brought into production in 1968. During 1965 preliminary construction and additional exploration were undertaken.

Access to the property is by a road about 26 miles in length, that leaves the Sixty mile road near mile 37, follows the ridge line west of Mickey Creek to the valley of the Forty mile River, and then the valley of Clinton Creek. The portion of the Sixty mile road between Dawson and the turn-off is to be rebuilt by the federal government and the government and the company are to share the cost of both the remaining 26 miles from the turn-off to the property and the bridge over the Forty mile River. In the earlier exploration, a tote road to the property followed the same general route but several soft spots and difficulties with the ford on Forty mile River limited its usefulness during the summer season when the camp was serviced by aircraft operating from an airstrip located about 2 miles north of it.

Proven ore reserves at the end of 1965 were 14,545,775 tons, valued at \$14.12 per ton with a waste to ore ratio of 3.3 to 1 and indicated ore an additional 9,529,614 tons valued at \$12.40 per ton with a waste to ore ratio of 6.5 to 1. Additional drilling is planned for 1966. (Christian, 1966). Most of the production will be of Group 4 asbestos fibre, used mainly in cement products. Initial production is planned at a rate of 40,000 tons of fibre per year, rising to 80,000 tons by 1970.

The deposit is located on Porcupine Hill, on the south side of Clinton Creek, about 5 miles from the mouth. From the crushers at the pit, the ore will be moved by tramline to the mill located on Trace Hill, about one mile to the north on the opposite side of Clinton Creek. The townsite, planned for a population of 600 to 700 is to be located about 5 miles away in the valley of the Fortymile River upstream from the mouth of Clinton Creek.

Exploration work carried out on the deposit in 1965 consisted of 32 vertical diamond drill holes with a total length of 18,158 feet designed to test the continuity of the main orebody to the southwest. The latter, has now been traced for about 3,000 feet with an average horizontal width of about 300 feet and ranging in depth to up to 800 feet beneath the surface.

The Clinton Creek property occurs in one of a number of small bodies of ultrabasic rock that occur in metamorphic rocks of the area (Green and Reddick, 1962). Enclosing metamorphic rocks observed on the property include shiny black phyllite, grey argillite, and brown weathering, micaceous, gritty quartzite. The body containing the showing is probably little more than a mile in maximum diameter. Typically, the serpentine is lustrous, green to grey-green, with numerous polished slip surfaces. Nearly all of the asbestos occurs as cross-fibre veins, generally $\frac{1}{4}$ inch or less wide. A number of other ultrabasic rocks, nearly all containing traces of asbestos fibre, occur in the general area but, to date, no other mineable deposits are known.

SIXTYMILE AREA

(Silver-Lead)

Per Group ($64^{\circ}00'N$, $140^{\circ}47'W$)

Reference: Cockfield (1921).

P. Johnson of Whitehorse, Yukon holds 16 claims of the Per and Pag groups covering a silver-lead showing located on the edge of the dredge tailings on the right limit of Sixtymile River about $\frac{3}{10}$ ths of a mile upstream from Miller Creek. The showing, an old one

discovered during dredging, was staked and re-examined in 1965 by P. Johnson and P. Gaudard, both of Whitehorse, Yukon. It is reached by a secondary road about $10\frac{1}{2}$ miles in length that leaves the main Sixtymile road to the International boundary at Mile 48.

When visited early in August, the showing had been stripped for a distance of several hundred feet, but because of sloughing the vein itself was only exposed for a distance of about 30 feet at that time. Stripping by bulldozer is difficult as the vein occurs in frozen and altered rock that thaws to produce a gumbolike mud and as the showing is at river level and would require a bedrock cut several thousand feet in length for adequate drainage.

The showing exposed comprises a galena-bearing vein up to 32 inches in width occurring in altered volcanic rocks of probable Tertiary age (Cockfield, 1921). The vein strikes about N 60° E and dips steeply. A chip sample across the 32 inch width, which contains galena with the exception of a 4 inch barren zone in the centre assayed*: 0.04 ounces of gold and 12.5 ounces of silver per ton, 26.4 per cent lead, and 4.7 per cent zinc. Another sample, about 10 feet to the southwest along the vein, taken over a width of 18 inches composed mainly of altered clayey material with some pyrite assayed*: 0.08 ounces of gold and 0.80 ounces of silver per ton, 1.2 per cent lead and 0.4 per cent zinc. A composite sample of three pieces of massive galena from the vein assayed*: 0.02 ounces of gold, and 33.5 ounces of silver per ton, 85.5 per cent lead, and 0.6 per cent zinc. Later in the season, two short diamond drill holes were put down one of which did not cut vein material and the other cut $7\frac{1}{2}$ inches of galena at a depth of 26 feet below surface.

Most bedrock is decomposed in the vicinity of the showing but scattered outcrops of altered, buff weathering, pale brown to grey, volcanic rocks, of probable felsic composition remain. These have a glassy grey matrix and are crowded with altered feldspar phenocrysts, both euhedral and rounded, to about 3 mm in size. Under the

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

microscope the rocks were found to be highly altered to secondary minerals with little or none of the original minerals remaining. Much of the secondary material is indeterminate but abundant carbonate, probably magnesite (No about 1.70) and some fine mica is present.

The silver to lead ratio of the Per group is low and the deposit is difficult to explore because of drainage problems. However, silver-bearing galena has been reported from placer concentrates on Miller Creek (Cockfield, 1921, p.42), in a prospect near the head of the Creek (op.cit. p. 51) and on the CCL group described in this report and the general area would appear worthy of careful prospecting.

Mosquito Creek

(Silver-Lead)

CCL Group ($63^{\circ}50'N$, $140^{\circ}48'W$)

Reference: Cockfield (1921).

The CCL group of 16 claims was staked by prospectors M. Chefkoi and J.R. Lerner, both of Whitehorse, Yukon, to cover float and geochemical anomalies discovered while prospecting in the area during the 1965 field season. The property was subsequently optioned by A.H. Moisey, of Edmonton who carried out bulldozer trenching, located galena in place, and acquired a large number of additional claims in the general area.

The showing, which was not visited, is reported to lie near the head of the west fork of Mosquito Creek, a tributary of Sixtymile River, at an elevation of about 4,200 feet, and is accessible only by bulldozer trail from the Sixtymile placer area.

A number of bulldozer trenches located on some of the anomalies are reported to have exposed a series of approximately parallel faults in gneiss, some of which are up to 10 feet in width and in places contain up to 18 inches of massive galena.

WHITEHORSE MINING DISTRICT

DAWSON RANGE AREA

Freegold Mountain

(Gold)

Laforma Property (Discovery Mines Limited) (62°16'N, 137°06'W)

References: Bostock (1936a, pp. 52-56; 1941, pp. 22-26);
Johnston (1937); Skinner (1961, pp. 33-35; 1962, p. 34);
Green and Godwin (1963, pp. 20-23; 1964, pp. 25-26);
Green (1965, pp. 28-31).

Discovery Mines Limited, formed by amalgamation of Consolidated Discovery Yellowknife Mines Limited and Ormsby Mines Limited on 5 March 1964, holds 32 leased claims covering the Laforma property on Freegold Mountain. Access to the property is via a 41-mile road from Carmacks, Yukon.

Ormsby Mines Limited purchased the property in 1960 from W.J. Langham, G. Fairclough, and the late E. Forrest. A number of showings are known on the property, but most of the underground work has been done on the G-3 zone, which strikes N25°E and dips steeply northwest and a small amount on the Pal vein, which strikes northeast and dips steeply. The gold occurs in lenses of quartz along the veins and the country rock is mainly quartz monzonite to granodiorite although some quartz porphyry and andesite porphyry are present. At the time of purchase, the underground development comprised 3 adits, No. 1, a short adit at an elevation of about 3,900 feet, No. 2, at about 3,625 feet, and No. 3 at about 3,545 feet. A small mill built near the portal of the 2nd level was operated in 1939 and 1940 by T.C. Richards of Whitehorse, Yukon. During this period, about 1,414 tons of ore were milled with a production of about 1,437 ounces of gold, exclusive of that contained in 52 tons of concentrate shipped in 1940 (Bostock, 1941, p. 25 and private report by A.P. Beavan, 1951).

Between 1961 and 1965, the company re-opened the road to the property, drove the 4th level, elevation 3,350 feet to the

junction of the G-3 zone and the Pal vein and followed the former for a distance of about 1,420 feet, drove raises between the 4th and 2nd levels, rehabilitated the 2nd and 3rd levels and extended the former to a total length of about 1,200 feet along the G-3 zone, and prepared the property for mining.

Early in 1965, the company announced that the LaForma property would be brought into production by 30 June 1965 in order to qualify for federal government assistance under the Emergency Gold Mining Assistance Act. Proven and probable ore reserves above the 4th level at this time were 86,000 tons averaging 0.76 ounces of gold per ton after allowing for dilution in mining (J. C. Byrne, address to shareholders, 20 April 1965). Mill and camp construction were rushed and the company was able to meet the 30 June deadline. The initial milling utilised an amalgamation and flotation process treating 35 tons per day due to temporary limited water supply from underground, although later addition of a cyanide plant capable of treating 125 tons per day was planned. A number of difficulties were encountered, including rising labour costs, initial milling problems and very poor percentage recovery of gold in the ore, and a lower grade of ore than originally estimated, and operations were suspended at the end of February 1966. The camp has subsequently been closed. Production for the period of operation was about 1,610 ounces fine gold and 570 ounces of silver. Exclusive of construction crews, up to 49 men were employed in the operation.

The G-3 zone consists of a highly sheared band, often up to 8 feet in width, containing some vein quartz and marked by an extensive clay alteration. The zone is strong throughout most of its length and can generally be followed without difficulty in the underground workings. It has now been followed for about 1,200 feet on the 2nd level and 1,420 feet on the 4th level, as well as in raises and sublevels between these two. Near the junction with the Pal vein,

the hanging wall of the G-3 zone is dense white quartz porphyry, but elsewhere with the exception of small areas of andesite porphyry, both walls are in altered granitic rocks, chiefly quartz monzonite and granodiorite. Some of the richer portions of the zone contain up to 4 feet of broken, brownish stained, vein quartz. Much of this quartz is crystalline, and drusy cavities are common. Much of the brown stain appears to be caused by iron-stained clay minerals associated with the quartz. Grey quartz, darkened by the fine pyrite and arsenopyrite, is present along parts of the vein. Scattered specks of very fine free gold occur in the brownish quartz and to a lesser extent in the grey quartz. The vein quartz is bounded by sheared and altered granitic rocks, frequently containing fine crushed fragments of quartz similar to the vein quartz. An extensive clay alteration, chiefly illite, is present along the G-3 zone and to a lesser extent elsewhere in the granitic rocks.

Mining was undertaken in 4 stopes, the 407 on the South Zone and centered about 220 feet from the intersection of the adit with the G-3 zone, the 306 on a sublevel above it, the 411 on the North Zone centered about 860 feet from the adit, and the 312 on a sublevel above it. At the same time a series of raises were driven from the 4th level to test the G-3 zone. Erratic values were obtained in the work (Annual Report, 1965, p.17) and operations were consequently suspended.

Big Creek

(Copper)

Revenue Copper (62°20'N, 137°16' W)

References: Bostock (1936a).

Late in 1964, Canex Aerial Exploration Limited optioned 15 claims covering the showing from F. Guder of Carmacks, Yukon and staked an additional number claims in the area. The property, located at an elevation of about 3,000 feet lies near Revenue Creek, the local name

for a small tributary of Big Creek. It may be reached by a bulldozer trail, about 8 miles in length, leading from the Laforma property. Early in 1965, the company moved a drill to the property and drilled 3 holes with a total length of 542 feet in an area where a geochemical survey indicated a high copper content. Only minor mineralization was encountered and the option was subsequently dropped. The area drilled, about 1,500 feet west of the original showing, is covered by overburden and deep cuts put in by Guder using ground-sluicing did not reach bedrock. The property was visited in August 1964, prior to the recent work.

The original showing, found by Guder while placer mining on the creek, is on the east bank of the east fork of Revenue Creek about a mile from the mouth. Workings consist of a cut and prospect adit, now caved, both about 30 feet above the creek and a small cut about 200 feet up the slope. Material on the dump consists of a buff-weathering "breccia" with coarse crystals of pyrite and traces of chalcopyrite. The showing was tested by geophysical surveys in 1954 and in 1955, Teck Exploration Company Limited drilled 5 diamond drill holes with a length of 1,401 feet beneath the showing. The holes contained only minor amounts of pyrite and chalcopyrite. At the same time, the company drilled two holes with a total length of 341 feet on the Forrest Ridge showing, located some 6,500 feet to the SW, and one hole, No. 2, cut a small amount of galena and sphalerite.

On the main showing, specimens of country rock from both surface exposure and diamond drill core are so highly altered that the original lithology can not be determined. Examined microscopically, the rock is pale buff and shows considerable variation in texture including:

a rock with apparent uniform grain size of about 2 mm, a porphyritic rock with ghosts of altered feldspar crystals to 5 mm, and a breccia composed of fragments to about 25 mm. Exposed surfaces of the rock are soon flecked with rusty spots through the oxidation of contained iron-bearing carbonate. Examined microscopically in index oils, the rock consists of: fine quartz, much of which is probably of secondary origin; fine muscovite, (replacing feldspar?); irregular grains of carbonate; and tiny pyrite cubes. The carbonate has a refractive index N_o between 1.71 and 1.73 and is probably a ferroan dolomite or ankerite although it may be an iron-bearing magnesite. In addition to the previous minerals, a specimen from the upper cut contained partially altered crystals of orthoclase feldspar. In the author's opinion, the country rock of the showing may have originated through the extensive alteration of a porphyritic rhyolite breccia (unit 13, Bostock, 1936a), although others who have worked on the property have suggested that the rock is an altered arkose.

The recent drilling by Canex is reported (personal communication) to have cut altered augite-biotite quartz diorite. The rock contained minor pyrite and chalcopyrite associated with the ferromagnesian minerals. Core from the Forrest Ridge showing is much as that from the main showing although dark green, banded, chlorite-rich rocks are also present. One specimen of core contained partially altered orthoclase feldspar.

Granite Mountain

(Copper)

March Group (Canex Aerial Exploration Limited) ($62^{\circ}19'N$, $136^{\circ}58'W$)

The company holds the March group of 44 claims covering old copper showings on Granite Mountain. The showings, on the flank of

Granite Mountain at an elevation of about 4,000 feet, occur in granitic rocks (unit 10, Bostock, 1936a) that have been intruded by minor quartz porphyry and felsite.

During the summer of 1965, the company built a road to the property from near Mile 33 on the Freegold road and carried out a geochemical survey of a portion of the group. The property was not visited.

Nansen Creek

(Silver-Gold)

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

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

During 1965 and early 1966, underground exploration was carried out on the Webber and Huestis properties of Mount Nansen Mines Limited and the nearby Brown-McDade property. As of 31 July 1965, Peso Silver Mines Limited held 53.2 per cent of the shares of Mount Nansen Mines Limited and 48.7 per cent of Brown-McDade Mines Limited. Late in 1965, Mount Nansen Mines Limited held 2 blocks totalling 269 claims and Brown-McDade Mines Limited a block of 70 claims (Peso Silver Mines Limited, Annual Report for year ended 31 July 1965). Other subsidiary companies hold additional claims in the area.

The main camp for the operation is located on a tributary of Webber Creek at an elevation of about 4,100 feet, close to the Webber portal. The Huestis portal is located about 5,400 feet SE of the Webber portal and the Brown-McDade portal about 5,000 feet ENE of the Huestis. During the winter months the camp may be reached by a winter road, 41 miles in length, leading from Carmacks and following

the flank of Miller's Ridge above Rawlinson Creek for 20 miles, the chain of lakes to Victoria Lake, from whence it climbs the ridge between Victoria and Nansen Creek to the old Brown-McDade camp and the new camp in the valley of Webber Creek. During the summer months, a route, about 19 miles long, suitable for tracked vehicles leaves the Freegold road about mile 32 crossing Mount McDade to join the other road just east of the Brown-McDade camp. Victoria Lake is suitable for float-equipped aircraft but the airstrip nearby is soft and unusable during the summer months.

Up to 40 men were employed in the operation.

Webber Property ($62^{\circ}03\frac{1}{2}'N$, $137^{\circ}10'W$)

The property was discovered by Whitehorse prospector, G.F. Dickson, in 1962 and surface stripping, diamond drilling, and overburden drilling were done on the showing in the summer of 1963 and 1964. Late in 1964, an adit was collared in the valley of Webber Creek, at an elevation of 4,280 feet and up to 200 feet below the surface exposures, and an extensive underground exploration program carried out through 1965 and early 1966.

Two principal veins are present, No. 1, trending about $N\ 35^{\circ}W$, and No. 2, about $N\ 60^{\circ}W$. Both dip steeply SW. When visited in late March 1966, No. 1 had been drifted for a strike length of about 830 feet, No. 2 for 825 feet and the combined vein beyond the junction for about 320 feet. In addition, extensive diamond drilling had been done both in the horizontal plane of the workings and beneath.

Country rock of the showing is mainly gneissic rocks of the Yukon group (unit 1, Bostock 1936a) but much of the rock is too highly altered and manganese- and iron-stained to identify with certainty. A band of younger quartz feldspar porphyry (unit 13, Bostock 1936a) varying from buff to light grey in color, and

containing phenocrysts of quartz and feldspar to about 3 mm was cut about 560 feet from the portal and extends about 100 feet.

The vein zones vary from broken zones to 8 feet in width carrying thin lenses of dark grey quartz to single dark grey quartz veins a few inches in width. The quartz is darkened by sulphide minerals, commonly too fine grained to identify and occurs in two forms, a dense, fine grained, cherty-appearing rock and a rock composed of tiny needles of crystalline quartz. Considerable arsenopyrite is present and green scorodite staining is prevalent in the portions of the veins that have undergone some alteration. Other sulphide minerals identified visually include pyrite, galena, and sphalerite. Silver-bearing minerals reported from the property include: freieslebenite*, acanthite**, native silver*, andorite**, and argentiferous tetrahedrite**.

The veins have been cut by a number of cross-faults with broken zones from a few inches to 20 feet in width. The faults strike about N 75°E and dip steeply. Vein material is commonly dragged into the fault zones and in most relatively minor horizontal displacement of the vein has resulted.

Proven and probable reserves of the Webber property as of 10 November 1965 were estimated at 73,450 tons containing 0.39 ounces of gold and 22.3 ounces of silver per ton and with an average width of 4 feet (Campbell, 1965, p. 16).

Huestis Property (62°03'N, 137°09'W)

The area was first staked by H.H. Huestis in 1947 and some stripping was done at that time. Later between 1962 and 1964 extensive surface stripping was done on the showing by the Mount Nansen Exploration Syndicate and its successor Mount Nansen Mines Limited. In March 1965, an adit was collared at an elevation of 4,295 feet, about 200 feet beneath the surface outcrops, and an

* Identified by Mineral Sciences Division, Mines Branch, Department of Mines and Technical Surveys.

** Identified by X-Ray Diffraction Laboratory, Geological Survey of Canada.

underground exploration program carried out through 1965 and early 1966.

Two narrow veins systems, the No. 12 and 13, up to about 250 feet apart have been explored. The adit cut the No. 12 vein about 270 feet from the portal at which point it strikes about north swinging to N 45° W about 280 feet to the north of the intersection. The vein has been drifted for about 1,370 feet along strike. The No. 13 vein, about 250 feet west trends about N 35° W and has been drifted for 600 feet along strike. Both veins dip about 60 to 70 degrees east.

Country rock of the showing is mainly gneissic rock of the Yukon group (unit 1, Bostock, 1936a). These are unaltered throughout much of the workings but locally have undergone a clay alteration. In addition, a small area of feldspar porphyry was cut by the workings on the 12 vein between about 595 feet and 740 feet southeast of the main cross-cut. This rock is light buff in colour and crowded with fine feldspar phenocrysts to about 3 mm.

The No. 12 zone is up to 5 feet in width and often contains one or more bands of quartz with sulphide minerals up to 6 inches in thickness. The quartz is dark grey, colored by fine sulphide minerals, and varies from a mass of small quartz crystals to a dense cherty-appearing rock. Sulphide minerals identified visually include arsenopyrite, pyrite, galena, sphalerite, and stibnite. The vein has been cut by a number of northeast trending, steeply dipping, minor faults with limited displacement. Vein material is commonly dragged into these faults and, in some, fragments are found in gouge. The No. 13 zone is essentially similar.

Proven, probable and drill indicated reserves of the Huestis property as of 10 November 1965 (prior to drifting on the No. 13 vein)

are estimated as 46,615 tons containing 0.46 ounces of gold, 16.0 ounces of silver per ton and with an average width of 3.4 feet (Campbell, 1965, p.21).

Brown-McDade Property ($62^{\circ}03'N$, $137^{\circ}07'W$)

The property, originally discovered by A. Brown and G. McDade was purchased by Brown-McDade Mines Limited in 1946. Surface exploration and underground work was done in 1946 and 1947. With the exception of some surface work in 1950, the property remained inactive until 1964 when surface trenches were re-opened and extended. The underground workings were re-mapped early in 1965 and later in the year an underground diamond drilling program of 37 holes with a total length of 1,811 feet completed.

The Brown-McDade showing consists of a wide shear zone, trending about $N 20^{\circ} W$ and dipping about $50^{\circ} - 70^{\circ} W$, cutting granodiorite (unit 10, Bostock, 1936a) and carrying values in gold and minor amounts of silver. Earlier underground exploration consisted of a cross cut, 680 feet in length, to the altered zone and about 500 feet of drifting in the zone to the north and 650 feet to the south.

The alteration zone is up to 100 feet horizontally and within it the granitic rocks have undergone a pervasive clay alteration. Much iron staining is also present. Gold values occur in irregular grey quartz lenses containing variable amounts of pyrite and arsenopyrite. In general, better values occur near the footwall of the altered zone.

Proven and probable reserves of the Brown-McDade property as of 10 November 1965 are estimated as 32,190 tons containing 0.61 ounces of gold and 5.4 ounces of silver per ton and with an average width of 6.7 feet (Campbell, 1965, p. 25). In addition, there is an indicated tonnage of 77,945 tons (op. cit.)

Casino Creek

(Silver-Lead)

Casino Silver Mines Limited (Casino Creek Property) ($62^{\circ}43'N$, $138^{\circ}49'W$).

References: Cockfield (1928b, pp. 11A-13A) ; Green and Godwin (1964, pp. 22-24); Green (1965, pp. 34-35).

Casino Creek Silver Mines Limited, formed in 1965, hold 222 claims in the Casino Creek area covering silver-lead showings originally staked by J. Meloy of Dawson, Yukon. The property is accessible from an airstrip, suitable for wheel-equipped light aircraft, located on the ridge to the northeast of the main Bomber showing. During the winter, a road, about 140 miles long, was built from the Alaska Highway to the property, following Brooks Arm of Kluane Lake, Brooks Creek, Onion Creek, Nisling River, and Dip Creek. Camp equipment and supplies were moved over the road until break-up early in April 1966.

During the summer of 1965, two bulldozers moved to the property in 1964 (Green, 1965, p. 35), were used to strip the veins on the Bomber showing. About 48.42 tons of ore, assaying 161.1 ounces of silver per ton and 68.0 per cent lead were hand-sorted in this operation and flown to an airstrip near McQuesten for shipment to the smelter. On completion of the winter road, mining equipment was moved to the property and a crew of up to 16 men were employed in underground exploration of the Bomber showing. No work was done on two other silver-lead showings, the Helicopter, located about 3,000 feet to the west, or the Trombley Creek showing ($62^{\circ}40'N$, $138^{\circ}38'W$), about 7 miles to the southeast. The latter showing, located on a tributary of Dip Creek is described by Cockfield (1928). The author visited the property in late August 1965 and in April 1966.

The Bomber showing, located on a tributary of Casino Creek at an elevation of about 4,000 feet, consists of veins, striking

about N 40° W and dipping steeply, that cut granodiorite. Surface trenches were cut on four veins, No. 1, lying to the northeast and tested previously by a short shaft (Green and Godwin, 1964), was stripped for a distance of about 280 feet; No. 2, about 50 feet southwest of No. 1, was stripped for about 160 feet, No. 3, about 100 feet further to the southeast was stripped for about 250 feet, and No. 4 slightly southwest of No. 3 was stripped for about 40 feet. No. 1 vein is the widest with an apparent width to 12 feet. The remaining veins have some wider portions but are generally 4 feet or less in width. Ore was sacked during the stripping operation, and of the total of 752 sacks, 491 came from the No. 1 vein, 195 from the No. 2, 10 from the No. 3, and 56 from the No. 4. (Prospectus, Casino Silver Mines Limited, 1966).

The surface trenches are in frozen ground and both vein material and country rock have undergone alteration as a result of both oxidation and frost action. Much of the vein material exposed consists of brown - to rusty-stained, punky material containing limonite, quartz crystals, barite, and patches of greasy-appearing dark quartz. Lenses of both galena and barite up to 20 feet in length and several feet in width occur within the veins. Galena is frequently altered to cerussite and some secondary native silver was found in the punky rock. Sphalerite, chalcopryrite, and pyrite, all common in the underground workings, appear to have been removed by oxidation. Granodiorite of the country rock, has crumbled to a coarse sand, probably as a result of surface weathering and frost action, and iron-and manganese-staining is common, particularly near the veins.

An underground exploration program consisting of about 1,200 feet of drifting and crosscutting was carried out between January and mid-April 1966. The adit is located about 565 feet N 26° W of the old shaft on the No. 1 vein at an assumed elevation of 3,940

feet up to 165 feet beneath the surface showings. The No. 1 vein was intersected about 445 feet from the portal and followed for some 375 feet. A spur commenced from about 60 feet along the No. 1 vein explored ground to the SW of it for a strike length of about 150 feet and up to 60 feet from the main drive. In addition, the area beneath the 2, 3, and 4 vein was tested by two crosscuts, both trending about WSW and approximately 120 feet apart, the first turning off some 325 feet from the portal.

Country rock in the underground workings is medium grained hornblende-biotite granodiorite varying from fresh rock to a soft pale-green rock in which the mafic minerals and feldspar have undergone an pervasive alteration, presumably to clay minerals with minor calcite. The alteration, not closely related to the vein faults, is often accompanied by minor faulting with the development of slickensides and destruction of the original texture. The No. 1 vein, as exposed underground, consists of a wide fault zone containing lenses of vein quartz and barite, with sulphide minerals including galena, dark brown sphalerite, pyrite, and chalcopryite. Much vuggy material containing crystals of quartz, barite, pyrite and chalcopryite is present. In places, the chalcopryite has been stained iridescent blue and green, elsewhere, it has a thin dark grey to black metallic coating, possibly of native silver. Little evidence of oxidation was seen underground. Lenses of massive sulphide minerals, principally galena and sphalerite, occur in the vein, one about 27 feet long and up to 18 inches in width was exposed in the drift and another perhaps 80 feet in length and of the same width was cut by 2 small crosscuts on the NE side of the drift and in a number of test holes. The company reports (The Northern Miner, 14 April 1966, p. 1) that a sample across 14 inches of the first sulphide lens assayed 128.7 ounces of silver per ton and 73.9 per cent lead.

Of the two crosscuts to test the 2, 3, and 4 veins, the first, closest to the portal, cut a zone of minor faulting with some thin veins of sulphide minerals and the second cut two veins parallel to the No. 1 vein and located about 75 and 95 feet SW of it. The first of these veins appears to be a composite break, up to 12 feet in width, with dips to both the NE and SW. The second farther to the SW dips about 70°SW and carries a band of galena up to 4 inches thick.

YUKON CROSSING AREA

Williams Creek

(Copper)

Bonanza King Property (62°23'N, 136°38'W)

References: Cairnes (1908, p. 10*; 1910, pp. 57-60)*;
Bostock (1936a, p. 56).

The Bonanza King group of 4 crown-granted mineral claims is held by C. F. G. Goulter of Carmacks, Yukon. The main workings, on the Bonanza King Claim, are located on the east side of Nancy Lee Creek about 1,000 feet from the mouth. The creek is a tributary of Williams Creek and joins the latter about 3/4 of a mile above the mouth. A wagon road leading from the Yukon River about one mile above the mouth of Williams Creek is almost completely overgrown. Copper showings were first staked in the area in 1907 and the Bonanza King property was visited by Cairnes in 1907 (1908, p. 10) and 1909 (1910, pp. 57-60). The shaft and upper adit had been driven at the time of his visit in 1909 and only the lower adit has been driven subsequently, presumably about 1913. The author visited the property in July 1965.

The showings consist of quartz lenses, up to 5 feet in width and carrying copper minerals, that occur in altered volcanic rocks of the Mount Nansen group (unit 7, Bostock, 1936a, Map 340 A) close to the contact of later granitic rocks (unit 10, op. cit.).

The lenses contain minor bornite and chalcopyrite, now mainly altered to secondary copper minerals, and a small amount of bright pink microcline similar to that in the country rocks. They lie in the plane of foliation (about N 40° W and dipping steeply) of the enclosing volcanic rocks and are believed to consist of a number of echelon lenses rather than a single vein although outcrops are poor between the workings. Rocks assigned to the Mount Nansen group vary from fine grained green volcanics to gneissic rocks crowded with bright pink microcline feldspar crystals similar to those in the nearby granitic rocks. The latter are highly foliated with coarse phenocrysts of pink microcline to about 25 mm and much green hornblende. The workings, all partially caved, consist of a lower adit about 10 feet above creek level, an upper adit about 200 feet above the creek level, and a shaft an additional 200 feet higher in elevation.

The lower adit, now caved at about 210 feet, follows a quartz vein up to 5 feet in width that trends about N 40° W and dips 60° SW. Wall rock consists of volcanic rocks that are in part altered to buff weathering quartz carbonate rock and in part crowded with microcline crystals and gneissic in appearance. The quartz is fractured and rusty weathering with a minor amount of copper staining. A composite sample of material picked from the dump and containing minor bornite and chalcopyrite assayed*: trace of gold, 0.64 ounces of silver per ton and 1.6 per cent copper.

The second adit, located to the NW of the lower adit and about 200 feet above it in elevation, lies about 40 feet NE of the contact of the granitic rocks. The adit was driven on a trend of N 45° W for a distance of about 50 feet and a cross-cut to the NW

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

about 40 feet from the portal is now caved at 20 feet. The adit is in sheared and altered volcanic rock containing scattered quartz stringers to a few inches in width and parallel to the foliation.

Further to the NW and about 200 feet in elevation above the second adit, a shaft about 25 feet deep has been sunk on a zone about 8 feet wide of quartz with some copper stain on the contact between volcanic and granitic rocks. The zone appears to trend about N 70° E and dip 80° S. A chip sample taken across 4 feet on the lip assayed*: 0.01 ounces of gold and 0.82 ounces of silver per ton and 2.4 per cent copper.

The Homestake property on Merrice (Merritt) Creek, about 3 miles south of the Bonanza King property, was not visited but from the description given by Cairnes (1910, pp. 57-60) it appears to be a similar type of deposit.

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

NORDENSKIOLD RIVER AREA

(Copper)

Mack's Copper Showing (Arctic Mining and Exploration Limited)
(61°38'N, 136°09'W)

References: Cairnes (1909, pp. 29-30*; 1910a, pp. 55-56).

Late in 1964, Arctic Mining and Exploration Limited optioned 5 crown granted mineral claims covering the showing and staked additional claims in the area. The showing, at an elevation of about 4,100 feet, is in a plateau area between Nordenskiold River and Kirkland Creek. Early in 1965, a road about 11 miles in length, was built to the showing from just north of Twin Lakes on the Whitehorse-Mayo road. A magnetometer survey and four diamond drill holes were completed before the camp closed in late May.

The property is an old one but until the recent work little appears to have been done since the property was visited by Cairnes (1909, 1910) in 1908. Workings at that time consisted of an adit 38 feet in length on the main showing and an open-cut on another showing to the southwest. Cairnes (1910) reported that a sample from the end of the adit assayed: trace of both gold and silver and 1.80 per cent copper and that a sample from the best four feet in the open-cut assayed: 0.025 ounces of gold and 3.4 ounces of silver per ton and 5.55 per cent copper.

The mineralization occurs in irregular bodies of magnetite- and garnet-rich tactite formed in limestone interbedded in a thick sequence of volcanic rock. On the main showing, a body of magnetite with some copper minerals, striking about north and dipping east, is exposed for about 500 feet of strike length along the axis of a small knoll and as a dip slope on the east side of the knoll. The short adit described by Cairnes is located on the east side of the knoll about 90 feet vertically below the top. A section in the vicinity of the adit was explored by three diamond drill holes. Hole No. 1, a vertical hole 165 feet in length, was located on the crest of the knoll about 220 feet horizontally from the adit on a bearing of N 60° W and about 90 feet above it. Holes Nos. 2 and 3 were located about 130 feet S 60° E and 60 feet vertically below the adit. The latter holes both trend about N 80° W, No. 2 plunging 45 degrees and 285 feet in length and No. 3 plunging 70 degrees and 200 feet in length. Results of the drilling suggest that the tactite zone has a width of about 150 feet and dips about 35 degrees to the E. Hole No. 1 was mainly in magnetite but Nos. 2 and 3 are in garnet-rich tactite with scattered thin bands of magnetite. Scattered low copper values were obtained.

Hole No. 4, planned to test the main showing to the north of the adit, was drilled about 300 feet N 10° E and at approximately the same elevation as Hole No. 2. Hole 4 was 209 feet in length, plunging 30 degrees on a bearing of N 80° W, and cut tactite for the first 23 feet of bedrock encountered. Deeper in the hole some native copper was observed as thin plates on fracture surfaces in the andesite.

A smaller showing is located on a slightly higher knoll about 700 feet S 70° W of the adit. Here, old pits on the north side of the knoll expose a garnet-magnetite tactite about 25 feet wide which contains some chalcopyrite and secondary copper minerals. The skarn band appears to trend about north and dip about 45 degrees to the east. Some coarsely crystalline marble is present in the skarn and as it is traced over the crest of the knoll the band changes to mainly marble, with grain size of about 3 mm, and about 15 feet of magnetite.

Much of the area between the two showings is covered with overburden and the relationship between them is uncertain although field evidence suggests they are not continuous. However, the two zones have similar strikes and it is possible that they represent a single zone offset by faulting passing through the low saddle between them.

Volcanic rocks forming the walls of both showings are dark green andesite. Hornblende is the predominant mafic mineral of the andesites although some contain phenocrysts to 5 mm of dark green clinopyroxene. Minerals present in the tactite are mainly magnetite, both granular and crystalline, light brown garnet, and crystalline calcite, with minor amounts of albite, quartz, bladed specular hematite, and chalcopyrite.

11

ANVIL RANGE AREA

Rose Creek

(Lead-Zinc)

Dynasty Explorations Limited (Anvil Mining Corporation Limited)
(about 62°08'N to 62°35'N, 132°40'W to 133°45'W)

References: Chisholm (1957, pp. 269-277); Roddick and Green (1961); Green and Godwin (1964, pp. 31-32); Green (1965, pp. 36-37); Aho (1966, pp. 127-149).

Dynasty Explorations Limited, succeeded by Anvil Mining Corporation Limited late in 1965, carried out an extensive exploration program in the Swim Lakes, Vangorda, and Rose Creek areas in 1965. Late in June 1965, a lead-zinc deposit was discovered by drilling on the Faro property (62°21½'N, 133°22'W) and early in 1966 the successor company announced that the deposit contained a potential of at least 40 million tons with a probable average grade of 10 per cent combined lead and zinc with some silver (The Northern Miner, 24 March 1966, p. 3). Diamond drilling of this deposit is currently underway.

The exploration program, commenced in 1964 (Green, 1965, p. 37) included airborne geophysical surveys (both magnetometer and electromagnetic), ground geophysical surveys (magnetometer, electromagnetic, and gravity), geochemical surveys, and geological mapping followed by rotary drilling in an attempt to discover deposits similar to the Vangorda lead-zinc deposit (Chisholm, 1957; Green and Godwin, 1964, pp. 31-32). As a result of the preliminary work, principally airborne geophysical and geochemical surveys, a large number of claim groups were staked and at year end the successor company held about 2,500 claims. Late in the year a major staking rush took place and much of the ground, between the groups staked by Dynasty Explorations Limited, is now held by other companies and individuals.

Rotary drilling, using Mordwell-mounted equipment, was used to

test anomalous zones between March and December 1965 with the discovery of lead-zinc mineralization on the Faro group on 26 June 1965. Groups drilled previous to this included the Sea group ($62^{\circ}11'N$, $132^{\circ}48'W$) with massive sulphides of sub-marginal grade, the Nasty group ($62^{\circ}14'N$, $132^{\circ}47'W$) with inconclusive results, the Cub group ($62^{\circ}13'N$, $132^{\circ}42'W$) with sulphide minerals with a trace of zinc, and the Beta group ($62^{\circ}16'N$, $132^{\circ}54'W$) with traces of sulphides (Annual Report, Dynasty Explorations Limited for the year ending August 12, 1965). A number of other groups were drilled subsequently.

Initially, exploration in the district was confined to altered sedimentary (units 7, 9a*, and 9b; Roddick and Green, 1961) and volcanic rocks (unit 8) between granitic rocks (unit 11) of Mount Mye batholith and the Pelly River. The sedimentary and volcanic rocks (7, 8, 9) are believed to be of Mississippian (?) and/or later age based on a comparison to other areas, although fossil evidence is lacking. Subsequent staking has extended far to the southeast and northwest along the strike of units 7 and 8, southwest of the Pelly River to the Tintina fault and to Upper Devonian and Lower (?) Mississippian sedimentary rocks (unit 5b) to the northeast.

Outcrop is poor in much of the staked area with talus and moss cover at higher elevation and a veneer of glacial deposits on the lower slopes. Three base metal deposits (Faro, Vangorda, and Swim) are now known over a distance of about 15 miles and definite controls for the deposits either stratigraphical or structural are unknown. Factors that have been suggested include favorable horizons within unit 7, proximity to the granitic rocks of Mount Mye batholith, proximity to NE striking faults suggested by lineaments such as the lower portion of Blind Creek, proximity to the Tintina fault or other subsidiary NW striking faults, and a general association with quartz or granite porphyry dykes.

* More recent mapping by Roddick (personal communication) has resulted in unit 9a being included within unit 7.

Faro property (62°21½'N, 133°22'W)

The Faro property is located at an elevation of about 4,000 feet in an area with little outcrop, near a tributary of Rose Creek. Two base metal deposits were discovered by rotary drilling, the Faro No. 1 zone and the No. 2 zone some 1,500 feet to the southeast. In addition, copper float has been found about 1,500 feet south of No. 2 zone and high grade silver-lead mineralization in a vein zone in schist on the north side of No. 2 zone.

Subsequent to the discovery, an airstrip was built in the valley of Rose Creek, about 1½ miles southwest of the deposit, and camps erected at the airstrip and near the showing. The camps were connected to a landing on the Pelly River about 1½ miles upstream from the mouth of Blind Creek by a road about 24 miles in length and suitable for four-wheel drive vehicles. During the winter, the camp was connected to the Canol Road at Ross River by tote-road, ice bridge across the Pelly River, and a portion of the partially completed Ross River to Carmacks development road. Diamond drilling of the Faro showing commenced during the summer of 1965 and is expected to continue through much of 1966. Up to 80 men were engaged in the 1965 operation.

Some of the first diamond drill cores were examined on a visit to the property in September 1965. Host rock for the deposits appeared to be mainly thinly banded, grey to green, phyllite (unit 7, Roddick and Green, 1961). Most of the rock is fine grained but some patches of coarser grained metamorphic minerals were present. In addition to the phyllite, minor amounts of granite porphyry, with phenocrysts of biotite and feldspar, and highly altered greenstone of probable volcanic origin were observed. There is little outcrop near the showing but one bluff near the Faro No. 1 zone exposed a greenish breccia of phyllite fragments. The Faro No. 1 deposit contains much pyrrhotite

(Aho, 1966, p. 147-148) with pyrite, sphalerite, galena and minor chalcopyrite. The Faro No. 2 lacks pyrrhotite and gave no response to magnetometer surveys, either ground or airborne (Aho, op.cit.).

ROSS RIVER AREA

Swim Lakes

(Lead-Zinc)

Kerr Addison Mines Limited (Swim Group) ($62^{\circ}12\frac{1}{2}'N$, $133^{\circ}02'W$)

Reference: Green (1965, p. 36).

The Swim "A" group of 72 claims held by Kerr Addison Mines Limited, was partly staked in late 1963 following an airborne magnetometer survey carried out by the company and an additional 24 claims added in 1965. During the 1965 field season a limited amount of drilling was completed on the group. At year-end, the company announced (The Financial Post, 1 January 1966, p. 13) that 3 holes located 200 feet apart had cut massive sulphide mineralization that, in part, contained values of lead, zinc, and silver similar to those of the Vangorda property, some 6 miles to the NW. The company plans to resume drilling in the spring of 1966.

WHITEHORSE AREA

Whitehorse Copper Belt

(Copper-Iron)

New Imperial Mines Limited ($60^{\circ}33'N$ to $60^{\circ}45'N$, $134^{\circ}53'W$ to $135^{\circ}10'W$)

References: McConnell (1909); MacLean (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).

During 1965, New Imperial Mines Limited continued an extensive exploration program, begun in 1963, on a number of old properties in the Whitehorse Copper Belt. The deposits are of the contact

metamorphic type and most occur along the contact between discontinuous bodies of limestone, of the Lewes River group of Upper Triassic age, and granitic rocks of probable Cretaceous age. Recent descriptions of individual properties are given in Kindle (1964) and Green and Godwin (1964, pp. 33-39).

At year end, the company held 286 mineral claims and one crown-granted mineral claim. The company also held options on 104 mineral claims and 21 crown-granted mineral claims. Work done during the year consisted of diamond drilling (129 holes with a total length of 44,212 feet), surface stripping, geological mapping, and a mill-feasibility study. Exploration work in 1965 was done mainly on the War Eagle, Little Chief, and Cowley Park properties. Up to 40 men were employed in the field.

Late in 1965, the company announced (The Northern Miner, 16 December 1965, p. 5) that they and Sumitomo Metal Mining Company had signed a letter of intent under which the latter company would provide senior financing to bring the property into production and would purchase all copper, gold, and silver concentrates for a minimum 10 year period.

Properties with known ore reserves are strung out over a distance of $18\frac{1}{2}$ miles along a northwest-trending belt that lies a few miles west of Whitehorse. Open-pit mining is planned, with the ore to be trucked to a centrally located 2,500 ton-per-day mill located near MacRae. Mining would commence on the Little Chief orebody nearby. Early in 1966 (Whitehorse Star, 17 March 1966, p. 7) the company reported open-pit reserves of 5,023,000 tons grading 1.10 per cent copper (allowing for mining dilution) and more than \$1 per ton in gold, silver, and molybdenum. In addition, (op. cit.) deep drilling beneath the proposed Little Chief open-pit has indicated reserves of 435,000 tons containing 1.63 per cent copper.

WHEATON RIVER AREA

(Antimony)

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

References: Cairnes (1916, p. 48)*; Bostock (1941, p. 35);
Wheeler (1961, p. 132); Green (1965, p. 42).

At year end, the company held 154 claims in the Wheaton River-Annie Lake area. These include many of the old properties in the Carbon Hill, Mt. Anderson, Chieftain Hill, Berney Creek-Skukum Creek, Folle Mountain-Schnabel Creek, Gold Hill, and Mineral Hill areas. Early in 1965, the company erected a permanent camp on Becker Creek, near the Wheaton River. The camp is reached by a road, 23 miles in length, that leaves the Carcross road about mile 11. From the camp a road was built to the Becker-Cochran property, about 5½ miles, and tote roads to a number of other showings in the district. A crew of up to 15 men was employed.

The first recorded work in the Wheaton area is in 1893 when two prospectors, Corwin and Rickman, spent the summer in the area and located a number of claims on Carbon Hill, Chieftain Hill, Idaho Hill and perhaps elsewhere (Cairnes, 1912, p. 3). They returned to Juneau with samples of antimony ore and some very rich gold-quartz ore but subsequently both died suddenly without disclosing the location of their claims. In August 1906, H.E. Porter found the old locations and workings on Carbon and Chieftain Hills and a staking rush to the area ensued.

The Becker-Cochran property on which most of the recent work was done, is located on the east side of Carbon Hill, at an elevation of about 5,100 feet, near the head of a small draw that joins an east-flowing tributary of Becker Creek, which in

turn joins the main creek about 3 miles above the mouth. The showing was first visited by Cairnes (1916, p. 48) in 1915. Intermittent development work has been reported Bostock (1941, p. 35) in 1940 and Wheeler (1961, p. 132) in 1951. Previous underground workings consisted of a tunnel 100 feet in length which was open at the time of Bostock's visit. Work on the property in 1965 included extensive bulldozer stripping, surface mapping and sampling, about 500 feet of underground exploration, and diamond drilling from both surface and underground. The property was visited in early August and again in late October after the underground work had been completed.

The showing occurs in a strong shear zone, trending about N 50° W and dipping 60° SW, in a small body of altered acidic volcanic rocks located within a much larger mass of granitic rocks of the Coast Intrusions (Wheeler, 1961). The shear has been traced by bulldozer stripping in two cuts, a lower about 300 feet in length and an upper about 150 feet, spaced over a distance of about 1,000 feet. Steep slopes preclude stripping between the two cuts. As exposed in the cuts, the shear contains quartz with fine stibnite and some pods of massive stibnite in highly altered country rock that ranges from brown to black in colour. The ground is frozen and in mid-summer, details in the cuts are obscured by sloughing within a few hours of exposure. Considerable alteration of the stibnite to secondary red and yellow minerals has taken place. In the lower cut the vein was cut by a later dyke of younger volcanic rock about 20 feet wide and in the upper cut a lens of similar rock appeared to lie within the shear zone. Other rock types present in the cuts include a small amount of buff weathering chert pebble conglomerate and dark green, fresh-appearing, volcanic rocks.

Late in the 1965 season, an adit was driven on the vein at an elevation of about 5,000 feet roughly 40 feet below the old adit and up to 350 feet below the surface. The adit, about 370 feet in length, was driven on a bearing of N 50° W. Two spurs one trending west and 60 feet in length, the other S 25° W and 70 feet in length were driven from a point about 160 feet from the portal. The adit followed the vein for about half its length. About 120 feet from the portal the vein is cut by a dyke about 7 feet thick and 45 feet beyond by another dyke about 32 feet thick. The dyke contacts appear to be fault surfaces and are marked by a few inches of clayey gouge. Mapping of the vein suggest it is offset slightly to the left at each dyke. The vein was picked up again in the last 75 feet of the adit. As exposed at the face, the shear zone is about 7 feet wide and contains much sheared and broken wall rock; soft, rubbery gouge, ranging from light grey to black in colour; quartz with fine stibnite; and pods of massive stibnite to 6 inches or more. Individual crystals of stibnite are often up to several inches in length. Wall rock consists of grey to black, fine grained rock with considerable clayey material. A chip sample taken across a width of 4 feet at the face assayed*: 16.4 per cent antimony, 0.35 per cent arsenic, and traces of gold, silver, and lead. Early in 1966, the company announced (Northern Miner, 13 January 1966, p. 22) that the vein zone explored by the adit had an average width of 5 feet and a grade of 4.83 per cent antimony, 0.59 per cent arsenic, and 0.88 ounces of silver per ton.

Examined microscopically using refractive index oils, samples of country rock from the property were found to be highly altered. Most of the specimens appeared to have been completely altered to

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

secondary minerals but a few contained partially altered remnants of sodic plagioclase, suggesting that the original rock was probably an acidic volcanic. What may have been the groundmass of the rock is now a fine-grained, indeterminate, mixture, probably containing much fine sericite. The development of carbonate, both as fine grains and larger crystals is common and many of the specimens contained as much as 25 per cent of this mineral. The N_D refractive index of the carbonate was observed to vary between 1.69 and 1.70, suggesting ferroan dolomite. Most of the specimens contained some distinct grains of quartz, and very fine grained material, similar in appearance to chert and probably composed mainly of quartz, was common. Much of the quartz may have originated through alteration of the volcanic rocks to carbonate and quartz. Brown weathering, characteristic of much of the country rock, probably results from the oxidation of contained ferroan dolomite. The dark grey colour of a number of specimens of clayey gouge was found to result from ubiquitous crystals of very fine pyrite.

The cross cutting dykes are composed of dark green, porphyritic, volcanic rock, containing feldspar phenocrysts to 2 mm in size. The dykes too are much altered but examined in index oils there are remnants of sodic plagioclase, probably oligoclase, and of hornblende. Some calcite is present and the finer grained alteration products are thought to include albite and epidote.

CARCROSS AREA

Montana Mountain

(Gold-Silver)

Arctic Caribou (Big Thing) Property ($60^{\circ}05'N$, $134^{\circ}42'W$)

References: Cairnes (1906, pp. 24-25*; 1908, p. 14*; 1917, pp. 36-28)*; Cockfield and Bell (1926, p. 39; 1944, p.12); Wheeler (1961, p. 127).

During 1965, Arctic Mining and Exploration Limited optioned 2 crown granted mineral claims and acquired an additional 36 claims in the vicinity of the Big Thing property. The workings, located above timberline on Sugarloaf Hill, a satellite peak of Montana Mountain, at an elevation of about 5,600 feet, are reached by a road 8 miles in length from the town of Carcross. The showing consists of gold- and silver-bearing veins cutting granodiorite.

The property is an old one and was being explored underground when visited by Cairnes in 1906. Development work done between 1905 and 1912 (Cairnes, 1917, p. 36) included an inclined shaft 450 feet in length, which followed the vein for all but the last 50 feet, four levels, the first with 120 feet of drifting, the second with about 50 feet, the third or 300-foot level, about 185 feet, and the fourth or 400-foot level over 700 feet of drifting. In addition, an adit, 2,320 feet in length, was driven southeasterly at an elevation of about 5,100 feet from a valley on the opposite side of Sugarloaf Hill and eventually connected to the previous workings. During 1916, most of the old workings were re-opened and a minor amount of further work done. At this time, Cairnes (1917, p. 37) estimated that 75,000 tons of ore had been blocked out that would average in the neighbourhood of \$15 per ton of gold and silver (at 1916 prices) and that "probable ore" on the property would be several times this amount. Since 1916 the property appears to have been inactive with the exception of the late thirties, when some open-cuts and trenches were put in on a second vein parallel to the original one.

Some hand-sorted shipments have been made from the property and in the present company reports (Annual Report, November 1965) that old records of work between 1910 and 1915 state that approx-

imately 3,000 tons of ore grading 1.08 ounces of gold and 27.7 ounces of silver per ton were shipped.

Work done in 1965 consisted of re-opening the road to the property, bulldozer trenching of surface showings, and driving a new adit intended to cut the vein near the east end of the 400 level in the old workings. Up to 10 men were employed in the underground operation.

When visited early in September, vein material had been exposed in 5 trenches east of the workings over a distance of about 1,000 feet and in two trenches west of the showing over a distance of about 500 feet. Later in the season, the company reports that the vein material was exposed in an additional 3 trenches west of the old workings for a total distance of 900 feet on this side. The trenches, up to 15 feet or more in depth and in frozen ground, were cut using a ripper tooth mounted on a bulldozer. Bedrock was obscured by sloughing soon after exposure.

Vein material, as exposed in the surface cuts, consists mainly of quartz including both fine grained dark grey quartz that is colored by fine sulphide minerals and vuggy, white, coarsely crystalline quartz. Metallic minerals present include arsenopyrite, both fine and coarsely crystalline, minor pyrite and galena. Scorodite, a green secondary arsenic mineral is common. As exposed in the surface cuts the veins strike about N 60° E.

The new adit, commenced in October 1965 and, located about 630 feet east of the old inclined shaft and approximately 200 feet lower in elevation, was driven to test the footwall vein exposed in the surface stripping and the main vein east of the old workings. The former was cut about 270 feet from the portal and the latter about 770 feet. When visited in late April 1966, the footwall vein had

been drifted for 235 feet to the northeast and 490 feet to the southwest, workings on the main vein joined to the 4th level of the old workings and the vein drifted for about 290 feet to the northeast.

Country rock of the deposit appears to be equi-granular granodiorite with a grain size of about 5 mm. Towards the vein, the rock is more altered and bleached; mafic minerals (principally hornblende and biotite) have commonly disappeared through alteration to fine grained secondary minerals; feldspars have been replaced by a fine grained mass of mica and clay minerals. Streaks of pyrite are common and small amounts of molybdenite were observed in the country rock, mainly along small slip surfaces.

The footwall vein as exposed underground varies from a single sulphide-bearing quartz vein, a foot or less in width, to a number of such veins spread over several feet. There are many small branching and joining veins and good values frequently occur at the junctions. Thin seams of both quartz and pyrite often parallel the vein in both hanging- and foot-wall. Quartz in the vein varies from white to dark grey, the latter darkened by fine sulphide minerals, probably arsenopyrite. Common sulphide minerals include arsenopyrite, often coarsely crystalline, pyrite, dark brown sphalerite, and less commonly galena. In places, the vein is marked by a blood-red staining believed due to secondary antimony minerals. East of the adit, the vein strikes about east, swinging to southwest on the opposite side of the adit and the dip is 30 to 45 degrees to the north and northwest. The vein is interrupted by numerous steeply dipping pre and post-mineral faults which strike at large angles to the vein and exhibit minor displacements. Where cut by the adit, the vein contains about 18 inches of massive sulphide minerals, mainly arsenopyrite and sphalerite, and is flanked by numerous small parallel veins in the hanging wall. True width of the vein at this point is reported

to be about 8 feet but sampling across a width of 26 feet returned 0.55 ounces of gold and 4.85 ounces of silver per ton, and about 1 per cent lead (Northern Miner, 10 February 1966, p. 11) and of the length of 90 feet to the east (including the adit and about 80 feet of drifting) 0.834 ounces of gold and 5.02 ounces of silver per ton and 1 per cent lead across an average width of 7 feet (op. cit.).

The main vein was cut about 15 feet below and just to the east of the 4th level of the old workings. Where cut it is nearly flat lying and consists of about 2 feet of sulphide minerals, principally arsenopyrite, sphalerite, pyrite, and galena, and of dark grey quartz, underlain by 2 to 3 feet of quartz-rich material. The sulphide-rich portion of the vein is reported to carry a high precious metal content with lower values in the quartz-rich portion. The vein strikes about northeast and has an overall dip of about 15 degrees although a section through the old incline indicates considerable variation. Where cut by the new workings, the vein has a slight reverse dip and rises into the roof of the main crosscut. When the property was visited in late April 1966 the vein had been drifted for about 290 feet along the strike to the northeast. In this direction, there is an overall decrease in the amount of sulphide minerals and an increase in the amount of quartz present. Much of the vein contains blebs of white quartz to $\frac{1}{2}$ inch in diameter surrounded by dark quartz containing both fine arsenopyrite and crystals to about $\frac{1}{4}$ inch in length. The vein is cut by numerous steeply dipping faults with minor displacements.

A short raise has been driven to the northeast end of the old 4th level and this was being re-sampled at the time of the visit. The main incline is partially filled with ice and the upper levels had not been re-opened. In the old workings stoping was done over a distance of about 255 feet along the 4th level, most of it between the old incline and the raise from the new workings.

The vein in this portion appears to have a high sulphide mineral content, now indicated by the presence of thick coatings of secondary salts, probably containing arsenic, iron, and some copper, and to be broken into a number of blocks by steeply dipping faults with relatively minor displacement. The vein tested by the new workings is believed to be the displaced portion of the main vein lost near the northeast end of the old workings. West of the incline, the vein consists mainly of quartz and is more continuous due to the apparent absence of the minor faults. This portion has not been stoped and it is assumed that values were lower than in the sulphide-rich portion of the vein to the northeast.

BIG SALMON RANGE AREA

Boswell River

(Silver-Lead)

Boswell River showing (61°03'N, 133°48'W)

References: Bostock (1935, p. 12); Lees (1936, p. 23-24);
Wheeler, Green, and Roddick (1960a).

J. Mohagen of Whitehorse, Yukon holds 23 claims in 3 scattered blocks covering silver-lead showings in the Boswell River area. Showings in this area were first reported by Bostock (1935, p.12) in 1934 and later described by Lees (1936, pp. 23-24). The area has been prospected by Mohagen for many years. The westernmost showings, on the Gopher claims, were visited briefly in his company in mid-summer 1965. The showing is located at an elevation of about 4,100 feet on a burnt-over sidehill overlooking Boswell River about 2 miles east of the mouth of Falls Creek and just west of the triple fork in the river. It may be reached by helicopter or by a trail about 15 miles in length leading from Teslin River at the mouth of the Boswell. The Teslin River at this point is suitable for use by float-equipped aircraft.

Country rock in the vicinity of the showing consists of quartz-feldspar-biotite gneiss, in part calcareous, with minor interbedded sugary white dolomite; all striking about S 70° to 80° E and dipping nearly vertical. The dolomite bands are usually 10 feet or less in thickness but one band about 35 feet thick is present a few hundred feet north of the showings and forms the south rim of a small draw. The centre of the draw is covered and a quartz-feldspar porphyry sill, about 20 feet thick, forms the north rim. The quartz-feldspar porphyry contains scattered phenocrysts to about 3 mm of quartz and, less commonly, feldspar in a pale buff sugary matrix, all much altered to fine secondary mica. Regionally, a number of granite porphyry and felsite bodies have been mapped in the area (Lees, 1936) and the showings are located about 1½ miles SW of the contact of granitic rocks of the Cassiar intrusion (Wheeler, Green, and Roddick, 1960a). The showings themselves are of two types: galena bearing lenses in dolomite within the gneiss and quartz veins with galena. Both parallel the foliation of the enclosing rocks.

When visited, a galena-bearing dolomite lens, up to 10 feet thick and partially altered to tremolite, has been explored in three trenches over a distance of about 50 feet. It was best exposed in the middle trench where the first 18 inches containing considerable galena assayed*: trace of gold, 95.60 ounces of silver per ton, 51.60 per cent lead, 0.3 per cent zinc and the remaining 36 inches exposed assayed*: trace of gold, 1.90 ounces of silver per ton, 1.2 per cent lead and a trace of zinc. A sample of cerussite-coated galena, taken from this cut and tested to determine the silver to lead ratio assayed*: 0.01 ounces of gold

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

and 157.70 ounces of silver per ton, 81.5 per cent lead, traces of antimony and zinc. About 300 feet to the west, a number of small pits had been sunk on quartz veins with some galena. A composite sample of quartz with galena broken from a vein 2 feet in width assayed*: trace of gold, 5.70 ounces of silver per ton, 6.8 per cent lead, and 0.1 per cent zinc. Older workings about 300 feet west of the present workings and overlooking a small creek tributary to Boswell River include a cut in the thick dolomite bed and an adit about 50 feet above the creek in elevation. The cut exposes dolomite cut by numerous quartz veins and containing traces of galena along fractures in the latter. The adit was collared in the gneiss just to the south of the thick dolomite bed but appears to have been very short.

Four miles further upstream, Lees (1936, p. 24) reported that an adit 120 feet long was driven in biotite schist reportedly to cut the contact of the granitic rocks. This objective was never attained but the adit cut 15 feet of quartz at its inner end; the latter carrying silver-bearing galena with a little molybdenite.

While the showings seen were small, the area would appear worthy of careful prospecting in as much as most samples have a favorable silver to lead ratio and showings have been reported over a distance of about 5 miles.

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

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Cone Mountain

(Copper)

Cone and Luck groups ($60^{\circ} 43'N$, $133^{\circ} 22'W$)

Reference: Mulligan (1963).

The group of 8 claims is held by T. Adams of Whitehorse, Yukon. The showing, at an elevation of about 5,000 feet, is located on the south slope of a saddle cutting through Big Salmon Range and is about $2\frac{1}{2}$ miles NNE of Cone Mountain. A tote road, about $11\frac{1}{2}$ miles in length and suitable for tracked vehicles, was built to the showing from near Mile 26 on the Canol Road in 1963. The showing was visited in mid-September 1964, in the company of Mr. Adams.

Country rock of the showing is well banded, micaceous gneiss containing much muscovite and lesser amounts of chlorite and biotite. It is of presumed Mississippian or Earlier age (Mulligan, 1963, map 1125A). Two bands of white vein quartz, up to 1 foot thick and parallel to the foliation, contain considerable bornite and chalcopyrite. They have been exposed in a cut about 20 feet by 20 feet at the base of a small bluff. The upper band has been traced for about 20 feet at which point it appears to thin and die out around the nose of an isoclinal fold with about 6 inches between the vein quartz on the two limbs. A lower band with a gentler dip than the upper band has been exposed intermittently for about 20 feet near the base of the cut. The contact between the two bands is not exposed but they may represent a single band following around a fold structure in the enclosing gneiss. A specimen taken to determine the precious metal content assayed*: 0.04 ounces of gold and 6.62 ounces of silver per ton, and 14.6 per cent copper.

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

WATSON LAKE MINING DISTRICT

PELLY MOUNTAINS AREA

Ketza River

(Silver-Lead)

Silver Key Mines Limited (all about 61°35'N, 132°10'W)

References: Wheeler, Green, and Roddick (1960a); Skinner (1961, pp. 39-40; 1962, p. 36).

Silver Key Mines Limited hold 124 claims and 6 fractions of which 37 claims are optioned covering a number of showings in the Ketza River area. During the 1965 season, a crew of up to 5 men was engaged in exploration, stripping, and sampling of a number of the showings. The Ketza area is reached by a tote road, about 24 miles in length, that leaves the Watson Lake-Ross River road about 10 miles from the junction of the former with the Canol Road. Three main showings were visited by the author in late September 1965.

Silver-lead showings were discovered in the Ketza area in 1947 by Hudson Bay Exploration and Development Company Limited (Skinner, 1961, p. 40); the original showing being the Vic 3 claim about 2 miles southeast of the Key 3 showing. In 1954, G. Fairclough, the late E. Erickson, and associates discovered the main Key showing and several others and in the same year the Conwest gold showing was discovered by that company. Conwest Exploration Company Limited and a number of other groups did extensive exploration work in the district in 1954 and 1955 and intermittent work has been done since. A very large number of showings are known in the area and some, found mainly as float, have sufficiently high silver values to be direct shipping ores. The only shipment appears to be about 15 tons of silver-lead ore from the Key 3 A vein (Skinner, 1962, p.36). At the time much of the initial work was done transportation to the area was extremely difficult and most of the operations were supplied by fixed wing

aircraft. In winter, supplies were flown to a winter airstrip in the valley of Ketz River and in summer, to Bruce (61°49'N, 132°07'W) and Grayling (61°30'N, 132°35'W) Lakes from whence they were moved to the properties by packstrings operating up to 20 miles over difficult trails. The region is more accessible now that a tote road has been completed to the Ketz valley and a number of the showings and will become even more so on completion of the Ross River-Carmacks portion of the development road.

Silver Ridge (Key 3) Showing (61°34½'N, 132°13'W)

The showing, located at an elevation of about 5,600 feet in a steep draw on the west side of the Ketz River valley is reached by a tote road about 4 miles long from camp in the main valley.

Exploration work on the showing was done in the following years: in 1954 and 1955 by Conwest Exploration Company Limited, in 1959 by R.R. Kirwan, who controlled the property at that time, and in 1960 and 1961 by Ketzakey Silver Mines Limited who made a 15 ton shipment from the property. Since then, the property has been inactive due to litigation until acquired by Silver Key Mines Limited in late 1964. During 1965, the company improved the road to and stripped portions of the main showing.

The Key 3 showing occurs along what may be a fault contact between overlying brown-weathering, phyllitic rocks with some contained volcanic rocks and lower black shale with minor chert and black quartzite. Rocks of both units and the contact strike between east-west and southeast and dip about 30 degrees to the south or southwest. Rocks in the vicinity of the showing have been mapped as volcanic rocks of Mississippian (?) or earlier age (Wheeler, Green, and Roddick, 1960) but the overlying phyllite closely resembles unit 2 of Middle and Upper Cambrian (?) (op. cit.) and the underlying black shale, unit 5 of Mississippian (?) or earlier age (op. cit.).

Stripping has exposed somewhat discontinuous mineralization along the contact between two of the old adits, a distance of about 150 feet, and for a further 120 feet to the northwest. The mineralization appears to occur mainly in hard siliceous beds and a few quartz lenses parallel to the contact. In places, galena is present in blocks to a few feet in size, elsewhere only as thin veinlets. Other minerals observed include lustrous brown sphalerite, pyrite, and light brown siderite. Tetrahedrite and chalcopyrite have also been reported (unpublished report by J.R. Woodcock).

The former adits, now caved or partially removed in stripping, were driven in from the face on what appears to have been cross veinlets at a large angle to the main lens. The longest adit, No. 2, about 36 feet in length, followed a vein striking about south and dipping 38° west. Sampling (Woodcock, op. cit.) indicated erratic high silver values over widths to 3 feet and a silver to lead ratio (ounces of silver per one per cent of lead) varying between 1.13 and 5.00. A sample of massive galena collected from the surface showing by the author in 1963 assayed*: 0.01 ounces of gold and 76.7 ounces of silver per ton, 67.4 per cent lead and a trace of zinc.

Galena vein (Hoey) Showing ($61^{\circ}33'N$, $132^{\circ}10'W$)

The showing, located at an elevation of about 5,000 feet on the south side of Cache Creek (a left-limit tributary that joins Ketz River near $61^{\circ}34'N$, $132^{\circ}10'W$) is one of the early discovered showings of the Ketz area. Country rocks are quartzite and carbonate of Silurian and Devonian Age (Wheeler, Green, and Roddick, 1960). These strike about east and dip north so that the hill-side is close to a dip slope. The showing occurs on a nose of

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

quartzite and consists of a faulted zone, containing galena, that trends about north and dips steeply. Float from the zone has been traced about 100 feet uphill and 50 feet downhill in a number of small pits but the showing is only well exposed at one point where the zone is about 30 feet wide and marked by much fracturing of the enclosing quartzite. Stringers of massive galena to 12 inches wide and perhaps 10 feet long occur in the eastern 12 feet of the zone and thinner stringers in the remainder. The east side of the showing consists of a rock face about 6 feet high and further to the east below this the slope is talus covered. At the base of the face a small pit exposes limonite with some galena. Ankerite (N_0 about 1.720) was observed in one of the lower pits and much of the limonite may have originated through alteration of the former mineral. A composite sample of galena from the main portion of the showing assayed*: 0.04 ounces of gold and 48.1 ounces of silver per ton, 73.2 per cent lead, and a trace of zinc. Another small galena showing, referred to as the Gopher Copter, is located downhill and about 700 feet to the northwest.

South Fault Zone ($61^{\circ}32\frac{1}{2}'N$, $132^{\circ}08'W$)

The showing is located in the valley of the upper Ketz River at an elevation of about 4,200 feet and is accessible by a tote road, 4 miles in length, from the main camp. Country rock of the showing is black dolomite with some beds of graphitic phyllite which appears to be interbedded with buff-weathering limy phyllite. The phyllite is probably of Middle and Upper Cambrian (?) age (unit 2 of Wheeler, Green, and Roddick, 1960) and the black limestone and phyllite may belong to the same unit or unit 3 of Ordovician and Silurian age (op. cit.). The dolomite is much fractured with the fractures healed by coarser crystals of secondary white

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

dolomite. Scattered showings occur in bulldozer trenches overlooking the Ketza River and in pits along a small east-flowing tributary creek over a total distance of about 1,100 feet. When visited in mid-September, the trenches had not reached undisturbed bedrock but slide material containing black dolomite with sphalerite and galena had been discovered. A composite sample of material from the trenches, rich in galena, assayed*: trace of gold, 20.0 ounces of silver per ton, 28.1 per cent lead, and 8.1 per cent zinc. To the west in the valley of the small creek a number of hand-dug pits had been put in on small showings all of which appear to occur in black dolomite near the contact with overlying buffy phyllite. Relationships are uncertain, as the creek is in a small V-shaped valley and there has been a great deal of sloughing, but about 50 feet of the black beds appear to be present in two places, probably a result of a single bed being repeated either through folding or faulting. Rocks in the creek appear to strike about north and dip moderately to the west. A composite sample, rich in galena, from the upper exposure assayed*: 0.005 ounces of gold and 54.5 ounces of silver per ton, 24.2 per cent lead, and 8.4 per cent zinc. It is not obvious whether the showings occur along a fault or faults cutting the black dolomite bed or as lenses at the contact of this bed with the buffy phyllites.

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

FRANCES LAKE AREA

Tyers River

(Zinc)

Norquest Joint Venture (about 61°15'N to 61°30'N, 128°20'W to 128°40'W)

Reference: Green (1965, pp. 45-46).

During the 1965 field season, Norquest Joint Venture - formed by the Anaconda Company (Canada) Limited, Asbestos Corporation

(Explorations) Limited, Bralorne Pioneer Mines Limited, the Granby Mining Company Limited, New Jersey Zinc Company (Canada) Limited, and Utah Construction and Mining Company - did further work on lead-zinc showings in the vicinity of the Black Jack showing and general exploration in the district. A helicopter supported party of up to 10 men was engaged in the work. As of late 1965, the syndicate held 215 claims in the area and an additional 15 claims in Northwest Territories. The Black Jack, Ron, and Lake showings were visited during the field season.

Showings explored in the mountainous area between Tyers and Hyland Rivers include the Black Jack, Fir Tree (Green, 1965, pp. 45-46), the Ron group, the Helen group, the Blueberry Fluke group, and the Lake group. Regionally, the showings lie within a belt of schist and paragneiss partially engulfed by granitic rocks. Granitic rocks, principally biotite granodiorite, occur as cross-cutting stocks and dykes and as sills parallel to the foliation of the paragneiss. The showings are similar in that they occur in epidote- and clinopyroxene-rich bands within the paragneiss or schist; the bands containing variable amounts of iron sulphide, chiefly pyrrhotite but with some pyrite, sphalerite and minor galena. The showings vary from those in which little epidote-rich rock remains, to relatively continuous bands carrying up to 10 per cent zinc, to continuous epidote-rich bands which carry little or no iron or zinc. The bands are believed to have formed through the alteration of limestone and locally they contain small lenses and pockets of marble. To date, the Black Jack showing, discovered by R. McBean and H. Buckzo in 1963 and explored in 1964, appears most promising. However, mineralization in the area is widespread and it may well be that other larger and higher grade deposits are as yet undiscovered.

Black Jack Showing (61°22'N, 128°23'W)

The showing, located on an elongate ridge at an elevation

of about 6,500 feet, may be reached by a tote road, about 5½ miles in length, that leaves the Canada Tungsten road near Mile 58 and leads to the base of the ridge. The showing is about 4 miles SSE of the similar Fir Tree showing described previously (Green, 1965, pp. 45-46). No work was done on the showing in 1965. A number of epidote-rich bands with sphalerite occur but the best has a thickness of about 15 feet and has been traced in exposures and pits for about 1,400 feet northerly, angling down the west face of the ridge. The rocks strike about east and dip about 30 degrees north. In the lower part, heavy talus cover has made it difficult to trace the band. The band weathers bright rust and contains epidote, a dark green clinopyroxene, shiny dark brown sphalerite and traces of iron sulphides. A chip sample taken across a pit near the ridge that exposes 8 feet of the band assayed*: trace of gold, 1.18 ounces of silver per ton, 3.7 per cent zinc, 0.4 per cent lead, and 0.14 per cent cadmium. The enclosing rocks are quartz-feldspar-biotite paragneiss that in places is almost a biotite schist. Granitic rocks occur as scattered cross-cutting dykes and as sills up to 10 feet thick and parallel to the foliation of the gneiss.

Ron Group (61°26½'N, 128°31'W)

The Ron group, about 3 and 7 miles NW of the Fir Tree and Black Jack showings, respectively, is located at an elevation of about 5,000 feet on a ridge that trends northeast, across and nearly at right angles to the trend of the other showings. On this showing, about one third of the rock exposed is paragneiss, the remainder being granitic rocks, both cross-cutting and parallel to the foliation. The paragneiss strikes N to NW and dips about 20 degrees to the east. Scattered rusty weathering, epidote- and clinopyroxene-rich bands with pyrrhotite, galena, sphalerite and

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

minor pyrite and chalcopyrite occur but the bands in the area are seldom more than a few feet thick, appear discontinuous, and frequently can be traced into granitic zones where they lens out.

Lake Group (61°16½'N, 128°19'W)

The Lake group, at an elevation of about 5,500 feet, is located on a NW trending ridge overlooking a small creek tributary to Hyland River. A zone of paragneiss, schist, and hornfels, about 1,500 feet thick, is exposed on a steep north-facing slope. The zone is about 1½ miles long and is underlain by granitic rocks which cut up onto the ridge at each end. The altered sedimentary rocks strike about east and dip moderately to the south. Rock types present include fine grained, quartz-feldspar-biotite gneiss, quartz-muscovite-chlorite schist, chlorite schist, finely banded green and brown hornfels, pistachio green epidote-rich bands, and remnants of limestone. Dykes and sills of granitic rock are rare. A band about 200 feet thick appears to be composed of about 10 per cent of epidote-rich rock. Only a small amount of the latter contains sufficient sulphide minerals to produce the rusty-weathering so characteristic of this rock type in other showings. A few areas with zinc mineralization comparable to the Black Jack showing are reported to be present.

Rain Group (61°39½'N, 128°06'W)

The Rain group is located about 8 miles east of the Canada Tungsten road in a creek bottom at an elevation of about 5,000 feet. The showing was not visited but is reported to consist of irregular pods of pyroxene skarn which carry sparsely disseminated chalcopyrite with much pyrite and pyrrhotite. Copper and precious metal content of samples taken from the showing is reported to be too low to be of potential economic interest.

Simpson Tower

(Copper)

May Showing (Yukon Pacific Prospecting Group) (61°25'N, 129°25'W)

Two groups, Yukon Pacific Prospecting Group and Mount Billings Venture, both organized by R. McBean of Vancouver have been active in the area between Frances Lake and the Canada Tungsten road in 1964 and 1965. They hold a number of showings particularly in the area NW of Mount Billings where zinc and lead mineralization similar to that explored by Norquest Joint Venture occurs. Two such properties are the DC group of 4 claims (about 61°13'N, 128°43'W) and the BM group of 15 claims (about 61°16½'N, 128°42'W). During 1965, the author visited only one small showing, the May, near Frances Lake.

The May showing, at an elevation of about 3,000', is located on the brush-covered flank of Simpson Tower above the East Arm of Frances Lake. The showing, exposed on a small knob and in a nearby trench about 25 feet long, consists of a lens of pyrrhotite with some chalcopyrite lying between the contact of a grey phyllite and bull quartz. The contact appears to trend about N 20° W and dip E with the quartz in the form of a lens parallel to the foliation of the phyllite. The pyrrhotite-bearing portion is up to 2 feet thick. A composite sample of material rich in pyrrhotite taken from the trench assayed*: trace of gold, 0.08 ounces of silver per ton, 2.8 per cent copper, and trace of zinc. Additional pyrrhotite is exposed in a cut about 150 feet N 40° E of the main showing.

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

HYLAND PLATEAU AREA

Quartz Lake

(Lead-Zinc)

MacMillan Showing (60°30'N, 127°57'W)

Reference: Smitheringale (1963).

The property consists of 70 claims, currently held by Liard River Mining Company Limited, a subsidiary of American Smelting and Refining Company Limited. The showing was discovered in 1948 by the late K. MacMillan formerly of Lower Post, B.C. It was explored between 1948 and 1950 by Noranda Mines Limited and New Jersey Zinc Company and between 1951 and 1956 by the present owners. The property has been inactive since.

The main camp for the exploration work was at Noranda Lake, the local name for a small lake about one mile west of Quartz Lake. Much of Noranda Lake is shallow but it can be used by lightly-loaded float-equipped aircraft. The main showing, about a mile SSW of the camp, is exposed in the valley of a creek, locally known as Mine Creek and tributary to Hyland River, at an elevation of about 3,200 feet. A tractor trail leads from the camp to the drill sites and to an upper campsite about 2½ miles from the main camp. The property was visited briefly in August 1965.

The showing occurs at the base of a limestone conglomerate overlying a buff, waxy-appearing argillite and has been explored by a trench about 60 feet long. The contact strikes about N 60° E and dips about 30° NW. The lower portion of the conglomerate has been replaced by siderite (? , No much above 1.74) and fine ankerite (No 1.72) with brown sphalerite, galena, and pyrite, the latter generally in tiny pyritohedrons. The showing is deeply stained by iron and manganese and there is a heavy iron staining for some distance downstream in the creek. The limestone conglomerate overlying the mineralized portion contains angular fragments of fine grained, grey limestone to several inches in maximum dimension cemented by a buff-weathering material containing fine quartz and muscovite in addition to calcite. The limestone conglomerate is overlain by a brown-weathering, pale buff-grey, carbonate probably ankerite(? , No about 1.72). Diamond drilling on the property consists of 83 holes with a total length of 19,571' of which 19

have outlined a mineralized lens striking about north, roughly parallel to the creek, and containing about 1 million tons assaying about 5 per cent lead, 10 per cent zinc and 1.8 ounces of silver per ton (Smitheringale, 1963).

The creek was traversed for about a mile above and below the showing. Most of the rocks exposed consist of buff-weathering, pale buff to greenish, soft argillite with minor amounts of maroon argillite, limestone, and carbonate-rich quartzite. One specimen of brown-weathering, grey quartzite examined was found to consist of quartz grains and a carbonate (N_0 about 1.70; probably ferroan dolomite). The brown to rusty weathering surface appears to be due to alteration of the carbonate. Some of the drill core stored at the main camp consists mainly of similar light grey to green argillite with a few quartzose layers.

Mapping in the immediate area, the exploration geologists identified three units: an upper Canyon unit of black fetid limestone and phyllite, a middle Range unit of quartzite and grit, and a lower Ridge unit of quartzite, grit limestone, and argillite with the mine limestone near the top. Their work suggested that both Mine Creek and Pyrite Creek, another north-flowing creek about 2 miles to the east lay along thrust faults and that the mineralized zone occurred in the upper plate of the thrust on Mine Creek.

Viewed from the air, the general area contains numerous outcrops of distinctive maroon and green shale, particularly in some of the creek canyons, and bald ridges of grey-appearing limestone to half a mile in length and up to several hundred feet thick project through the cover on the plateau surface. Both features and the lithology of argillite, gritty quartzite, and limestone observed on the ground suggest that the rocks belong to a Cambrian and Earlier unit (P6a of Douglas and MacLean, 1963) that outcrops in a huge arc between the present area and Dawson, Yukon. The immediate area is unmapped but the unit (11 of Gabrielse, Roddick, and Blusson, 1965, map 35-1964) has been mapped on the upper West Coal River about 35 miles north of the property.

CASSIAR MOUNTAINS AREA

Logjam Creek

(Silver-Lead)

Logjam Creek Silver Mines Limited (60°01'N, 131°35'W)

References: Poole, Roddick and Green (1960); Skinner (1962, p. 36); Green and Godwin (1964, pp. 47-48).

Logjam Silver Mines Limited holds 25 claims covering the Logjam Silver property discovered by W. McKinnon, of Teslin, Yukon in 1945. Early in 1965, a winter road, about 15 miles in length, was built to the showing following the valley of Smart River from the Alaska Highway. A camp, at an elevation of about 4,300 feet, was established beneath the showing on a small creek tributary to the river. Most supplies were freighted in at this time and the camp was accessible in the summer months only by helicopter or by a precipitous trail, about 2 miles in length, leading from an earlier tote road that ends on the ridge southeast of the main showing. A relocated road to the property, following the valley of Smart River, was opened after freeze-up in late 1965. A steep route, usable by tracked vehicles, leads from the camp to the portal site. During 1965 and early 1966, an adit was driven at an elevation of about 5,200 feet, and 6 diamond drill holes with a total length of 2,607 feet drilled from underground to test the vein zones. Up to 10 men were employed. The property was visited briefly in August and again in December 1965.

The surface showing consists of several silver-bearing veins exposed in a north-facing cliff of diorite (Poole, Roddick, and Green, 1960). The diorite appears to be a sill-like body and in the vicinity of the showing is exposed from the ridge top to just above the adit, a vertical distance of about 1,000 feet. Veins in the diorite are marked by rusty zones to a few feet in width and up to 500 feet in length, locally containing lenses and ribs of quartz and varying amounts of arsenopyrite, pyrite, galena, and

sphalerite (Green, 1964, p. 47). Veins Nos. 1, 2, and 6 strike between N 50°E and N 70° E, and No. 5 strikes between N 10° E and N 25° E; all dip steep to vertical. In previous work, high silver assays were obtained from surface sampling of the veins but the steep slopes and lack of suitable drill sites precluded further surface exploration. The adit, trending about S 40° W and 680 feet in length, was collared about 50 feet below the diorite contact. It cut the diorite contact about 580 feet from the portal and a drift, 115 feet in length, was driven southeast along the diorite contact. Diamond drill holes were fanned from the end of the adit.

Specimens of the diorite and the enclosing sedimentary rocks were examined microscopically in refractive index oils. Most of the diorite specimens are unaltered with plagioclase feldspar, (probably andesine); hornblende; and lesser amounts of clinopyroxene, (probably augite). Grain size is generally 1 to 2 mm. although coarser phases, containing dark minerals, mainly hornblende, are present. In some of the specimens part of the hornblende was replaced by large flakes of biotite.

The sedimentary rocks enclosing the diorite have been altered to dense, dark grey hornfels. Many of the minerals in the hornfels are too fine grained to be determined but some quartz and feldspar is present. The dark hornfels has been cut by myriad thin white veinlets containing quartz and feldspar. Some thin bands of limestone, now altered to marble, often with diopside and tremolite along the contact, are present. Distinctive purplish-brown hornfels, close to the diorite contact, is coloured by fine metamorphic biotite.

Upper Swift River

(Lead-Zinc)

Bom Property (60°8½N, 131°13'W)

References: Poole, Roddick, and Green (1960).

The property, originally held by Hudson Bay Mining and Smelting Company Limited, was explored about 1946 and 1947. Zinc showings in the Crescent Lake area, some 3 miles to the north were explored about the same time and are probably similar. The Bom property has been re-staked from time to time but only minor representation work appears to have been done. The No. 1 showing, located at an elevation of about 4,200 feet, on one of the creeks forming the headwaters of Swift River, was reached by a road, about 13 miles long, leading from the Pine Lake airstrip. No. 2 and No. 3 showings, about 7,500 feet to the ENE, lie on the Smart River drainage at an elevation of about 5,000 feet. The showings were visited in August 1965.

Regionally, country rock of all three showings has been mapped as chert, hornfels, argillite, slate, phyllite, quartzite and limestone all of Upper Devonian and Lower Mississippian age (Poole et al, 1960). The showings all appear to occur in carbonate-rich bands that have undergone variable amounts of alteration to secondary silicate minerals, principally diopside.

The No. 1 showing is exposed in a trench just above creek level on the east side of the creek and two other trenches, one about 60 feet and the other an additional 340 feet up the slope. The showing is parallel to the banding of the enclosing rocks, striking about N 70° E and dipping 50° S. The lower trench about 40 feet long, exposes a well-banded hornfels with a heavily manganese-stained portion near the north end that contains a few pieces of massive sulphide minerals and some marble. A composite sample of highly manganese-stained, sulphide-rich rocks exposed in and near the lower trench assayed*: trace of gold, 5.46 ounces of silver per ton, 3.3 per cent lead, 3.7 per cent zinc and 0.03 per cent cadmium. The middle trench is now sloughed. The upper

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

trench exposes a rusty zone about 20 feet long containing pyrrhotite, galena, and lesser amounts of sphalerite. A chip sample taken across 20 feet assayed*: trace of gold, 6.34 ounces of silver per ton, 5.0 per cent lead, 5.0 per cent zinc, and 0.05 per cent cadmium. Diamond drilling, 18 holes with a total length of 6,540 feet spaced over a distance of about 2,000 feet along the strike of the showing, cut only minor mineralization. In the eastern portion, a marble band up to 150 feet thick is present but only minor limestone occurred west of the creek. Both calcite and dolomite were observed in fragments of core left on the property and in the lower trench. In the latter, much of the carbonate appears to have been altered to a secondary silicate mineral, probably diopside. Rocks enclosing the limestone range from banded brown biotite-rich to green diopside-rich hornfels to white recrystallized quartzite.

No. 2 showing is located in the upper valley of a creek flowing into Munson Lake and is at an elevation of about 5,000 feet. Three trenches on the showing have sloughed but the upper end of one contains heavily iron-and manganese-stained diopside-rich rock with brown sphalerite, galena, pyrrhotite, and traces of arsenopyrite. The showing is parallel to the foliation of the enclosing rocks, striking about N 70° W and dipping about 50° S. Diamond drilling, 6 holes with a total length of 1,195 feet, spaced over a strike length of 750 feet cut a marble band, up to 100 feet thick with minor mineralization, mainly near the top of the marble. Carbonate minerals in the core include both calcite and dolomite and the marble appears to be in part replaced by secondary silicate minerals, mainly diopside, with minor amounts of hornblende and garnet. Some dedolomitization with the formation of calcite and serpentine was also observed in the core. Sulphide minerals in the core are frequently disseminated in dolomite

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

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rather than a diopside-rich rock as in the surface cuts. Enclosing rocks include, brown biotite-rich and green diopside-rich hornfels and white recrystallized quartzite.

No. 3 showing is located on the same creek as No. 2 but about 1,400 feet upstream (south) and very close to the divide. One small trench contained galena with lesser sphalerite, pyrrhotite, and pyrite in a rock rich in quartz but drilling 2 holes with a total length of about 875 feet did not cut sulphide minerals or marble.

Freer Creek

(Silver Lead)

Dale Mountain Property (60°01'N, 130°29'W)

References: Poole, Roddick, and Green (1960).

Dale Mountain Mines Limited held 16 claims covering the showing in 1958 and did about 525 feet of underground work at that time (Financial Post Survey of Mines 1959, p. 332). The property has been held by a number of individuals subsequently but little serious work has been done. The showing is on a ridge east of Freer Creek at an elevation of about 5,250 feet and the adit is on the east side of the ridge at an elevation of about 4,700 feet. The camp and adit may be reached by a rough road about 4½ miles in length leading from the bridge across the Rancheria River near mile 706 on the Alaska Highway. The property was visited in late August 1965.

On the showing, silver-lead mineralization, occurring in granodiorite of the Cassiar batholith (Poole, Roddick, and Green, 1960), has been traced about 50 feet in three small trenches. The trenches expose a vein, from a few to 30 inches wide, containing quartz crystals, minor siderite and galena now much altered with the production of limonite, manganese oxides and secondary lead minerals. The vein appears to strike about N 60° W and dip

steeply, probably to the southwest. A chip sample taken over 30 inches to include the vein and the adjacent altered zone assayed*: 0.06 ounces of gold and 23.8 ounces of silver per ton, 23.0 per cent lead and 1.7 per cent zinc.

The adit still open, was driven about 500 feet in elevation beneath the showing, reportedly for 525 feet (Financial Post Survey of Mines 1959, p. 332) and on a bearing of about S 65°W. Rock on the dump consists of fresh, medium-grained, porphyritic biotite quartz monzonite or granodiorite with no evidence of vein matter. About 225 feet of diamond drill core has been dumped in the shed at the portal and it appears to consist of similar rock with the exception of a trace of sphalerite near 167 feet.

With the limited size and the relatively low silver to lead ratio the deposit is of little economic interest.

Boulder Creek

(Tungsten)

Fiddler (Yukon Tungsten) Property (60°08'N, 130°26'W)

References: Lord (1944, pp. 16-17)*; Poole, Roddick and Green (1960);

A group of 6 claims covering the property is currently held by Native Minerals Limited. The property, on a ridge north of Boulder Creek at an elevation of about 5,100 feet, is reached by a secondary road, about 5½ miles long, that leaves the Alaska Highway just west of the Boulder Creek (George's Gorge) bridge at Mile 701.6.

The property was originally staked in July 1943 (Lord, 1944) for The Consolidated Mining and Smelting Company of Canada Limited. In 1951, Yukon Tungsten Corporation Limited acquired the property and were active between 1951 and 1953 at which time the underground work was done and a small mill built near the Alaska Highway.

*Reprinted in Geological Survey of Canada, Economic Geology Series No. 17 (Little, 1959, p. 37).

There was no production and the mill was later burnt. Since then only representation work has been done. The property was visited in August 1965.

Country rock of the showing is highly contorted phyllite and limy phyllite of Lower Palaeozoic age (mapped as unit 3 but more comparable lithologically to unit 4; Poole, Roddick and Green, 1960). The showing, exposed on the top of a rounded dome, consists of a quartz vein (or veins) up to 30 inches thick containing a tungsten-bearing mineral of the wolframite group. The vein, striking about N 60° E and dipping about 25° SE has been traced a total distance of about 650 feet down the south face of the dome in a series of trenches trending about S 5° W. It is not completely exposed in the lower portion and it is possible that an echelon veins rather than a single vein may be present in this part. In addition, some trenching has been done on the north face of the dome and the east flank where the extension of the vein might be expected. The vein appears to cut across the foliation of the enclosing country rock, the latter showing much evidence of internal deformation.

In the main trench near the summit, the vein consists of white, coarsely crystalline quartz with open vugs between some of the crystals, patches and lenses of fine muscovite, and scattered crystals of wolframite. About 75 feet south of the cliff face, a small vein, about 5 feet beneath the main one and approximately 10 feet long and 1 foot thick, contains galena and some secondary copper minerals near the top and coarse crystals of wolframite to several inches in size near the base. Other minerals present in this vein in minor amounts include scheelite, muscovite, and pale green fluorite. Small cross-cutting veinlets with small quartz crystals, pale purple fluorite, and muscovite are also present in this part of the cut. Small amounts of pyrrhotite is common in the country rock adjacent to the veins. Farther down the slope little mineralization was observed with the exception of about

150 feet from the main cut where some wolframite was present and fractures in the quartz were coated with tiny crystals of cassiterite. Cassiterite crystals to 1/4 inch were panned from the frost-heaved material overlying the vein in this area.

The adit was driven from a point about 700 feet SE of the showing and 180 feet lower in elevation. It was driven about 530 feet and then an inclined raise 235 feet in length driven to the surface breaking through about 65 feet SE of the trenches. Material on the dump consists mainly of phyllitic limestone and phyllite with little evidence of vein quartz. A specimen taken from the ore bin was composed mainly of crystalline quartz cut by a stringer about 1 inch thick containing coarse muscovite, fluorite, and minor cassiterite.

UPPER LIARD RIVER AREA

Old Gold Creek

(Copper)

Mont Group (61°01'N, 130°40'W)

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

The group, originally explored by Newmont Mining Corporation of Canada Limited between 1955 and 1957, was restaked in 1965 by G.E. Stephen of Watson Lake, Yukon. The property was visited briefly with Stephen in August 1965.

The showing, located in a cirque at an elevation of about 5,500 feet, was explored from a camp in the main valley of Old Gold Creek, about 3 miles west of the showing and 4 miles from the mouth of the creek. The camp was accessible by a winter air strip nearby and by a road, about 17 miles in length and suitable for tracked vehicles, leading from Watson Lake. Except in periods of very low water, the Liard River is navigable by small river boats from Upper Liard bridge, on the Alaska Highway, to the mouth of

Old Gold Creek, a straight-line distance of about 90 miles. Float-equipped aircraft have landed on suitable stretches of the Liard River in this area. Work done between 1955 and 1957 included trenching of the main showings and 7 diamond drill holes with a total length of about 7,055 feet.

Country rock of the showing is hornfels formed from phyllite and minor limestone of Middle and Upper Cambrian age (?) (Wheeler, Green, and Roddick, 1960) located about one mile southwest of the contact of a small batholith of granodiorite. The showings, consisting of lenses of white quartz with minor calcite, pyrrhotite, and chalcopyrite, have been trenched for about 1,500 feet along the flank of the cirque and some copper staining was noticed over a distance of about 5,000 feet. The thickness and number of quartz lenses appear to vary across the area and the showing appears to consist of en echelon lenses rather than a single vein. The lenses strike about N 55° W and dip steeply. A chip sample taken from the most westerly cut over a distance of 12 feet assayed*: trace of gold, 0.20 ounces of silver per ton, 1.80 per cent copper and a trace of zinc. The quartz vein in this cut is wider and contains more visible chalcopyrite than most others observed. In the surface cuts, much of the pyrrhotite is altered to limonite and chalcopyrite to secondary copper minerals.

Diamond drilling was done from 3 stations, all at an elevation of about 5,300 feet and roughly 300 to 500 feet beneath the showings. Holes 1, 3, and 5 were fanned from the most westerly station, Holes 2, 4, and 6 from a station 790 feet S 47° E of the original station and Hole 7, 1,040 feet S 54° E of the centre station. The holes were drilled at an inclination of about 15 degrees below the horizontal, with the exception of Hole 7 at about 25 degrees. Some quartz containing scattered pyrrhotite and

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

chalcopyrite was encountered in all the drill holes but none appeared to be of potential economic interest.

Examined microscopically in index oils, the rocks were found to be hornfels. Minerals present in it include: muscovite, biotite, albite, calcite, tremolite (?), and quartz. Distinctive purplish-brown bands in the hornfels are coloured by fine grained biotite and the light green to white areas are rich in muscovite and fine albite, and possibly tremolite.

Exploration of this showing proved discouraging because of low copper values and the narrow width and lens-like nature of the mineralized quartz. However, a number of other copper showings are known in the general area and it would appear to warrant additional prospecting. During 1965, Stephens located a new copper showing on the left limit of the Liard River about one mile downstream from the mouth of Old Gold Creek. He also prospected an area about $4\frac{1}{2}$ miles up Dome Creek ($60^{\circ}55\frac{1}{2}'N$, $130^{\circ}49'W$) where flat-lying lenses of quartz in a grey to white marble contain minor chalcopyrite and secondary copper minerals. The lenses are up to 1 foot thick and form about 5 per cent of the bluff. The overall copper content is low and an assay* indicated only traces of precious metals.

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

NAHANNI MINING DISTRICT (DISTRICT OF MACKENZIE)

SELWYN MOUNTAINS AREA

Upper Flat River

(Tungsten)

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

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

Canada Tungsten Mining Corporation Limited was formed in 1959 to develop a tungsten deposit near the headwaters of the Flat River, 130 miles north of Watson Lake, Yukon. The company holds 112 claims in the area. An all-weather road to the property was completed late in 1962.

The orebody, at an elevation of about 4,800 feet, is exposed on the floor of a small cirque on the west side of the valley of the Flat River and is mined by an open-cut operation. The mill and town-site, at an elevation of about 3,500 feet, have been built on a bench in the main valley near the mouth of the cirque. The two are connected by 3 miles of switchback road.

During 1965, 127,000 tons of ore was mined from the open-cut requiring the removal of 200,000 tons of waste and overburden and 108,000 tons of ore averaging 2.53 per cent WO_3 was milled with a production of about 4,000,000 pounds of WO_3 (The Northern Miner, 14 April 1966, p. 11). Reserves at year-end were 919,917 tons averaging 2.49 per cent WO_3 , before dilution. Most of the production is sold under long term contract, principally for use in the manufacture of metallic tungsten and tungsten carbide. About 75 men are employed in the operation.

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).

The Yukon Consolidated Gold Corporation Limited was formed in 1923 from eight companies with interests in the Klondike area. The company operated five electrically driven dredges and a bulldozer-sluicing plant in the Klondike area in 1965. The company holds much of the placer ground in the district (705 claims and 2 hydraulic leases) but at year-end 324 claims were dropped. The ground held is located on Hunker and Bonanza Creeks, southern tributaries of Klondike River, and on Dominion, Sulphur and Quartz Creeks, northern tributaries of Indian River. A 100-mile network of roads connects all operations with Dawson and with the company's office, shops, gold room, etc., at Bear Creek, 8 miles east of Dawson. The company also operates a 15,000-hp hydroelectric plant on Klondike River about 4 miles below the junction of the north and south forks of the river. This plant supplies power to the city of Dawson, and drives the dredges and other mining equipment.

Available figures of operations of the company (Financial Post Survey of Mines, 1966, p. 98) are as follows:

Year	Cubic Yards Treated	Value of Gold (and Silver) Recovered
1932-61	186,989,871	\$51,156,935
1962	4,477,386	1,647,985
1963	4,473,831	1,650,383
1964	<u>4,004,350</u>	<u>1,682,810</u>
Total	199,950,438	56,138,613

Most of the following information concerning the 1965 operations of the company was supplied by Mr. A.G. Barrett,

Manager, Dawson. The cooperation of the company is gratefully acknowledged.

General

In 1965 the Yukon Consolidated Gold Corporation Limited employed a maximum labour force of 208 men (160 of whom were seasonal), treated a total of 2,343,055 cubic yards of gravel and produced 33,268 ounces of fine gold and 7,326 ounces of silver, with a total value of \$1,167,326. Proven gravel reserves written off during 1965 were 3,522,747 cubic yards and proven gravel reserves at the end of 1965 were 4,367,138 cubic yards valued at \$2,060,152 (about 42.3 cents per cubic yard).

The dredge operations started about 1 May 1965. These were adversely affected by poor digging conditions for the dredges resulting from deep penetration of seasonal frost following a cold winter with below normal snow cover. In addition, a one-week shut-down in October due to slush ice at the power plant and the early shut-down for the season limited production. Thawing operations ahead of No. 6 and 8 dredges were adversely affected by cool, cloudy summer weather and a shortage of labour. No stripping was done in 1965.

Mining Operations

Dominion Creek

Dredge No. 6 (7-cubic-foot buckets) is working down lower Dominion Creek about 2 miles south of Granville. In 1965 this dredge operated from 3 May until 3 November, mined 772,123 cubic yards at a cost of 40.5 cents per yard and recovered 7,129 ounces of fine gold and 1,602 ounces of silver with a total value of \$249,590. Work started on the dredge and site on 6 April and finished 11 November. The thawing plant ahead of the dredge operated from 20 May to 13 September and thawed 935,171 cubic yards of gravel at a cost of \$3.38 cents per cubic yard. Work on the plant site began 7 April and ended 24 October.

Dominion Creek Benches

Bulldozer mining operation No. 16 is on the left limit bench of middle Dominion Creek about 1.2 miles above the mouth of Jensen Creek. During 1965 the plant operated from 1 June to 15 October, mined 137,449 cubic yards of gravel at a cost of 118.8 cents per cubic yard, and recovered 2,631 ounces of fine gold and 548 ounces of silver with a total value of \$92,071. Work started on the plant and site 1 May and ended 20 October.

Dredge No. 12 (2 $\frac{1}{2}$ -cubic-foot buckets) is located on the left limit bench of middle Dominion Creek about 1 $\frac{1}{2}$ miles above the mouth of Jensen Creek. In 1965 this dredge operated from 2 June to 30 September, mined 202,275 cubic yards at a cost of 58.2 cents per cubic yard, and recovered 4,741 ounces of fine gold and 1,051 ounces of silver valued at \$165,939. Work started on the dredge and site 4 May and finished 8 October. No stripping or thawing was done ahead of the dredge.

Sulphur Creek

Dredge No. 8 (7-cubic-foot buckets) is working up middle Sulphur Creek about claim 60 Below. In 1965 this dredge operated from 3 May until 4 November, mined 657,340 cubic yards of gravel at a cost of 35.0 cents per cubic yard, and recovered 6,917 ounces of fine gold and 1,483 ounces of silver valued at \$242,177. Work started on the dredge and site 6 April and finished on 10 November. The thawing plant ahead of the dredge operated from 26 May to 25 September and thawed 1,206,241 cubic yards of gravel at a cost of 7.13 cents per cubic yard. Work on the plant site began 7 April and ended 25 October.

Dredge No. 9 (5 $\frac{3}{4}$ -cubic-foot buckets) is working upstream on upper Sulphur Creek about 1.7 miles below the mouth of Green Gulch. In 1965 this dredge operated from 3 May to 3 November, mined 380,699 cubic yards of gravel at a cost of 69.5 cents per

cubic yard, and recovered 5,263 ounces of fine gold and 1,157 ounces of silver with a total value of \$184,208. Work started on the dredge and site 5 April and finished 7 November. No stripping or thawing was done ahead of the dredge.

Hunker Creek

Dredge No. 11 (7-cubic-foot buckets) is working up Hunker Creek about 1.3 miles below Last Chance Creek. In 1965 this dredge operated from 1 May to 4 November, mined 693,169 cubic yards of gravel at a cost of 32.7 cents per cubic yard, and recovered 6,537 ounces of fine gold and 1,435 ounces of silver with a total value of \$233,341. Work started on the dredge and site 5 April and finished on 8 November. No stripping or thawing was done ahead of the dredge.

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).

Ballarat Mines Limited, owned by G.D. Franklin of Seattle, Washington, and H. Schmidt, of Munroe, Washington, is the second largest producer in the Dawson area with a total 1965 production in excess of 4,500 ounces of crude gold. During 1965, the company worked a full season on Eldorado and Dominion Creeks. A total of 8 men were employed in addition to the owners.

Eldorado Creek (63°52'N, 139°15'W)

On Eldorado Creek, the company owns claims 29, 30 and 43-OA and leases claims 28 and 31 to 46A from The Yukon Consolidated Gold Corporation, and claims 47 to 56 from J. Castonguay and D.M. Campbell, and has operated a bulldozer-sluicing plant since 1961. The valley of this portion of Eldorado Creek is narrow with steep walls and tailings disposal has presented a considerable problem in much of the work.

In 1965, the company mined about 80,230 cubic yards in a total of 7 cuts; 4 located between claims 44 and 46A and 3 starting up the creek from the end of the dredge operation at the upper end of claim 27.

The upper cuts are now completed to within about 300 feet of the mouth of Chief Gulch. At the upper end, the cut is about 50 feet wide with rimrock exposed in the left side of the cut and on the right side in an overflow outlet close by. Gravels in the cut are about 8 feet thick and contain angular blocks to 1 foot in maximum dimension in an earthy matrix; much probably originating as slide material from the sides of the creek. The gravel is overlain by about 12 feet of silts with some muck and a few thin bands of pebble gravel. Bedrock is soft chloritic phyllite with abundant pyrite crystals. Values are reported low towards the upper end of the cuts.

The lower cuts are located on the left limit in ground that has been mined previously, resulting in much of the gravel being piled on top of the muck. Depth to bedrock is about 20 feet. Bedrock consists of a number of rock types; including graphitic phyllite, chloritic phyllite, and dense chloritic quartzite.

Dominion Creek (63°49'N, 138°39'W)

On Dominion Creek the company owns creek claim No. 13 Below Lower Discovery, has a 1 1/4 mile lease above claim No. 9 Above Discovery, and leases 48 claims from the Yukon Consolidated Gold Corporation below the 1 1/4 mile lease. The company has operated a bulldozer-sluicing plant on the left limit bench of Dominion Creek since 1959, although during 1962 and 1964 most of the men and the equipment were employed on Quartz Creek for part of the season. During the 1965 season, 12 cuts, with a total area of 263,000 bedrock square feet and a volume of 71,000 cubic yards, were

mined on the left limit of Dominion Creek between the mouth of Portland Creek and operation 14 of the Yukon Consolidated Gold Corporation Limited.

Test drilling was carried out on the right limit of Dominion Creek immediately downstream from the mouth of Caribou Creek. The results of the drilling indicated that deeply buried portions of the old creek channel extend under what was previously considered the rim of the creek. The elevation of bedrock changes very little until true rim and then rises very steeply. Against the side of the hill the old channel may be covered by as much as 40 feet of muck. Similar portions of unmined ground occur intermittently over a distance of about 3 miles downstream.

Ground of this type, located about claims 5 and 6 Above Lower Discovery and about 1,000 feet long by 300 feet wide, was stripped using the sprinkler system first devised in 1963 (Schmidt, 1964). In this method, brush was first removed by bulldozer, drainage ditches cut by perforated hose, followed by sprinkling using irrigation sprinkler fed by water pumped from Dominion Creek. About 200,000 cubic yards of muck were removed using this method in the period 17 June to 3 September 1965. The method proved effective and the cost per cubic yard is reported (Schmidt, personal communication) to be very slightly above the cost of 3.74 cents per cubic yard in 1963 (Schmidt, 1964, p. 80).

Quartz Creek (63°47'N, 139°06'W)

No mining was done on Quartz Creek but late in the season bulldozer-stripping and test drilling was done on the right limit in an area between 1,000 and 2,000 feet upstream from the mouth of Calder Creek. The company plans to mine on Quartz Creek in 1966.

Bonanza Creek

G. Heitman and C. Janus (64°00'N, 139°21'W)

References: McConnell (1907) ; Skinner (1962, p. 8); Green and Godwin (1963, pp. 44-45; 1964, p. 56).

During 1965, partners Heitman and Janus mined White Channel Gravels on Cripple Hill in a combined hydraulic and bulldozer sluicing operation. The ground was leased from Cripple Hill Mining Company Limited which holds six creek claims on Bonanza Creek, one on Trail Gulch, three hill claims on Cripple Hill and on Trail Hill (all part of the old Bronson and Rae Concession). A crew of up to 4 men, including the partners, was employed. Production was about 241 ounces of crude gold.

White Channel gravels, named for their distinctive appearance have been an important source of placer gold on both Bonanza and Hunker Creek. Those on Cripple Hill are up to about 230 feet in depth and lie on a bedrock bench about 220 feet above the present level of Bonanza Creek. As exposed on the steep face they consist of a few well-rounded boulders, up to 1 foot in diameter and mainly of white quartz, and numerous cobbles, up to 6 inches and composed of about 30 per cent white quartz, 60 per cent chloritic phyllite (Klondike schist), and 10 per cent other rock types (Nasina series), all in a matrix of white quartz grains with considerable muscovite. The face shows strong horizontal stratification and sandy lenses to a few feet thick are common. Bedrock is mainly a deeply weathered grey mylonite formed from grey quartzite and graphitic phyllite. Nearly all the gold values are believed to be near bedrock and McConnell (1907, p. 10) found on sampling a 150 foot section on nearby Trail and Lovett Hills values of \$2.55 per cubic yard on the lower four yards, including 1 foot of bedrock, and less than 2 cents per yard in the overlying 46 yards.

Prior to the present work, mining had been carried out on Cripple Hill first by underground and later by hydraulic mining. In the latter, the gravels had been removed for about 300 feet back from the face of the bench, mostly during the period the Twelvemile ditch was in operation (about 1909 to 1933) and more recently in the operations of the Cripple Hill Mining Company between 1961 and 1963 (Green and Godwin, 1964).

In the present operation water was pumped from Bonanza Creek to the top of Cripple Hill using a 12 inch pipe and 3 electrically driven pumps. The monitors were mounted on top of the hill up to 500 feet behind the face and the intervening gravel stripped and flushed over the lip of the bedrock bench into the valley of Bonanza Creek. As the top of the hill was cut down the monitors were shifted to the rear of the partially stripped area and the process repeated. In this manner the bulk of the gravel was removed from a very large area but considerable difficulty was experienced in removing the lower 50-70 feet above bedrock. This appeared to arise from the compacted nature of the latter and the inability of a monitor working from above to break up and "lift" the well stratified gravels. Consequently, bulldozer stripping was used for the last few feet of gravel and it was only found possible to clean about 13,000 square feet of bedrock. The values recovered from this were disappointing.

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

The Lintick and Berg families hold 7 claims on Bonanza Creek in the vicinity of Sourdough Hill. Mining part time last summer, using a 4 inch high pressure pump and a No. 1 monitor, they produced about 27 ounces of crude gold.

F. Chudy (63°59'N, 139°21½'W)

F. Chudy of Whitehorse, Yukon holds claims 54 and 55 Below Bonanza Creek, near the limits of the former Bronson and Lee concession. During the season, he mined a portion of a narrow, poorly-defined bench about 100 feet above the present level of Bonanza Creek. Water for sluicing was pumped from a small pond in the dredge tailings.

Bedrock on the bench, sloping about plus ten degrees towards the hill behind, consists of hard chloritic pebbly quartzite. It is overlain by up to 3 feet of rock debris with blocks of phyllite and quartzite to 1 foot in maximum dimension in a matrix of comminuted rock composed mainly of fine grains of quartz and mica. A minor amount of gravel is also present.

A portion of the outer edge of the bench had been open-cut by the early miners in the area. During the past season, an area about 180 feet along the bench and 90 feet wide was mined using a small T-6 gas bulldozer and later for a short period, a D-6 and a D-8. About 176 ounces of crude gold was recovered. Considerable difficulty was encountered in the riffles plugging with a white mineral, believed to be cerussite, and a portion of the gold may not have been recovered. The gold recovered varies from about 790 to 758 in fineness, in general, with the lower grade towards the edge of the bench. Typical gold is rough, much of it in nuggets to wheat size.

A.T. Fry (63°57'N, 139°22'W)

A.T. Fry holds 31 and 32 Below and leases 26 to 30 Below from the Yukon Consolidated Gold Corporation and in addition, holds two creek claims on both Boulder Creek and Monte Cristo Gulch. During the 1965 season, Mr. and Mrs. Fry mined two areas of ground originally overlain by White Channel Gravels, located on the lip of King Solomon Hill overlooking Bonanza Creek and

near Monte Cristo Gulch. The lip of the Hill appears to have been hand-mined originally and then left in the subsequent hydraulic operations. In the present operation, about 8 feet of gravel and bedrock are stripped by bulldozer and pushed into a sluice box set below the lip of the bedrock bench. Water for the sluice is obtained from Boulder Creek. Production for the season was about 168 ounces of crude gold.

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).

H.C. and D.F. Boutillier own 11 creek claims on Adams Creek and 4 bench claims on Adams Hill, about 8 miles up on the left limit of Bonanza Creek. Their operations include a hydraulic plant on Adams Hill and a bulldozer-sluicing plant on Adams Creek, the latter being operated when there is insufficient water on the hill. In 1965, they mined on the creek for 6 days with a production of 47 ounces and the remainder of the season on the hill with an additional 53 ounces for a total of about 100 ounces of crude gold.

When visited in mid-September, the face in the hydraulic cut was about 125 feet high and some 4 feet of gravel had still to be removed to clean up an area of about 2,000 square feet of bedrock. Much trouble was encountered with sloughing. Blocks of chloritic phyllite up to about 15 feet by 5 feet were exposed above bedrock in the face of the cut earlier in the season and were later found to have gravel behind them. The blocks may represent an island in the channel or may have been washed in during a sudden storm during deposition of the gravels. The operation was south of the area near the edge of the cut where what appeared to be high bedrock was encountered previously (Green, 1965, p. 58).

Victoria Gulch
(Tributary of Upper Bonanza Creek)

E. Lesaux and 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).

E. Lesaux and F. Perret operate a bulldozer sluicing plant at the mouth of Victoria Gulch, a tributary of Upper Bonanza Creek. Claims 42 and 43 Above Discovery on Bonanza Creek are leased from the Yukon Consolidated Gold Corporation. The operation uses water from Victoria Gulch, and mining is restricted in periods of dry weather. In the 1965 deason, the partners mined a slot about 40 feet wide and 200 feet long on the right limit of Victoria Gulch and produced about 234 ounces of crude gold. The depth of muck rises to 30 feet against the hillside and includes ice lenses to 6 feet thick. Rimrock is reported to rise steeply behind the edge of the present mining. Most of the muck was removed by ground sluicing using the water of Victoria Gulch and the gravels pushed across bedrock to the sluice box near the left limit. What little gravel was left undisturbed by earlier mining is poorly sorted and contains slabby rock to about one foot in maximum dimension. Bedrock is chloritic phyllite containing areas of tough pebbly phyllite that act as natural riffles.

W. Christianson (63°54'N, 139°12'W)

References: Green and Godwin (1964, p. 58).

Using a rocker, W. Christianson recovered about 15 ounces of crude gold from Victoria Gulch in the vicinity of 7 Pup.

Eldorado Creek

Ballarat Mines Limited

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

Hunker Creek

The Yukon Consolidated Gold Corporation

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

P. Brady (63°56'N, 138°53½'W)

Brady holds 7 claims on Hunker Creek (23 and 24 Below near the mouth of Gold Bottom Creek, 6 and 9 Below at Whiskey Hill, 2 Above, and 30 and 30A Above on the Right Fork) and Discovery Claim on Mint Gulch, a tributary of Hunker Creek. Working by hand methods on 2 Above on Hunker and Discovery on Mint Gulch he produced about 11 ounces of crude gold in 1965. Claims 23 and 24 Below on Hunker are being worked by L.M. Ross under an agreement.

Nugget Hill

J.A. Gould (63°59'N, 139°02'W)

Reference: Skinner (1961, p. 10).

J.A. Gould operated a small hydraulic-sluicing plant in White Channel gravels on Nugget Hill on a part-time basis during the 1965 season. He produced about 28 ounces of crude gold.

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).

J. and I.C. Bremner own 29 bench and hill claims and lease 9 creek and bench claims from G.M. Thompson on lower Last Chance Creek main tributary of lower Hunker Creek. In 1965, the

Bremmers with one hired man continued working their hydraulic pit in White Channel gravels on Discovery Hill. A point near the north edge of the hill with an area of about 10,000 square feet was mined with the production of 235 ounces of crude gold. Water for the operation is brought 5 miles from the forks of Last Chance Creek and has a head of about 40 feet at the monitor. Bedrock is soft and tailings from the sluice-box cut bedrock drains to the edge of the bench. Larger boulders must be broken or stacked.

When visited late in the season the following section was exposed in the face of the cut:

	Thickness in Feet	
	Unit	Total from Base
Silt and sand with some fine gravel.....	6	33
Gravel, rounded cobbles to 8 inches, mainly of quartz, with a sandy matrix.....	17	27
Gravel, boulders to 1½ feet, mainly of chloritic phyllite (Klondike schist) but about 1/3 white quartz and a few of grey quartzite, in a pale green matrix containing quartz, muscovite, and chlorite.....	10	10
Bedrock - Volcanic rock, altered to a grey-brown clayey "gumbo" that locally contains lenses of gravel to 3 or 4 feet thick. Surface hummocky and best pay found in low areas.		

An additional 49 ounces of crude gold were produced on the claims leased from G.M. Thompson.

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).

O. Lunde owns claims 8 to 17 on Gold Bottom Creek and has operated a bulldozer sluicing plant on the ground since 1962. During the 1965 season he mined about 27,000 square feet of

bedrock on Claim 10, and sluiced about 9,000 cubic yards to recover 192 ounces of crude gold. Stripping was done ahead to near the mouth of Ontario Creek using an automatic gate located some 500 feet further upstream.

The recent mining has revealed an old drain extending through the workings. In the present cut, the drain appears to have been sunk in bedrock and timber covered while further downstream a timber flume above bedrock was used. The drain sunk in bedrock is now filled in but its location can be followed by springs of clear water rising through muddy water produced by the present ground sluicing. The source of the clear water must lie above the automatic gate, possibly on Soda Creek. It is not known how much of the area upstream from the present operation may have been mined previously by open-cut methods utilizing this drain.

B. Bratsberg (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).

B. Bratsberg owns the upper 500 feet of Discovery claim and claims Nos. 3 to 12 Above Discovery on Gold Bottom Creek. His camp is on Discovery claim and may be reached by a 4.8 mile road along the right limit of the creek. In 1965, Bratsberg operated a bulldozer sluicing plant and produced about 159 ounces of crude gold.

Dominion Creek

The Yukon Consolidated Gold Corporation Limited

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

Ballarat Mines Limited

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

Caribou Creek
(Tributary of 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).

Mr. and Mrs. Burgelman own claims Nos. 2, 3, 5 to 10, and 20 on Caribou Creek, a large right limit tributary of Upper Dominion Creek where they have operated a bulldozer-sluicing plant since 1958. Early in the 1965 season, their camp and operations were moved to a 1 mile placer prospecting lease on Dominion Creek located on the left limit bench beside creek claims 143 to 179 Below, inclusive. Work was carried out in the latter area until August with a production of 53 ounces of crude gold. Subsequently, the Burgelmans returned to Caribou Creek and in the remainder of the season produced about 52 ounces of crude gold from this operation.

Gold Run Creek
(Tributary of Dominion Creek)

Gold Run Placers Limited (J. Lamontagne and E. Schink) (63°43½'N, 138°41'W)

References: Green and Godwin (1963, pp. 51-52; 1964, pp. 62-63); Green (1965, p. 62).

Lamontagne and Schink lease 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 left limit of Gold Run Creek. Production from 1962, the first year of mining to 1964 was about 3,332 ounces of crude gold. In 1965, about 18,500 yards were mined with a

production of about 916 ounces of crude gold.

The ground being worked lies immediately upstream from the upper limit of dredging on Gold Run Creek and has been extensively worked by hand methods, mainly underground mining using fires on bedrock, although some open-cut mining was done near the mouth of Laskey Creek, about 45 Above. Very little gravel appears to have been present on bedrock prior to the first mining at which time most of it was hoisted so that it now overlies the muck. Silt and muck are up to 20 feet thick and, in the upper few feet, contain considerable organic material, both wood and fine rootlets, locally referred to as "dog hair". The ground is prepared for mining by ground sluicing using an automatic gate. The method is found effective particularly if care is taken to ensure that the water undercuts large silt blocks. The remaining few feet of gravel and up to 4 feet of bedrock are then mined using a bulldozer-sluicing plant. Very little time is required for mining and most of the time and water is used in stripping. Water supply is a problem in extended periods of dry weather.

During the 1965 season, a slot about 100 feet wide and covering claims 41 and 42 Above was mined along the left limit, continuing the mining started on 36 Above in 1962. In addition, stripping had been completed to 47 Above on the left limit and to about 39 Above on the right limit. Equipment used includes two D-6 bulldozers.

Sulphur Creek

The Yukon Consolidated Gold Corporation Limited

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

Quartz Creek

A Sundt (63°50'N, 139°02'W)

References: Skinner (1962, p. 14); Green and Godwin (1963, pp. 53-54; 1964, p. 63); Green (1965, p. 62).

A. Sundt owns 4 claims on Little Blanche Creek (a tributary of Quartz Creek), and 8 claims on Quartz Creek. In 1965, Sundt operated a bulldozer-sluicing plant with a production of about 235 ounces of crude gold.

A. Sailer (63°47'N, 139°06'W)

Reference: Green (1965, p. 62).

Early in the 1965 season, Sailer did stripping on his one-mile prospecting lease on Dominion Creek, located on the left limit between claims 83 to 91 Below. Later in the season he mined about 7,000 bedrock square feet on right limit hill claim 27 Below A. Mack's Discovery and recovered about 73 ounces of crude gold.

Ballarat Mines Limited

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

Eureka Creek

Northern Yukon Services Limited (63°35'N, 138°51'W)

References: Skinner (1961, p. 12; 1962, p. 14); Green and Godwin (1963, p. 55; 1964, pp. 64-65); Green (1965, p. 63).

Northern Yukon Services Limited, owned by M.D. Cole of Dawson, operates a sluicing plant on Eureka Creek on ground sublet from G. Shaw, H. Hanulik, J. Buss, and Dr. J. Rooks. The property is accessible from Granville via an access road 12 miles in length.

The company has operated a bulldozer-sluicing plant on

Eureka Creek since 1960, and production from 1960 to 1964 inclusive, is 5,613 ounces of crude gold. In 1965, the plant operated on claims 15 and 16 Below and 90,000 bedrock square feet were mined with a production of about 488 ounces of crude gold. Three men were employed. It is not planned to continue the operation in 1966.

Allgold Creek

K. and S. Placers (63°56'N, 138°37½'W)

References: Skinner (1962, p. 14); Green and Godwin (1963, p. 56; 1964, p. 66); Green (1965, pp. 63-64).

K. and S. Placers Limited, owned by M. Kinakin and W. Scott of Dawson, operated a bulldozer-sluicing plant on Allgold Creek about ½ mile upstream from the settlement of Flat Creek on the Dawson-Mayo Road. The company leases Discovery claim and claims 1 to 10 Above from Consolidated Brewis Minerals Limited. Production by the company from 1961 to 1964 inclusive is about 2,367 ounces of crude gold. In 1965, about 1,259 ounces of crude gold were produced. Three men were employed in addition to the owners.

When visited early in October, the company was mining a cut on the right limit of Claim 2 where the following section was exposed:

	Thickness in Feet	
	Unit	Total from Base
Silt and sand, partially removed.....	3	17
Gravel, rusty and manganese stained, with flattened cobbles of gneiss to 3 inches in a sandy matrix.....	2	14
Gravel, well stratified, with cobbles to 6 inches mainly of quartz but with some platy gneissic fragments, in a sandy matrix. Scattered silt lenses to 8 inches thick.....	6	12
Gravel, well stratified, with subangular cobbles to 6 inches, mainly of quartz but some of gneissic rock and greenish quartzite in a sandy matrix. A few sand lenses to 1 foot thick	6	6

Bedrock - Paste-like gouge formed from
chloritic phyllite.....

The valley of Allgold Creek in the area being mined is very wide, rising gently on the right limit. On some of the lower claims mining has now been carried out over a width of about 225 feet and may be extended farther up the right limit slope. Muck is commonly about 6 feet thick in the centre of the creek rising to 10 feet or more on the margins. It contains much sand and silt and, in general is readily removed, except when a high wood content is present. The gravels are loosely packed and contain few boulders to 1 foot in diameter. Bedrock varies from hard chlorite and biotite gneisses to paste-like material formed from comminuted bedrock. Gold is fine and platy and contains much silver including some nuggets.

Since 1961, mining has been carried up the left limit to about 6 Above and to 2 Above on the right limit. An extensive area on the right limit has been partially stripped preparatory to mining using a dam on 7 Above. Equipment includes a TD 18 and a D-7 bulldozer.

Klondike River Valley

D.M. Strachan (63°56½'N, 138°37½'W)

References: Green and Godwin (1964, p. 76); Green (1965, p. 64).

D.M. Strachan of Dawson holds 4 placer claims along the south side of the Klondike River Valley just west of the settlement of Flat Creek. During 1965 he continued his part-time hydraulic operation on a poorly defined bench about 30 feet above the level of the Klondike River. The water supply is pumped from the Klondike River. During 1965, about 32 ounces of crude gold was shipped.

SIXTYMILE GOLDFIELD

References: McConnell (1905, pp. 33A-37A)*; Cockfield (1921); Bostock (1936, p. 1; 1937, p. 1; 1939, pp. 3-4; 1941, pp. 3-4); Skinner (1961, p. 13); Dep't of Mines and Technical Surveys (1964); Green and Godwin (1964, pp. 69-71); Green (1965, pp. 66-67).

The Sixtymile goldfield is located near the Alaska boundary, about 40 miles west of Dawson, and is reached by a rough road, 10 miles in length, that leaves the main Sixtymile road near Mile 49. Miller and Glacier Creeks, the most important creeks of the goldfield, head near the International Boundary and flow SE to join Sixtymile River about 3 miles apart. Main placer areas include the two creeks, the portion of Big Gold Creek between the mouth of Glacier Creek and Sixtymile River and the valley of Sixtymile River between the two creeks. In addition, there has been minor production from other creeks in the area. The goldfield was discovered in 1892 by miners crossing the divide from the Fortymile goldfields in Alaska. Descriptions of work in the area in 1901 are given by McConnell (1905, pp. 33A-37A) and in 1917 by Cockfield (1921, pp. 37-51) and the area is mentioned briefly in later reports by Bostock (1936, p. 1; 1937, p. 1; 1939, pp. 3-4; 1941, pp. 3-4). In addition to hand mining, two dredges have operated in the area; the first built by North American Trading and Transportation Company worked on Miller Creek in 1915 and 1916 (Cockfield, 1921, p. 37) and was later refitted by Holbrook Dredging Company and operated in the valley of Sixtymile River between 1929 and 1941; the second built by Yukon Explorations Limited worked Big Gold Creek, downstream from the mouth of Glacier Creek, and the valley of Sixtymile River between 1947 and 1959. Since the late 1940's a number of companies and individuals have operated bulldozer-sluicing plants. The goldfield is still producing although on a much reduced scale since 1961.

Bedrock in much of the goldfield is quartzite, schist, and minor gneiss of unknown age. Volcanic rocks of Tertiary age are present on the lower portions of Miller and Glacier Creek and presumably in the covered areas of the Sixtymile River valley. The gravels are reported (Cockfield, 1921, p. 38) to be of local origin and include flattened disks of phyllitic material and boulders of quartzite and the younger volcanic rocks. The ground is frozen and black muck is generally present.

Recorded production for the goldfield since discovery is about 213,600 ounces of fine gold including 123,000 ounces up to 1917 (Cockfield, 1921, p. 37), about 12,700 for the Holbrook Dredging Company for 1934, 1935, 1939, and 1940 (Bostock, 1936, p. 1; 1940, p. 3), 72,984 ounces for Yukon Explorations Limited, 1948 to 1961 inclusive (Dep't of Mines and Technical Surveys, 1964) 4,630 ounces for other operators between 1948 and 1962 (op cit), and about 290 ounces for later operations (Green and Godwin, 1964, pp. 69-71; Green, 1965, pp. 66-67). Total production for the goldfield is probably only slightly larger than recorded production.

Miller Creek is about 5 miles in length with Discovery Claim about 3 miles from the mouth on a small right limit tributary, Discovery Pup. The bottom of the main creek is narrow and when visited in 1917 by Cockfield (1921, p. 42) it had already been worked twice in some cases and the lower 3 miles had been dredged by the North American Trading and Transportation Company. Important bench deposits occur along the left rim of the creek and these have been worked or prospected for about 3 miles along the creek. Water for these operations was brought by ditch from upper Miller Creek, and from as far as Pat Murphy Creek, a tributary of Sixtymile River about $5\frac{1}{2}$ miles to the SW. On the lower part of the creek, about 29 to 30 Below, the old channel was deeply buried and was mined through shafts up to 110 feet in depth (Bostock, 1939, 1941).

Glacier Creek is about 7 miles in length with Discovery Claim located near the end of the old wagon road, about 3 miles from the mouth. When visited by McConnell (1905, p. 34) in 1901, the creek bottom had been worked from about 28 Above down almost to the mouth, a distance of about 5 miles. Later, considerable work was done along the benches of the creek, mainly on the left limit, (Cockfield, 1921, pp. 43-44). Yukon Placer Mining Company, operated a bulldozer-sluicing plant on the creek from 1950 to 1961 and mined the ground between 30 Below Discovery to 40 Above.

Big Gold Creek meanders in a wide valley from the mouth of Little Gold Creek to the Sixtymile River, a distance of about 2 miles and the Sixtymile River itself is located in a similar, though wider valley between Miller Creek and the Big Gold Creek. Much of this ground has been worked by the two dredges operated in the area. The dredge operated by Holbrook Dredging Company worked the ground in the valley of Sixtymile River from near the mouth of Miller Creek to about $1\frac{1}{2}$ miles downstream and the dredge operated by Yukon Explorations Limited much of the remaining ground in Sixtymile Valley and the valley of Big Gold Creek to near the mouth of Glacier Creek.

Little Gold Creek flows roughly parallel to Glacier Creek and at the closest point is about one-half mile north of it. Values on the creek were low and it was generally considered too poor to work in the early days (Cockfield, 1921, p. 45). However, in more recent years, bulldozer mining was done on about $1\frac{1}{2}$ miles of the creek commencing about $1\frac{1}{2}$ miles upstream from the mouth.

Bedrock Creek rises in Alaska and flows SE parallel to Miller Creek to join Sixtymile River about $2\frac{1}{2}$ miles upstream from the latter. Cockfield (1921, pp. 45-46) reported that some prospecting but very little mining had been done on the creek in 1917. Since then some bulldozer mining has been done on the creek, ending in 1960 (Skinner, 1961, p. 13).

Sixtymile River

O. and D. Medby (64°00'N, 140°47'W)

References: Green and Godwin (1964, pp. 63-71); Green (1965, pp. 66-67).

O. Medby holds Discovery claim and 14 placer claims on a right limit bench of Sixtymile River, commencing about 1/4 mile upstream from Miller Creek. Total production from the bulldozer-sluicing operation was about 149 ounces of crude gold.

W. Kaufman (64°00'N, 140°47'W)

W. Kaufman worked portions of claims 5 to 14 on the right limit bench of Sixtymile River, under an agreement with O. Medby. Considerable stripping was done preparatory to mining but only a small area was actually mined with a production of about 11 ounces of crude gold.

KIRKMAN CREEK - STEWART RIVER AREA

Kirkman Creek

L.M. Ross (63°00'N, 139°15'W)

References: Skinner (1961, pp. 13-14; 1962, pp. 15-16); Green and Godwin (1963, p. 57; 1964, p. 72); Green (1965, pp. 67-68).

L.M. Ross operates a bulldozer-sluicing plant on Kirkman Creek, a westerly flowing tributary of Yukon River, about 90 miles upstream from Dawson. Access is by float plane from Dawson or by river-boat from Dawson or Minto and thence via a 7-mile truck road up Kirkman Creek.

Ross owns creek claims 14 to 19 Below Upper Discovery and two 1-mile leases lower on the creek and leases 7 Above to 6 Below Upper Discovery from Ballarat Mines Limited. Ross has operated on Kirkman Creek since 1957; during 1965, Ross and one helper mined a total of approximately 160,000 bedrock square feet and recovered about 383 ounces of crude gold. Mining was done in two areas, lower on the Creek near 14 Below (about 60,000 square feet) and

about 1 Below. The ground was about 35 feet deep in both areas and considerable trouble was encountered with large boulders and erratic pay. Stripping has now been completed from Discovery to about 5 Above and it is expected that bulldozer mining will be completed during 1966, the creek having been mined for a distance of about $3\frac{1}{2}$ miles upstream from the canyon.

Henderson Creek

Golden Gate Placers (63°26'N, 139°08'W)

References: Green and Godwin (1964, p. 73); Green (1965, p. 69).

The Burian family of Stewart River, Yukon own 6 placer claims and operate a bulldozer-sluicing plant on main Henderson Creek, immediately upstream from the former dredging operation (Green, 1965). Golden Gate Creek, a right limit tributary joins Henderson Creek immediately above their operation. During 1965, a cut was mined on the right limit of Henderson Creek and about 25,000 square feet partially stripped. The valley is reported to have a mineable width of about 400 feet in this area, part of which has been mined previously. Production was about 105 ounces of crude gold. Equipment includes a TD 9 and a TD 18 bulldozer.

Brewer Creek

K. Djukastein (63°11'N, 139°00'W)

Reference: Green (1965, p. 68).

K. Djukastein holds a one-mile placer prospecting lease on Brewer Creek, a left limit tributary of Stewart River, about 3 miles downstream from Barker Creek. During the 1965 season he and one hired man worked on the creek from May 25 to October 3, mined about 19,000 bedrock square feet and recovered about 247 ounces of crude gold. During the season, a ditch about 5,000 feet long was built to feed a 10 inch pipe. Equipment includes a D-4 bulldozer.

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).

Spruce Creek Placers Limited, owned by F.M. Wilson, J.M. Acheson, and W.L. Drury, lease 22 claims from the E.H. Barker estate on Haggart Creek, between Dublin Gulch and Fifteen Pup. In addition, the company holds a 1-mile prospecting lease along the left limit bench down-stream from Dublin Gulch and a 3-mile prospecting lease down-stream from the mouth of Fifteen Pup. The property is accessible by a 25 mile road from Proctor's sawmill, which is near mile 268 on the Mayo-Elsa road. A brief historical sketch of placer mining on Haggart Creek and Dublin Gulch is given in Green (1965, pp. 70-71).

Managed by Acheson, Spruce Creek Placers have mined the ground since the end of September 1961, using a bulldozer-sluicing plant. Production from 1961 to 1964 inclusive was about 3,119 ounces of crude gold. Production for 1965 from April 25 to October 25 was 856 ounces of crude gold from about 95,000 cubic yards mined. Two areas were worked, a bench on the left limit immediately upstream from Platinum Gulch and a bench on the right limit upstream from Gill Gulch. In addition, a deep channel on the left limit was tested using an Atlas Copco overburden drill belonging to United Keno Hill Mines Limited. Up to 4 persons were employed in the operation and equipment included two D-8 and a TD 18 bulldozer, a 1½ yard dragline, and a sled-mounted monitor and pump.

On the left limit, the cut on the bench upstream from the mouth of Platinum Gulch had an area of about 34,000 bedrock square feet and in most of it gravels were about 25 feet in depth.

Bedrock in the cut is grey graphitic quartzite, graphitic phyllite and minor greenish-grey phyllitic quartzite. Away from the creek, bedrock rises sharply for about 6 feet in a sharp roll extending from the creek side of the downstream end of the cut to the hill side of the upstream end, with the best pay reported from the higher bench. The gravels are rusty weathering with a few rounded boulders to 1 foot and platy rock fragments to 6 inches in maximum dimension in a sandy matrix and are overlain by up to 3 feet of black silt, in turn overlain by brown gravels with good stratification and containing sand and silt lenses. The lower rusty gravels thicken from about 6 feet to 15 feet as they are followed up onto the 6 foot bedrock bench with the overlying silt band showing a marked roll.

On the right limit bench upstream from the mouth of Gill Gulch, a large area was stripped by ground sluicing using water brought by ditch from a dam immediately below Dublin Gulch, about 1/4 mile upstream. Mining is done by bulldozer with the dragline being used to stack tailings. Some mining, both by underground drifts and by open-cut has been done on the bench in the past. Bedrock on the bench is about 10 feet above creek level at the lip and rises about 6 feet more across the area mined. The total depth of gravel and muck varies but is up to 30 feet at the back of the cuts. The gravel on bedrock is rusty to brown weathering and contains a few well-rounded boulders to 2 feet and many platy rock fragments in a sandy matrix. It is overlain by silt and yellowish brown gravels. Bedrock is platy grey quartzite and black graphitic phyllite.

The deep channel on the left limit, first recognized in 1961, was tested by four lines of drill holes, spaced over about 4,500 feet from the mouth of Platinum Gulch to near 15 Pup. The drilling confirmed the presence of the channel and suggests that the grade is steeper than that of the present creek so that the two will probably be at the same elevation opposite the mouth of

Gill Gulch and the present camp. Only a portion of the gravels in the channel are frozen. Values obtained in drilling do not match nearby cuts and consequently are not considered representative. No plans have been made to mine the deep channel.

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).

F. Taylor owns 7 claims extending upstream from the mouth of Dublin Gulch. His operation is accessible by a rough road extending about 1½ miles beyond Spruce Creek Placers Limited's camp. A brief historical sketch of Haggart Creek and its tributary Dublin Gulch is given by Green (1965, pp. 70-71).

Taylor has mined on Dublin Gulch since 1937 with the exception of the periods 1943 to 1945 and 1949 to 1952, inclusive and to the end of 1964 had produced about 8,032 ounces of crude gold and about 7 tons of tungsten concentrates. In 1965, working with one son Taylor mined approximately 40,000 cubic yards and produced about 743 ounces of crude gold.

The cut mined in 1965, is located on the left limit and extends to the upstream boundary of the claims. Mining of the cut marks the completion of the third of a series of cuts Taylor has made on his ground, the first located in the centre of the creek, the second on the right limit and the third on the left limit. Width of the mining is about 400 feet and rimrock has not been reached on either limit. The present cut is about 300 feet long, 75 feet wide with the depth of gravel to about 40 feet. The gravel is poorly sorted boulder gravel with boulders to 4 feet in diameter. Most of the larger boulders are composed of granitic rocks. Bedrock in the cut is brown weathering, greenish grey

phyllite and platy quartzite striking about north and dipping 45 degrees east to form natural riffles in the bottom of the cut. Grade of bedrock in the cut is about 14 per cent, exceptionally steep for a placer creek. The method of operation is to mine using a 977 Traxcavator while the automatic gate-equipped dam is filling and then sluice the mined gravels in the limited time available. Tailings are stacked with a bulldozer.

Other work done during the season consisted of stripping ground on the left limit at the lower end of the claims preparatory to mining and exploratory ground sluicing on the left limit just upstream from Suttles Gulch, near the centre of the claim group. The latter was done using water brought by ditch with a head of about 200 feet. When visited at the end of the season, the lower portion of the cut exposed rusty gravels overlain by about 6 feet of banded silt. Bedrock was exposed in the cut about 200 feet from the edge of the previous mining, suggesting a bedrock bench and was overlain by about 25 feet of slide material containing boulders and cobbles, angular rock fragments, and scattered wood.

HIGHET AND JOHNSON CREEKS AND MINTO LAKE AREA

Highet Creek

E.C. Bleiler (62°45½'N, 136°09'W)

References: Skinner (1961, pp. 15-16; 1962, p. 19); Green and Godwin (1963, pp. 60-61; 1964, pp. 73-79); Green (1965, pp. 73-76).

E.C. Bleiler owns 24 placer claims on Highet Creek, covering most of the ground held previously by his father-in-law, E. Middlecoff. With his son he operates a combined bulldozer- and hydraulic-sluicing plant about ½ mile above his camp; the latter is at the mouth of Dredge Creek and is accessible from the Mayo-Else road by about 13 miles of secondary road. A brief historical

sketch of Highet Creek is given in Green (1965, pp. 73-75).

Bleiler has mined on Highet Creek since 1958 and from 1958 to 1964 produced about 1,590 ounces of crude gold. During 1965, he sluiced about 25,000 cubic yards from 4 cuts on the right limit, located about former claim 80, and recovered about 523 ounces of crude gold. Equipment includes a sluice-box and grizzly, 955H Traxcavator, a TD-14 bulldozer, and a monitor. The monitor utilizes water brought by ditch from McRae Creek at a head of about 150 feet.

F. Erl (63°46'N, 136°12'W)

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

F. Erl owns 6 claims located on Highet Creek a short distance upstream from the mouth of Rudolph Gulch. He has worked the ground on holidays and weekends since 1961, with a total production from 1961 to 1964 of 92 ounces of crude gold. During the 1965 season, Erl with one hired man worked the ground for the entire season with a production of about 168 ounces of crude gold.

During the season, one long cut was made in the previously stripped area along the creek bottom but values were discouraging. Following this cuts were put in on the right limit bench immediately downstream from some of the old open-cut workings. Elevation of bedrock in these cuts was found to vary as much as 15 feet with the better values in the lower areas. Considerable difficulty was encountered in pushing material from the low areas into the sluice box. The material excavated consisted of slide material of angular rock fragments in a sandy matrix plus a few rounded cobbles and boulders.

Johnson Creek

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

References: Cairnes (1916, pp. 25-26)*; Skinner (1961, p. 16; 1962, pp. 19-20); Green and Godwin (1963, pp. 61-62; 1964, p. 79); Green (1965, pp. 76-78).

Bardusan Placers Limited, owned by H. Barchen, operates a sluicing plant on Johnson Creek (about 1/4 mile below the mouth of Sabbath Creek). The property is reached by about 5½ miles of rough road, suitable only for four-wheel drive vehicles, leading from Upper Hight Creek.

Placer gold was known on the creek prior to 1898, but the first recorded production was \$800 worth of gold (about 47½ ounces) in 1915 (Cairnes, 1916). The present operators are of the opinion that there was little or no other production until the start of their operation. From 1958 to 1964, the latter has resulted in the production of about 6,269 ounces of crude gold. During 1965, Barchen and one part-time helper, mined about 43,000 cubic yards and produced about 568 ounces of crude gold. The creek has now been mined from near the mouth of Sabbath Creek to about 4,500 feet downstream with widths up to 250 feet. The best pay occurred from the vicinity of the present camp downstream about 1,500 feet to the lower end of Discovery Claim. Below this, values decrease and the gold becomes much finer while above, mining on the left limit yielded disappointingly low values. Equipment used in the operation includes a D-6 and a D-8 bulldozer and a 3/4 yard diesel shovel.

During the 1965 season, four cuts about 75 feet wide and totalling about 400 feet in length were mined on the right limit in the vicinity of 3 Below, a small point of previously frozen gravel was mined above the present camp, and an hydraulic cut was mined on the right limit about 6 Above using water from

Sabbath Creek, brought by a one mile ditch with a head of about 100 feet. Depth to bedrock in the hydraulic cut increases to about 30 feet against the hill slope. No further work was done on the test cut commenced on Upper Johnson Creek in 1964.

The following section was observed at the lower end of the ground mined on the right limit (about 3 Below) in 1965:

	Thickness in feet	
	Unit	Total from Base
Banded silt with some muck.....	4	17
Gravel, rusty, and poorly sorted with well-rounded boulders to 1 1/2 feet, the larger mainly of granitic rocks, in a matrix of micaceous sand.....	9	13
Comminuted phyllite containing a few angular boulders and broken fragments of phyllite and phyllitic quartzite.....	4	4
Bedrock - Blue-grey clay with fragments of quartz, probably formed through alteration of grey phyllite.....		

McLagan Creek

C.J. and H. Klippert (62°42'N, 136°14'W)

During the 1965 season, the Klippert brothers working part time put in a trial cut on McLagan Creek, a small creek flowing into Minto Lake. Their camp is reached by a tote road about 3 miles in length continuing from the end of the secondary road at Minto Lake.

The cut, at an elevation of about 2,600 feet and roughly 300 feet above Minto Lake, is located at the point where McLagan Creek leaves its bedrock rims and cuts a well defined bench on the side of the valley of Minto Lake. When visited late in the season, the cut was about 200 feet long and 25 feet deep and

exposed till-like material composed of coarse, well-rounded boulders to 3 feet in an unsorted earthy matrix. At the upstream end of the cut the lower 5 feet of face consisted of a shingled gravel with platy rock fragments to 3 inches in a yellow clayey matrix. Trial pans of this gravel contained a few fine colours of gold. Bedrock was not exposed but was believed to be about 4 feet below the upstream end of the cut. The upper portion of McLagan Creek is nearly at right angles to the direction of ice movement through Hinto Lake valley and the portion of the creek commencing a short distance above the present cut was probably little affected by glacial erosion and deposition. In contrast, much of the material exposed in the present cut is probably of glacial origin.

Bear Creek

J.J. Van Bibber (63°31'N, 136°21'W)

Reference: Green and Godwin (1964, p. 80).

J.J. Van Bibber of Mayo, Yukon holds a 2-mile placer prospecting lease on the headwaters of Bear Creek, often referred to locally as Carlson Creek. The operation is reached by a tote road, 15.5 miles in length, that leaves the Whitehorse-Mayo road near Mile 236.5. The bulldozer-sluicing plant is located on the upper part of the creek about 1½ miles upstream from the sharp bend where the creek turns to flow SSW along the main valley.

During the 1965 season, Van Bibber, using a D-8 bulldozer, mined a cut about 120 feet long, 40 feet wide, and up to 24 feet deep at the upstream end and recovered about 69 ounces of crude gold. Only the upper end of the cut reached bedrock where the following section was exposed:

	Thickness in feet	
	Unit	Total from Base
Gravel, rusty, with a matrix of fine sand....	3	24
Gravel, coarse, poorly sorted, containing platy rocks to 3 feet maximum dimension and rounded boulders to 1½ feet in a sandy matrix. Considerable iron and manganese staining with gold in clayey layers.....	17	21
Rubble, broken fragments of chloritic phyllite with a few rounded cobbles and some sandy material, much iron staining.....	4	4
Bedrock, platy, green chloritic phyllite		

Much of the gold is in flattened flakes although 2 nuggets the size of a bean were recovered. Specular hematite pebbles, some with jasper nodules, are common in the heavy minerals and its presence is believed to indicate that some of the gravel is of glacial origin. The source area for hematite of this type is believed to be sedimentary iron formation near the Yukon-North-west Territories boundary (cf. Crest Exploration).

Lower elevations in the area have been heavily glaciated by ice moving SSW following the depression now occupied by Minto Lake and Bear Creek and the present cut is on the line of a low draw between the two drainage systems. Exposures on the small hill to the east of the cut are mainly of sand, locally containing rounded pebbles and cobbles, and this material is probably of glacial or glacial-fluvial origin. Farther upstream, perhaps 2,000 feet, the creek would appear to have been little affected by glacial action as there are bedrock rims on both sides and this portion of the creek is at a large angle to direction of glacial movement.

DUNCAN CREEK AREA
Upper Duncan Creek

D. Heinz (63°53'N, 135°19'W)

References: Keele (1906, pp. 19A-30A)*; Cairnes (1916, pp. 16-19).

Mr. and Mrs. Heinz of Mayo, Yukon hold two one-mile placer prospecting leases on Upper Duncan Creek, upstream from the gorge. The camp is reached by a rough road about one mile in length that fords Lightning Creek a short distance above its mouth.

Upper Duncan Creek is nearly at right angles to the main course of Duncan Creek and is more properly considered a tributary with the larger Lightning Creek following the direction of the main valley to form the headwaters. During glaciation, the mouth of Upper Duncan Creek was blocked by glacial debris and the creek diverted into a deep bedrock gorge. Placer gold was discovered (Keele, 1906, p. 19A) in the canyon in 1898 by a party of three Swedes who worked the ground secretly without recording claims. On 12 September 1901, a discovery was staked by a party of four prospectors, during the absence of the Swedes and included the ground already worked by them. The canyon was worked out in a few years but Cairnes (1916, p. 18) reported that 5 men were hydraulicking above the canyon in 1915 and that the creek had been worked from Discovery, at the bottom of the canyon, to 22 Above. Cairnes (1916, p. 19) quotes an estimate of production by the Gold Commissioner to the end of 1915 of \$55,000 (about 3,320 ounces of crude gold) but states that figures obtained from old timers in the area indicate a higher production. Subsequent production has probably been small.

During 1965, Heinz stripped an area about 500 feet long by 200 feet wide located about half a mile upstream from the gorge. A limited amount was mined using a bulldozer-sluicing plant with a production of about 25 ounces of crude gold. The cut is above most of the earlier work although some old drifts were encountered. The gravels are approximately 20 feet deep rising towards the right limit and are very coarse, containing boulders of blue grey quartzite to 6 feet in diameter. Bedrock is soft graphitic phyllite. Heinz reports that pay is scattered throughout the gravel and that

both coarse reddish, and greenish-yellow gold were recovered in addition to the normal gold.

WHITEHORSE MINING DISTRICT

KLUANE LAKE AREA

Burwash Creek

Burwash Mining Company Limited (61°22½'N, 139°17'W)

References: Cairnes (1915, pp. 22-24)*; Skinner (1961, pp. 17-18; 1962, pp. 20-21); Green and Godwin (1963, p. 63; 1964, pp. 32-33); Green (1965, p. 30).

Burwash Creek, the most important placer creek of the Kluane Area, is a tributary of Kluane River, joining the latter about 10 miles below the outlet of Kluane Lake. After crossing the wide Kluane flat Burwash Creek cuts across the axis of the Kluane Ranges in a deep canyon. The main placer deposits occur in the latter section between the end of the lower canyon and Tatamagouche Creek, a distance of about 4½ miles.

Burwash Creek was first staked in 1904 and when visited by Cairnes (1915) in 1914 the creek had been more or less prospected and mined from the lower end of the canyon to about claim 66 Above, about 1,500 feet upstream from the mouth of Tatamagouche Creek. Production from the creek to that time is estimated between \$30,000 and \$40,000 with an additional amount of perhaps \$2,000 from Tatamagouche Creek.

The present operator, Burwash Mining Company Limited, owns 22 claims on the creek and since 1945 has mined the creek bottom from near the lower end of the canyon to about 2,000 feet downstream from the mouth of Tatamagouche Creek. The operation is accessible by tote road along the creek. Production during the period 1945 to 1964 is about 22,143 ounces of crude gold.

During 1965, H. Besner, president of the company, working with 3 men mined about 50,000 cubic yards and recovered about 695 ounces of crude gold. About 1,400 feet of creek bed was mined in the 1965 operation.

Equipment includes a 3/4 yard diesel shovel and two D-8 bulldozers. The shovel is used to move gravel onto a grizzly located over the sluice box and the bulldozers to stack tailings and strip overburden.

COAL MINING

WHITEHORSE MINING DISTRICT

CARMACKS AREA

Tantalus Butte Mine (62°03'N, 136°16'W)

References: Cairnes (1910a, pp. 52-53); Postock (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).

The Yukon Coal Company Limited, which is owned by Territorial Supply Company Limited, a subsidiary of United Keno Hill Mines Limited and Cassiar Asbestos Corporation Limited, operates the Tantalus Butte coal mine under management of United Keno Hill Mines Limited. The mine is at Carmacks, about 100 miles north-northwest of Whitehorse. The Tantalus Butte mine has operated since about 1923, except for the years 1939 to 1948. The Yukon Coal Company was formed in 1947 and the mine reopened in 1948. Production by Yukon Coal Company Limited from 1948 to 1964 inclusive was 117,161 tons. Annual production during this period has varied from less than 4,000 tons to a maximum of 14,113 tons in 1954. In 1965, production was 8,806 tons, which with the exception of about 104 tons was used by United Keno Hill Mines Limited at Elsa and Calumet. A maximum crew of 11 men is employed.

The coal is of the high-volatile Bituminous Group. It occurs

in the Tantalus Formation, which consists (Bostock, 1936a, p. 28) largely of conglomerate, with some sandstone, shale, and a few coal seams. Wheeler (1961, p. 74) considered the Tantalus Formation to be of Upper Jurassic (?) and Lower Cretaceous age.

The main entry, elevation 2,056 feet and about 350 feet above the Yukon River, follows the main coal seam northward and is about 2,530 feet in length. The seam strikes north and dips about 55° W. It is cut by northeast-trending, steep southeasterly dipping faults, which cross the main entry about 1,300 and 1,800 feet from the portal. The seam was located about 80 feet beyond the second fault and production in 1965 was won from this portion.

Samples of the coal, taken by A.D. Oliver, Resident Mining Inspector, were analysed by the Mines Branch of the Department of Mines and Technical Surveys with the following results:

Chemical and Physical Properties

Laboratory Number	CHANNEL				DUST	MINE RUN
	2596 -65	2597 -65	2598 -65	2599 -65	2600 -65	2601 -65

Proximate Analysis

Moisture.....	%	1.4	2.1	1.9	2.0	2.3	2.0
Ash.....	%	9.1	11.1	15.8	17.8	14.1	13.7
Volatile Matter.....	%	35.8	33.3	32.0	30.6	32.8	33.1
Fixed Carbon.....	%	53.7	53.5	50.3	49.6	50.8	51.2

Ultimate Analysis (Dry Basis)

Carbon.....	%	73.2	73.1	67.9	66.7	69.4	70.7
Hydrogen.....	%	4.9	4.6	4.3	4.1	4.4	4.4
Sulphur.....	%	0.3	0.3	0.6	0.5	0.5	0.3
Nitrogen.....	%	1.0	1.0	0.9	0.9	1.0	0.9
Ash.....	%	9.2	11.3	16.1	18.2	14.5	14.0
Oxygen.....	%	11.4	9.7	10.2	9.6	10.2	9.7

Calorific Value (Moist Basis)

Btu/lb.	12,590	12,290	11,210	11,100	11,680	11,850
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Grindability.....	46	46	73	61	61	60
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Ash Fusibility

Initial Deformation Temp. °F	2070	2030	2070	2050	2120	2100
Softening Temp. Spherical °F	2130	2120	2150	2140	2240	2210
Softening Temp. Hemispherical..... °F	2210	2190	2200	2160	2310	2260
Fluid Temp. °F	2280	2210	2260	2240	2370	2340

Equilibrium Moisture.....	2.9	2.8	3.0	2.8	4.3	3.3
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2596-65 to 2599 - Channel sample across the face of the main entry
11 June 1965

Hanging-Wall

2596-65 - Coal with about 1 inch of "bone at base"
2597-65 - uniform coal with small lenses of "siliceous material"
2598-65 - soft clay bands and dirty coal
2599-65 - uniform coal with small lenses of "siliceous material"

Thickness in feet	
Unit	Total from Base
1.7	13.4
5.4	11.7
1.9	6.3
4.4	4.4

Foot Wall

2600-65 - Sample of dust from the tippie

2601-65 - Run of mine sample, about 200 pounds

"The coal is classified as high volatile B bituminous according to the ASTM System of Classification of Coal by Rank. All samples are agglomerating and have a swelling index of 1 (ASTM). Coals of this type would not be expected to yield metallurgical grade coke.

Float-and-sink tests on the Plus 48 mesh size fraction indicate that the coal would not be difficult to beneficiate with high yields. However cleaning would not be expected to significantly improve the coking properties, as indicated by the swelling indices of the various gravity fractions. The relatively low yield of 1.30 specific gravity material with FSI of 3 would not make such a separation favourable."

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