W.A. No. 15W

NAME MINISTRY REFS

SUBJECT

RUTH VERMONT MINE

82KNE009 - 02
PROPERTY FILE
003726

M28-1506

(82K/8W, 9W)

**REDMAC (82K/NW-59) (Fig. A, No. 65)**

LOCATION: Lat. 50° 30′ Long. 116° 27′ (82K/8W, 9W)
GOLDEN M.D. Eighteen miles west of Invermere, on McDonald and Red Line Creeks at their confluence.

CLAIMS: REDMAC 1 to 16.

OWNERS: Vern Bostock, Val Winser, and Walt Konkin.

OPERATOR: LONGBAR MINERALS LTD., 100, 10975 – 124th Street, Edmonton, Alta.

METALS: Silver, lead.

WORK DONE: Linecutting and self-potential survey, 3.2 line-miles; geochemical soil survey, 70 samples taken at 100-foot intervals along and near the baseline for dithizone testing covering Redmac 1-6.

REFERENCE: Assessment Report 5169.

**SILVER DOLLAR (82K/NW-101) (Fig. A, No. 68)**

LOCATION: Lat. 50° 45′ Long. 117° 34′ (82K/12E)
REVELSTOKE M.D. Seven miles east of Beaton, on a west-flowing branch of Mohawk Creek, near its headwaters, at approximately 6,000 feet elevation.

CLAIMS: IRON DOLLAR (Lot 7059), CARBONATE HILL (Lot 7060).

OWNER: RESOURSEX LTD., 303 Wildwood Drive SW., Calgary, Alta.

METALS: Gold, silver, lead, zinc.

DESCRIPTION: The claims are underlain by grey and green grit, dark grey and green phyllite, and minor volcanic rocks of the Broadview Formation. At the Silver Dollar the carbonaceous chloritic schists are cut by quartz veins bearing pyrite, pyrrhotite, galena, sphalerite, and occasional patches of tetrahedrite.

WORK DONE: Surface geological mapping, 1 inch equals 300 feet and minor sampling covering Iron Dollar and Carbonate Hill.

REFERENCES: *Minister of Mines, B.C.*, Ann. Rept., 1957, p. 58; *Geol. Surv., Canada,* Bull. 2, 1914, p. 22; *Geol. Surv., Canada,* Mem. 161, p. 40; Assessment Report 5209.

**RUTH VERMONT (82K/NE-9) (Fig. A, No. 100)** By R. W. Lewis

LOCATION: Lat. 50° 57′ Long. 116° 59′ (82K/15W)
GOLDEN M.D. Twenty-seven miles west of Spillimacheen, on Vermont Creek, a tributary of Vowell Creek, at approximately 5,500 feet elevation.

CLAIMS: Mineral Lease M-16 comprising RUTH, MINNIE (Lots 418, 419), CHARLOTTE (Lot 405), CLEOPATRA, VERMONT, SHEBA, RUTH FR. (Lots 8122 to 8125), plus the located claims DIANE, MARGARET, DEBBIE, ANNA, MAUREEN, CAROL, CAROL ANNA 1 to 6, BONGO 1 to 12, DIPSEY 1 to 6, 9, 11, 13, LYNN 1 to 3 Fractions.

(82K/16W)

OWNER: CONSOLIDATED COLUMBIA RIVER MINES LTD., 302, 475 Howe Street, Vancouver.

METALS: Silver, lead, zinc.

DESCRIPTION: The claims are overlain by rocks of the Horsethief Creek Formation. Mineralization consists of sulphides which have replaced limestone.

WORK DONE:

There were no mining nor milling activities at this operation during 1974. The property suffered extensive damage from snow avalanches during January 14 to 16. The series of snowslides that occurred at this time were from both the north and south sides of the valley.

The avalanche from the south slope completely destroyed the powerhouse facility, most of the dry building, the mechanical maintenance shop, storage sheds, the tramway portion of the crushing house, and the southwest corner of the mill. The avalanche from the north slope extensively damaged the No. 1 and No. 2 bunkhouses, and also caused damage to the mine office building.

A caretaking staff of two persons has been on the property for most of 1974.

REFERENCE: *B.C. Dept. of Mines & Pet. Res.*, GEM, 1973, p. 96.

**BEVERLY MINE (82K/NE-1, 28) (Fig. A, No. 66)**

LOCATION: Lat. 50° 57′ Long. 116° 28′ (82K/16W)
GOLDEN M.D. Four and one-half miles northwest of Spillimacheen, covering the northeast flank of Jubilee Mountain, at approximately 5,000 feet elevation.

CLAIMS: ATLANTA (Lot 134), HORSESHOE (Lot 266), LONDON (Lot 15303), WINCHESTER (Lot 15304), CORNWALL (Lot 15305), MOUNTAIN DAISY (Lot 647), LANCASTER (Lot 1112), SILVER KING (Lot 648) plus LUCK 1 to 12, HOPE 1, 2, 5 to 7.

OWNERS: Peter Klaui and Beverley Mines Limited.

OPERATOR: DeKALB MINING CORPORATION, 6th Floor, 630 Sixth Avenue SW., Calgary, Alta.

METALS: Lead, silver, zinc, copper, gold.

DESCRIPTION: Disseminated galena, sphalerite, local chalcopyrite, and chalcocite occur in the Jubilee Mountain Formation.

WORK DONE: Surface geological mapping, 1 inch equals 200 feet covering Luck 1 to 12 and Crown grants; vertical-loop electromagnetic survey, 200-foot grid spacing covering same claims; surface diamond drilling, 18 holes totalling 4,495 feet on Luck 2 and London; surface workings surveyed; grid recut on Hope 1, 2, 5-7; road construction, one-half mile on Luck 2 and London.

REFERENCES: *B.C. Dept. of Mines & Pet. Res.*, GEM, 1969, p. 341; Assessment Report 5013.

and about 40 claims surrounding the lease were located. The present company acquired the property in 1965 and began underground work in an old adit called the Old Timers level and subsequently referred to as the 6000 level.

The main activities in 1966 were directed to the development of the 6000 level. The level was driven from the footwall to the hangingwall of a mineralized zone containing appreciable values of lead, zinc, and silver, and was extended along the hangingwall for 1,200 feet. Contact was maintained with the zone by frequent drilling, which amounted to 132 holes totalling 20,000 feet by the year-end. A new level was opened at the 5,750-foot elevation and was extended 650 feet. It is expected that the 5750 will eventually become the main haulage level. Surface activities included the construction of an 88- by 20-foot power-house and machine-shop near the portal of the lower level. A new 4½-mile access road replacing the old road was built, partly on the south side of the valley of Vermont Creek to avoid snowslides as much as possible and to improve snow removal. Twenty men were employed the year round under the direction of T. E. Swanson, consulting engineer.

Rocks in the Vermont Creek area are grey slates; light-grey quartzites, grits, and pebble conglomerates; and minor limestones belonging to the Horsethief Creek Group of Late Precambrian age. The slates commonly carry disseminated pyrite, the quartzitic rocks contain white quartz veins and rusty iron carbonates, and the limestones are dark grey, fine grained, and more or less micaceous and cleaved. The slates and limestones are thin bedded, and beds crossed by cleavage are apparent in almost every exposure. Minor folds are fairly common, and from a distance major folds can be seen in cliffs.

In the mine area a bed of limestone 30 to 50 feet thick, here referred to as the Ruth limestone, lies between two thick slate formations. The lower slate, which is several hundred feet thick, is underlain by a greyish-brown quartzite that forms prominent cliffs on the Charlotte claim east of the mine and on the north side of Vermont Creek. It is buff-weathering to light-grey somewhat micaceous quartzite with rounded bluish-white quartz grains up to one-eighth inch in diameter. The quartzite has an irregular fracture cleavage, and contains local stockworks of barren white quartz veins.

A major asymmetric anticline trending northwest crosses Vermont Creek near the Ruth property. Reconnaissance suggests that it continues southeast and northwest of the mine for many miles and that most of the known showings of the region are near the hinge zone. On Vermont Creek the anticline plunges gently to the southeast and the axial plane dips steeply to the northeast parallel to the cleavage in the slates.

Figure 29 shows two large anticlines, the Charlotte on the northeast, the Sheba on the southwest, and between them the Ruth syncline. They are named from the old Crown-granted claims on which they are well exposed. All three folds are in the hinge zone of the major anticline just referred to and are local structures which change in form up or down the axial plane and along the axis of the anticline.

The Ruth syncline as outlined by the Ruth limestone is exposed near the portals of the 6000 level and is encountered underground on the level. The synclinal axis plunges at 5 degrees toward an azimuth of 135 degrees, and the axial plane dips 75 degrees to the northeast. In the inner part of the working the axis appears to swing to the west and steepen somewhat in plunge. The limestone on the southwest limb has a fairly uniform attitude with an average strike of 140 degrees and a dip of 30 degrees to the northeast. This southwest limb of the Ruth syncline contains the sulphide mineralization currently being developed.

(82K/12E)

the Towser claim. Concentration proved difficult, resulting in high losses and poor concentrates. Approximately 440 tons of ore was shipped to the Trail smelter.

REFERENCE: *B.C. Dept. of Mines & Pet. Res.*, GEM, 1972, p. 77.

**MIKE (82K/NW-96) (Fig. A, No. 141)** By P. E. Olson

LOCATION: Lat. 50° 39' Long. 117° 33' (82K/12E)
REVELSTOKE M.D. Approximately 1 mile west of the northwest end of Trout Lake.

CLAIMS: MIKE 1 to 12.

OWNER: H. A. McGOWAN, Ferguson.

METALS: Lead, zinc, silver (production shown on Table I).

WORK DONE: Surface exploration was done and 2 tons of ore was shipped to the Trail smelter.

**RUTH VERMONT (82K/NE-9) (Fig. A, No. 145)** By R. W. Lewis

LOCATION: Lat. 50° 57' Long. 116° 59' (82K/15W)
GOLDEN M.D. Twenty-seven miles west of Spillimacheen, on Vermont Creek, a tributary of Vowell Creek, at approximately 6,000 feet elevation.

CLAIMS: Mineral Lease M-16 comprising RUTH, MINNIE (Lots 418 and 419), CHARLOTTE (Lot 405), CLEOPATRA, VERMONT, SHEBA, RUTH FR. (Lots 8122 to 8125), plus surrounding located claims.

OPERATOR: CONSOLIDATED COLUMBIA RIVER MINES LTD., 73 Water Street, Vancouver.

METALS: Silver, lead, zinc, cadmium (production shown on Table I).

DESCRIPTION: The mineral claims overlie rocks of the Horsethief Creek Formation. Mineralization consists of sulphides which have replaced limestone following the trend of numerous fissure veins.

WORK DONE:

The Ruth Vermont mine was formerly operated by Copperline Mines Ltd. until the date of cessation of operation in June 1971.

Consolidated Columbia River Mines Ltd. commenced work on the rehabilitation of the mine and mill facilities in June of 1973 and completed this work by the end of September. The mine and mill were brought into production in October, with underground mining operations being performed by a mining contracting company. Production continued until December 17, when at this time the decision was made to stop production for the remainder of the winter months. Ore production was mainly from room and pillar stoping with a minor amount derived from development which consisted of a total of 326 feet of advance.

Total man-power at the operation was approximately 60 to 65. A total of 26,957 tons of concentrate was shipped to the Trail smelter.

REFERENCES: *B.C. Dept. of Mines & Pet. Res.*, GEM, 1970, p. 467; 1971, p. 430.

CLAIMS: ADR, totalling 10.
ACCESS: By road from Parson, 35 miles.
OPERATOR: MEDESTO EXPLORATION LTD., 215A Tenth Street NW., Calgary, Alta.
METALS: Silver, lead.
DESCRIPTION: The property is underlain by metamorphosed sedimentary rocks of the Horsethief Creek Group. Two quartz fissure veins contain argentiferous galena, chalcopyrite, and malachite.
WORK DONE: Trenching, 250 feet on ADR 14.
REFERENCE: *B.C. Dept. of Mines & Pet. Res.*, G.E.M., 1970, p. 467.

**RUTH VERMONT MINE (No. 165, Fig. G)** By R. W. Lewis

LOCATION: Lat. 50° 56.9′ Long. 116° 58.9′ (82K/15W)
GOLDEN M.D. The Ruth Vermont mine is on the south side of Vermont Creek, 25 miles southwest of Golden.
CLAIMS: The company holdings include 36 mineral claims and 7 mineral leases.
ACCESS: By logging and mining roads approximately 37 miles from Parson.
OWNER: COPPERLINE MiNES LTD., 203, 1885 West Broadway, Vancouver 9.
METALS: Silver, lead, zinc (production shown in Table 1).
WORK DONE: The mine and mill operated from the beginning of the year to June 24th when the mine was closed. Extreme winter conditions and the spring run-off adversely affected working performance during the operating period.
REFERENCES: *Minister of Mines, B.C.*, Ann. Rept., 1966, pp. 230-235; *B.C. Dept. of Mines & Pet. Res.*, G.E.M., 1970, p. 467.

## VERNON 82L

**FRED (No. 29, Fig. G)**

LOCATION: Lat. 50° 03.8′ Long. 118° 14.5′ (82L/1E)
SLOCAN M.D. Between elevations of 4,000 and 4,800 feet on Barnes Creek, 16 miles northwest of Needles.
CLAIMS: FRED 1 to 16.
ACCESS: From Needles by 16 miles of road along Barnes Creek.
OPERATOR: PAN OCEAN OIL LTD. [formerly United Bata Resources (Canada) Ltd.], 1050, Three Calgary Place, 355 Fourth Avenue SW., Calgary, Alta.
METAL: Zinc.
DESCRIPTION: The property is underlain by a sequence of medium to high-grade metamorphic rocks of the Shuswap Complex. Sphalerite occurs as discrete grains and small stringers paralleling the schistosity in the metasedimentary rocks.
WORK DONE: Surface geological mapping, 1 inch equals 200 feet and geochemical soil survey, 388 samples covering all claims.
REFERENCE: Assessment Report 3079.

## MOOSE CREEK

### WATERLOO (No. 25, Fig. K)

LOCATION: Lat. 51°11.5′ Long. 116°22.5′ (82N/1W)
At approximately 7,000 feet elevation, on Moose Creek, 15 miles southeast of Golden.

CLAIMS: WATERLOO 1 to 6, 9 to 14, RIVER 1 to 4.

ACCESS: By highway, logging-road, and helicopter from Golden, 30 miles (8-mile helicopter flight).

OWNER: PURCELL DEVELOPMENT CO. LTD., Brisco.

METALS: Lead, zinc, copper, silver, sodalite.

DESCRIPTION: Sulphide replacement in limestone and sodalite as veinlets in sedimentary rocks and disseminated in nepheline syenite.

WORK DONE: Hand-stripping and sampling on Waterloo 1, 2, 12, and 13; 1 ton sodalite-bearing rock shipped out by helicopter for evaluation purposes.

## SPILLIMACHEEN

### ADR (No. 30, Fig. K)

LOCATION: Lat. 50°55′ Long. 116°58′ (82K/15W)
At approximately 6,500 feet elevation, near the head of Vowell Creek, south of Golden.

CLAIMS: ADR 1 to 21.

ACCESS: By road from Parson, 35 miles.

OPERATOR: MEDESTO EXPLORATION LTD., 215A Tenth Street NW., Calgary, Alta.

METALS: Silver, lead.

DESCRIPTION: Two quartz fissure veins containing argentiferous galena, chalcopyrite, and malachite occur in sediments of the Horsethief Creek Group.

WORK DONE: Surface diamond drilling, one hole totalling 207 feet on ADR 13.

REFERENCE: *Minister of Mines, B.C.,* Ann. Rept., 1968, p. 265.

### RUTH VERMONT MINE (No. 108, Fig. K)

By R. W. Lewis

LOCATION: Lat. 50°56.9′ Long. 116°58.9′ (82K/15W)
The Ruth Vermont mine is on the south side of Vermont Creek, 25 miles southwest of Golden.

CLAIMS: Company holdings include 36 mineral claims and seven mineral leases.

ACCESS: By approximately 37 miles of logging and mining-road from Parson via Vowell Creek.

OWNER: COPPERLINE MINES LTD., 400, 1055 West Hastings Street, Vancouver 1.

METALS: Silver, lead, zinc (*see* Table 1 for production).

DESCRIPTION: The sulphide mineralization currently being mined is contained in what is known as the Ruth syncline. Veins containing most of the sulphides occur in the footwall of the limestone and in the slate beneath the limestone. The geology of the property is covered in great detail in the *Annual Report of the Minister of Mines and Petroleum Resources for 1966,* on pages 230 to 235.

WORK DONE:

A mine camp with accommodation for about 70 persons was established, together with first aid facilities and provision of an ambulance.

A diesel-electric generating plant was installed with a capacity of 1,950 kva. and compressor capacity of 2,200 cfm. The milling plant, with a capacity of 600 tons per day, was completed, with milling commencing in September 1970. A three-pond tailings impoundment was dyked and a cyclone installed.

Ventilation capacity of 30,000 cfm was provided for the initial development on both the 5750 and 6000 levels, with provision for 60,000 cfm to be available for subsequent stoping operations.

A total of 1,773 feet of development was completed, which included the driving of the ore raise and the service raise from the 5750 level to the 6000 level. During the last three months of the year the mill worked to capacity, with ore being provided from the initial ramps being driven into the orebody above the 6000 level.

A trackless method has been adopted to work the deposit, with rubber-tired diesel-powered front-end loaders and a similar propelled drilling rig. The mined ore is transported out of the mine along the 5750 level to the ore bins in small cars hauled by a diesel-propelled locomotive. Concentrates from the mill are loaded and hauled by road to Kellog, Idaho, for smelting.

**RED** (No. 105, Fig. K)

LOCATION: Lat. 50°58.5′ Long. 116°31′ (82K/15E)
On the northeast slope of Jubilee Mountain, 2½ miles due west of Harrogate.

CLAIMS: RED.

ACCESS: By road from Harrogate.

OPERATOR: DRESSER INDUSTRIES, INC., 301, 415 Third Street SW., Calgary, Alta.

METALS: Silver, lead, zinc.

WORK DONE: A magnetometer survey and a geochemical soil survey for copper, lead, and zinc (140 samples) were made of part of the Red 3 and 4 claims.

REFERENCE: Assessment Report 2724.

## BUGABOO CREEK

**SILVER BASIN** (No. 23, Fig. K)

LOCATION: Lat. 50°41.2′ Long. 116°44.7′ (82K/10E)
Bugaboo Pass, between elevations of 7,000 and 7,300 feet.

CLAIMS: WESTERN CROSS (Lot 1978), No. 21 (Lot 1977), and SILVER 1 to 22.

ACCESS: By road from Brisco, approximately 30 miles.

OWNER: PURCELL DEVELOPMENT CO. LTD., Brisco.

METALS: Silver, lead, zinc.

WORK DONE: Surface geological mapping, 1 inch equals 100 feet on Western Cross and part of No. 21; magnetometer survey, approximately 2 line-miles covering Western Cross, No. 21, and part of Silver 1 and 2; road construction, approximately 6 miles from main Bugaboo road to claims; minor trenching and stripping on Western Cross and No. 21; surface diamond drilling, six holes totalling 2,000 feet on Western Cross and No. 21.

REFERENCE: *B.C. Dept. of Mines & Pet. Res.*, G.E.M., 1969, p. 342.

was made near the Big Bend highway just north of the Cummins River, and a helicopter was used to take equipment into the canyon.

Showings in the canyon of the Cummins River on the Bend 3, Bend 4, Bend 5, and Bend 6 claims are of banded massive to disseminated sulphides in rusty-weathering dolomite. Fine-grained granular pyrite with interstitial very fine-grained sphalerite and galena occur in banded and folded rocks in a zone more or less parallel to the formations. The dolomite and sulphides lie between greyish garnet mica schist on the southeast or footwall side and platy greyish-brown micaceous quartzite on the hangingwall. The quartzite-dolomite-mica schist sequence strikes northwest and dips at more than 50 degrees to the southwest. It contains a series of step-like folds rising to the northeast which have a low plunge. The mineralized zone, which is mainly in dolomite but extends into the hangingwall quartzite, is as much as 30 feet thick. It is exposed for several hundred feet up the walls of the canyon, beyond which it is not exposed, but the slopes contain only scattered outcrops. Eight short holes were drilled—six on the south and two on the north side of the river.

Showings on and near the logging-roads 1½ to 2 miles north of the Cummins are between elevations of 3,500 and 4,000 feet on the Bend 19 and Bend 24 claims. The showings are in what appears to be the same sequence of rocks as is found at the canyon showings, but they are in the reverse order. Quartzite lies beneath chocolate-weathering dolomite, which in turn is beneath garnet mica schist. The beds appear to dip at moderate angles to the southwest, more steeply than the slope of the hill. They are folded and on the average probably lie almost parallel to the slope. The showings are scattered along a zone trending west-northwest almost 1,000 feet long and several hundred feet wide. Probably it marks the average trace of the beds on the hillside. The showings consist of fine- and very fine-grained galena, sphalerite, and pyrite in the dolomite and quartzite.

About 1,000 feet of bulldozed trenches and five short diamond-drill holes were made to expose the mineralization and test the grade.

## PARSON

*Silver-Lead-Zinc*

**Ruth Vermont**
*Columbia River Mines Ltd.*
By P. E. Olson

(50° 116° N.W.) Company office, 410, 470 Granville Street, Vancouver 2. The Ruth Vermont mine is on the south side of Vermont Creek 25 miles southwest of Golden and is reached from Parson via the Vowell Creek logging-road.

The property dates back to 1893 and originally consisted of 11 Crown-granted mineral claims which reverted to the Crown. The property was taken up in 1964 as a mineral lease. There are about 40 recorded mineral claims surrounding the mineral lease.

The present owners began work on the property in 1965 and worked continuously until the property was shut down on August 24, 1967.

During 1967 the 6000 level was advanced on several headings, and diamond drilling was carried out to further test the mineralized zone on that horizon. The 5750 level was also extended with a view to this becoming the main haulage level. This level was collared in heavy wet overburden. A mill-site was prepared near the 5750 level adit, and an assay office was installed nearby. Excavation of the mill-site had been completed prior to the stopping of operations.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1936, pp. E 37–E 42; 1966, pp. 230–235.]

Bond and associates had the road to No. 7 level cleared, but this road is still in poor condition. Plans were made to make a bulk concentrate from the old dumps by means of a gravity concentrator, and to haul this concentrate to Camborne, where separate lead and zinc concentrates would be made by selective flotation. Work at the mine employed five men, who were under the direction of C. A. Gilliard, of Ventura, California. Heavy snows in December forced a stoppage of work.

*Silver*

**Ethel**
*Rexony Mining Company Limited*
By James T. Fyles

(50° 117° N.W.) The Ethel is an old property at an elevation of 6,000 feet 3½ miles southwest of the community of Trout Lake. It is reached by a logging and " Cat " road which leaves the Galena Bay–Trout Lake road 4 miles west of Trout Lake. The mine was worked between 1898 and 1918, during which period five shipments of sorted ore totalling 76 tons were rawhided by means of a steep trail to Trout Lake; gross contents: Silver, 9,251 ounces, and lead, 12,664 pounds. Four adits, the longest about 300 feet, and several other workings were driven over a vertical range of 120 feet. Since that time the property has been idle, and the claims, which were Crown granted, have reverted.

In the summer of 1965 the ground was located by K. G. Sanders for Rexony Mining Company Limited, and a " Cat " road was built to the old workings from the logging-road. The workings were mapped and sampled, and in June, 1966, three holes were drilled which totalled 776 feet.

The showings consist of a series of closely spaced quartz veins in dark-grey phyllites and limestones. A layer of fine-grained limestone 50 to 75 feet thick contains the principal showings, but they extend beyond the limestone into the phyllite. The limestone dips 60 degrees to the northeast, essentially parallel to the schistosity in the phyllites. The quartz, containing scattered grains of galena, sphalerite, pyrite, and tetrahedrite, forms lenses up to 18 inches thick parallel to the schistosity. They have been mostly mined out, but judging from surface exposures and small stopes underground they formed an in echelon group of lenses with an average dip to the northeast of about 40 degrees. The old workings passed from one lens to the next, giving the appearance of a continuous vein. Selected pieces from surface containing sulphides or showing copper stain assayed as much as 80 ounces per ton silver. Three holes were drilled southwestward into the limestone and the mineralized zone but failed to encounter significant mineralization.

[References: *Minister of Mines, B.C.,* Ann. Rept., 1914, p. 317; *B.C. Dept. of Mines,* Bull. No. 45, 1962.]

## GOLDEN MINING DIVISION

### PARSON

*Silver-Lead-Zinc*

**Ruth Vermont Mine**
*Columbia River Mines Ltd.*
By James T. Fyles

(50° 116° N.W.) Registered office, 410, 470 Granville Street, Vancouver 2. The Ruth Vermont mine is on the south side of Vermont Creek 25 miles southwest of Golden and is reached from Parson via the Vowell Creek logging-road.

The property is an old one, originally consisting of 11 Crown-granted claims, on which more than a dozen short adits were driven before 1930. In 1956 and 1957 Rio Canadian Exploration Ltd. made an extensive survey of the property and did a small amount of drilling and soil-sampling. In 1964 the old Crown grants which had reverted were taken up by Mel Pardek, of Vancouver, as a mineral lease,

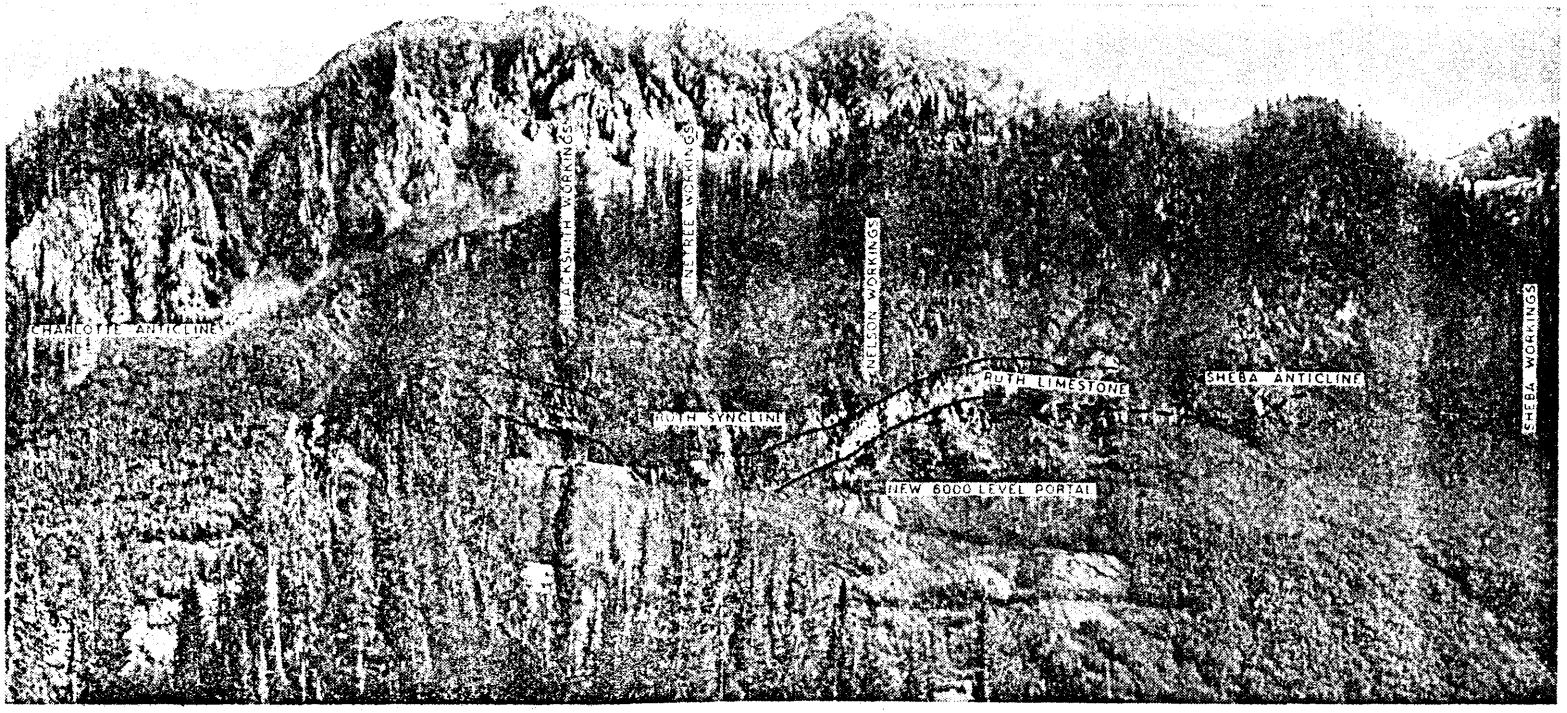


Figure 29. Panoramic view of the south side of Vermont Creek showing the main workings of the Ruth Vermont mine. This view is almost parallel to the axis of the Charlotte anticline and is oblique to the axes of the other folds. The portal of the 5750 level is obscured by the big trees in left foreground.

Quartz veins occur in well-defined sets of fractures. One set contains most of the sulphides, and the others are sparingly mineralized or barren. A set of barren quartz veins is perpendicular to the axis of the Ruth syncline. Other mineralized veins lie parallel to the bedding; the most prominent of them is on the footwall of the Ruth limestone.

The veins containing most of the sulphides trend 110 to 115 degrees and dip at moderate to steep angles to the south. They are well displayed in the 6000 level and in cliffs near the new portal. The veins are oblique to the structure transecting both the folds and the cleavage and occurring in the Ruth limestone and the slate above and below it. They contain galena, sphalerite, pyrite, and arsenopyrite and small amounts of chalcopyrite, boulangerite ($Pb_5Sb_4S_{11}$), argentiferous tetrahedrite, scheelite, and carbonates. The attitudes of these mineralized fractures which form a mineralized zone and the relationship of the mineralization to the Ruth limestone and the Ruth syncline are shown on Figure 30.

The veins in the slate beneath the limestone are up to a foot thick and most are only a few inches thick. They are lenticular and many pinch out in one direction or another where exposed in the workings. The largest one was stoped in the early days for about 80 feet along the level and for 15 feet above it. The veins are more numerous and richer in sulphides just under the limestone, and they extend

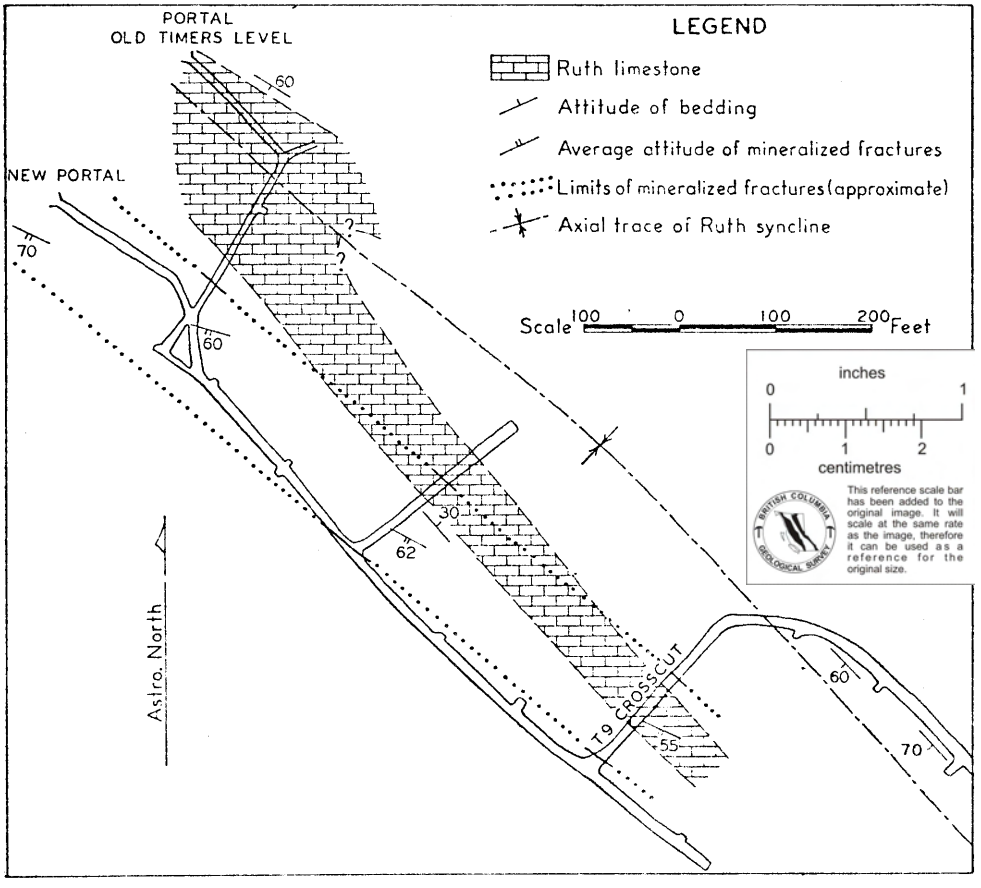


Figure 30. Columbia River Mines Ltd. Geological sketch-map of part of the 6000 level of the Ruth Vermont mine.

for several tens of feet beneath it, dying out irregularly down their dip. The quartz is vuggy and the sulphides are medium grained, occurring in clusters and pods which commonly occupy the entire width of a vein. The slates above the Ruth limestone contain veins which are more widely spaced than those below it.

In the limestone itself where a mineralized section is exposed in the T-9 crosscut, the sulphides are along mineralized fractures ranging from many very closely spaced ones a fraction of an inch thick to one fracture containing up to 5 feet of massive coarse-grained sulphides. Fine-grained sulphides, formed by replacement, are disseminated in the limestone adjacent to the fractures, but replacement ends abruptly and is very closely controlled by the fractures.

The veins have been explored by short adits and open cuts from the earliest days of discovery. This early work is described by Sargent (Annual Report, 1936, pp. E 37–E 41) and O'Grady (Annual Report, 1930, pp. 234–236), and the assays quoted are tabulated below. The veins and mineralized limestone in the 6000 level are known as the Nelson orebody and two groups of veins above the limestone as the Blacksmith and the Pine Tree veins.

| Vein | Width | Gold | Silver | Lead | Zinc |
|---|---|---|---|---|---|
| | In. | Oz. per Ton | Oz. per Ton | Per Cent | Per Cent |
| Blacksmith | 3–7 | 0.30 | 2.0 | Trace | 0.7 |
| Pine Tree | 12 | 0.14 | 29.0 | 35.1 | 1.6 |
| Pine Tree | 8½ | 0.10 | 32.0 | 18.8 | 14.4 |
| Nelson | 12 | 0.02 | 14.0 | 13.3 | 13.9 |

A shipment of sorted ore made in 1965 averaged: Silver, 63 ounces per ton; lead, 31 per cent; zinc, 19 per cent.

As indicated on Figure 30, the veins and the fractures that contain most of the sulphides form a mineralized zone with more or less well-defined margins that trends 130 degrees and probably dips steeply to the southwest. Within the zone are many in echelon veins and fractures which on the average strike 112 degrees and dip 50 degrees to the south. The veins transect the cleavage of the slates and are oblique to the trend of the Ruth syncline. Mineralization appears to have developed along tensional openings superimposed on the uniform and gently dipping southwestern limb of the Ruth syncline. The limestone obviously controlled the amount of fracturing and may also have aided the precipitation of the sulphides. Possible changes in the character of the mineralized zone as it impinges on the axial zone of the Ruth syncline underground to the southeast and as it crosses the Sheba anticline on surface to the northwest are of paramount importance in current exploration. The search for comparable zones along the southwestern limb of the Ruth syncline is continuing.

*Silver-Lead-Zinc-Copper*

**Alpha, Maud S., Standby** (50° 117° N.E.) Company office, 404, 510 West Hastings Street, Vancouver 2. The Alpha lies between the headwaters of Bobbie Burns and Bennison Creeks at elevations ranging from 7,500 to 8,500 feet on the Spillimacheen Range of the Purcell Mountains, 30 miles southwest of Golden. It comprises eight Crown-granted claims, including the Maud S. and Standby, and the seven-claim Alpha group held by record. It is an old showing that has been worked on a number of occasions since 1896.

*Bonanza Explorations Ltd.*
By D. R. Morgan

Some geological mapping was done in 1966, and approximately 400 feet of trenching done by hand. Four AX holes totalling 610 feet were drilled from the

## BRISCO

***Copper-Lead-Zinc-Silver***

**Jersey (The Consolidated Mining and Smelting Company of Canada, Limited)***

(50° 116° N.E.) Company office, Trail. This property is near the foot of Steamboat Mountain, 10 miles southwest of Brisco, and can be reached by logging-road leading from Brisco. It is at an elevation of 3,800 feet and consists of seven mineral claims formerly known as the Myras group, and were examined by New Jersey Zinc company in 1954. The property covers a showing of disseminated chalcopyrite with minor galena and pyrite in a brecciated dolomite zone adjacent to a large fault. The present company optioned the property in 1965 for examination. A reconnaissance survey was made, and a crew of three men drilled two AX and EX holes totalling 443 feet. The men were employed for two months, and the drilling was done under contract. The work was under the direction of G. L. Webber, senior geological technician.

## PARSON

***Lead-Zinc-Silver-Gold***

**Ruth (Columbia River Mines Ltd.)***

(50° 116° N.W.) Registered office, 410, 470 Granville Street, Vancouver 2. This property, also known as the Ruth Vermont, is on Vermont Creek 25 miles southwest of Golden. It comprises 11 Crown-granted and 35 recorded mineral claims, which are situated at elevations ranging from 6,000 to 6,500 feet, and can be reached by a 35-mile road leading from Parson. The Crown-granted claims were acquired by the present company in 1965, and the additional claims were recorded the same year. The property has been previously worked, and detailed descriptions are included in the 1930 and 1936 Annual Reports.

The main activities in 1965 were directed to the Old Timers level, which is at an elevation of 6,000 feet, and is being driven on the footwall of a slaty limestone containing mineralization. The level was extended 900 feet, and an additional 180 feet was driven back to a new portal to straighten the old level. Two raises were also driven from the level. A number of drill-sites were established on the level and in the raises, and 47 diamond-drill holes totalling 6,100 feet were drilled. Appreciable values in silver, lead, and zinc are reported to have been found as a result of the drilling, and preparations were being made at the year-end to drive a crosscut into the mineralized zone. The exploration started in July, 1965, and continued during the winter months. There were 22 men employed, and the work was under the direction of T. E. Swanson, consulting engineer. The men stayed in a camp near the creek level.

***Silver-Lead-Zinc-Copper***

**Alpha (Bonanza Explorations Ltd.)***

(50° 117° N.E.) Company office, 711, 543 Granville Street, Vancouver 2. This property is between the headwaters of Bobby Burns and Bennison Creeks, on the Spillimacheen Range of the Purcell Mountains, 30 miles southwest of Golden. It comprises eight Crown-granted and seven recorded mineral claims which are located at elevations ranging from 7,500 to 8,500 feet. Transportation at present is by helicopter from Golden. The present company acquired the

* By D. R. Morgan.

| | | | Tons | | Oz. | Oz. | Lb. | Lb. | Lb. | Lb. |
|---|---|---|---|---|---|---|---|---|---|---|
| Ruth | Parson | Columbia River Mines Ltd., Vancouver | 17 | Crude ore | 1 | 1,056 | | 10,335 | 6,425 | |
| *Nelson Mining Division* | | | | | | | | | | |
| Gold Belt | Salmo | A. Endersby, Fruitvale | 52 | Crude ore | 17 | 13 | | 155 | 263 | |
| H.B. | Salmo | The Consolidated Mining & Smelting Co. of Canada, Ltd., Trail | 415,290 | Lead concentrates, 6,326 tons; zinc concentrates, 36,454 tons | | 55,729 | | 9,355,280 | 40,603,480 | 328,813 |
| Jersey | Salmo | Canadian Exploration Ltd., Vancouver | 377,124 | Lead concentrates, 4,413 tons; zinc concentrates, 20,654 tons | | 26,680 | | 7,076,299 | 24,448,253 | 202,568 |
| Kootenay Belle | Salmo | Bryan's Transfer Ltd. and M. Arishenkoff, Trail | 6,085 | Crude ore | 196 | 691 | | 13,228 | 13,968 | |
| New Arlington | Erie | G. D. Fox, Trail | 5,406 | Siliceous ore | 767 | 3,044 | | 48,159 | 71,402 | |
| Reeves MacDonald | Remac | Reeves MacDonald Mines Ltd., Vancouver | 409,504 | Lead concentrates, 7,236 tons; zinc concentrates, 24,846 tons | | 47,274 | | 8,240,793 | 27,377,496 | 158,635 |
| Silver Dollar | Salmo | D. H. Norcross, Nelson | 154 | Crude ore | 57 | 2,276 | | 3,844 | 2,401 | |
| Star | Creston | F. J. Brady, Creston | 1 | Crude ore | | 13 | | 786 | 18 | |
| *Revelstoke Mining Division* | | | | | | | | | | |
| *Nil* | | | | | | | | | | |
| *Slocan Mining Division* | | | | | | | | | | |
| Altoona | Sandon | S. Hallgren and J. H. MacMillan, Nelson | 272 | Lead concentrates, 16 tons; zinc concentrates, 26 tons | | 941 | | 13,847 | 28,702 | 179 |
| Antoine | Sandon | Antoine Silver Mines Ltd., North Vancouver | 499 | Lead concentrates, 17 tons; zinc concentrates, 17 tons | 1 | 5,467 | | 18,291 | 19,802 | 149 |
| Bluebell | Riondel | The Consolidated Mining & Smelting Co. of Canada, Ltd., Trail | 256,332 | Lead concentrates, 16,978 tons; zinc concentrates, 27,183 tons | | 329,907 | 388,400 | 24,495,860 | 27,953,480 | 124,018 |
| Blue Star (Amazon, Black Fox, Triumph) | Ainsworth | Blue Star Mines Ltd., Kaslo | 3,260 | Lead concentrates, 45 tons; zinc concentrates, 124 tons | 3 | 2,335 | | 56,972 | 115,454 | 605 |
| Charleston | Retallack | Buchanan Mines Ltd., Nelson | 330 | Lead concentrates, 6 tons; zinc concentrates, 10 tons | | 617 | | 7,988 | 12,648 | 119 |
| Cody Reco | Sandon | Minoca Mines Ltd., Vancouver | Clean-up | Lead concentrates, 8 tons; zinc concentrates, 8 tons | | 582 | | 9,456 | 8,558 | 47 |
| Cork Province | Kaslo | London Pride Silver Mines Ltd., Vancouver | 26,081 | Lead concentrates, 774 tons; zinc concentrates, 3,284 tons | | 45,797 | | 1,098,286 | 3,532,805 | 31,305 |
| Deadman | Sandon | L. and O. Fried, New Denver | 198 | Lead concentrates, 9 tons; zinc concentrates, 84 tons; crude ore, 7 tons | 1 | 3,177 | | 20,035 | 102,434 | 781 |
| Enterprise | Silverton | R. T. Avison, Silverton | 19 | Crude ore | | 1,698 | | 12,638 | 10,487 | |
| Galena Farm[1] | Silverton | | | | | | | | | |
| Greenhorn | Silverton | S. Hallgren, Nelson | 13 | Crude ore | 1 | 191 | | 2,883 | 2,373 | |
| Hecla, Mammoth, and custom | Silverton | Johnsby Mines Ltd., Silverton | 10,925 | Lead concentrates, 674 tons; zinc concentrates, 838 tons | | 127,999 | | 848,262 | 958,952 | 5,666 |

[1] Ninety tons of low-grade dump material from the Galena Farm was milled with 2,649 tons of ore from the Washington.

On the surface a 500-ton coarse-ore bin was built and a 200-foot-long trestle leading to it from No. 7 level portal.

New equipment included a vibrating coarse-ore feeder under the new ore-bin, a 100-horsepower Belliss-Morcom air compressor in the power-house, and two diesel locomotives (27 and 30 horsepower) underground.

The average number of men employed was ninety-five, of whom fifty were employed underground.

### Horsethief Creek (50° 116° N.E.)

*Silver-Copper*

**Ptarmigan** This property is at an elevation of 8,600 feet, at the headwaters of Red Line Creek, a tributary of McDonald Creek, which in turn is a tributary of Horsethief Creek. H. F. K. Seel, of Edgewater, is the owner. A crew of three men was employed removing the ice from part of the old workings and re-establishing ventilation. A small cut-and-fill stope was developed on No. 3 level on a narrow quartz vein mineralized with tetrahedrite and pyrite. Six shipments of ore totalling 21 tons were made to the Trail smelter. Silver assays of these shipments ranged from 15 to 203 ounces per ton. The property was in continuous operation from May 15th.

### SPILLIMACHEEN*

*Silver-Lead-Zinc*

**Silver Giant (Giant Mascot Mines Limited)** (50° 116° N.E.) Company office, 908 Royal Bank Building, Vancouver; mine office, Spillimacheen. R. B. Buckerfield, president. A management contract is held by H. L. Hill and Associates, consulting mining engineers, Vancouver. J. M. McDearmid, general superintendent; J. C. Ehlers, mine superintendent; J. A. Vallance, mill superintendent; D. C. Beddie, surface superintendent. The property is on the west slope of Jubilee Mountain, on the northeast side of Spillimacheen River, 8 miles by road from Spillimacheen station on the Kootenay Central Railway.

Mining was discontinued on June 1st and milling on June 7th because the known ore reserves were exhausted. Diamond-drill exploration was discontinued July 29th, at which time the crew was reduced to a watchman.

Development work included 1,590 feet of drifts and crosscuts, 449 feet of raising, and 8,059 feet of diamond drilling.

During the period of operation 75,237 tons of ore was milled. A crew of 107 men was employed.

### VOWELL CREEK*

*Silver-Lead-Zinc*

**Ruth-Vermont (Rio Canadian Exploration Ltd.)** (50° 116° N.W.) Company office, Suite 1001, 335 Bay Street, Toronto. President, D. R. Derry. The property is on Vermont Creek about 3 miles west of its confluence with Vowell Creek, which is tributary to the Spillimacheen River by way of Bobbie Burns Creek. It was reported that a small amount of diamond drilling was done and a geochemical survey was made of soil samples.

### FIELD*

*Silver-Lead-Zinc*

**Monarch and Kicking Horse (Base Metals Mining Corporation, Limited).**—(51° 116° S.E.) The mill equipment was removed and shipped to the property of Cowichan Copper Co. Ltd. on Cowichan Lake. While removing the equipment, 60 tons of lead concentrate and 94 tons of zinc concentrate were recovered and shipped to the Trail smelter.

* By J. E. Merrett.

level station and loading-pockets, two crosscuts were driven radially to the ore zones and slusher drifts were driven along the zones.

Most of the drifting and crosscutting was done on the No. 6 adit level. This work was done in the investigation of scattered ore occurrences east of the shaft.

Surface diamond drilling on the Rothschild Crown-granted claim, which was acquired during the year, indicated an ore zone 200 feet long and 22 feet wide, with an average grade of 2.61 per cent lead. An exploration programme was commenced to investigate this occurrence at depth. Surface stripping along the limestone-slate contact above the adits on the Hidden Treasure claim indicated an ore occurrence. Two cuts, 60 feet apart, exposed a 15-foot width of an average grade of 3.5 per cent lead. This claim lies east of and above the Giant and Rothschild claims.

Approximately 80 per cent of the mine production was obtained from the footwall ore zone below No. 8 level. The remainder was obtained throughout the rest of the mine, including the open pit. The pillars were mined by long-hole stoping methods, and the stopes were mined by shrinkage and open stoping methods.

The concentrator treated 185,441 tons of ore, an average of 508 tons per calendar day. Concentration was by selective flotation, and the recoveries were reported to average 93.4 per cent of the lead and 84 per cent of the zinc.

During the summer the tailings pond adjacent to the Spillimacheen River was enlarged and encompassed with distributing launders.

The average number of persons employed was 122, of which seventy-four were employed underground.

***Lead-Zinc***

**Lead Mountain (Giant Mascot Mines Limited)**

(50° 116° N.E.) This property, comprising twelve claims, is 6 miles by road northeast of the Silver Giant mine in the Spillimacheen Valley. An agreement was made with The Consolidated Mining and Smelting Company of Canada, Limited, to jointly explore the property.

The northwest and southeast drifts in the 3930 adit were extended a distance of 200 feet each to total lengths of 250 feet. A total of 2,000 feet of diamond drilling was done from these drift extensions. A crew of three men was employed.

## VOWELL CREEK*

***Silver-Lead-Zinc***

**Ruth-Vermont (Rio Canadian Exploration Ltd.)**

(50° 116° N.W.) Company office, Suite 1001, 335 Bay Street, Toronto. President, D. R. Derry; property manager, S. M. Manning. This property consists of thirteen claims and fractions held under option and fifteen located claims. The claims are on Vermont Creek about 3 miles west of the confluence of that stream with Vowell Creek, which is tributary to the Spillimacheen River by way of Bobby Burns Creek. The mineral occurrences are at an elevation of about 6,000 feet. Access to the property is by way of 30 miles of winding road west from Parson on the Kootenay Central Railway.

Mineralization is of silver, lead, and zinc in narrow quartz veins and stringers with some replacement of limestone beds near the veins.

A small crew was employed between July 15th and November 1st. During this period approximately 10 miles of old logging-road was repaired and in places relocated to four-wheel-drive vehicle standards to give truck access to the workings. At the property, mapping and prospecting were done on the surface and 1,240 feet of old underground workings were surveyed and mapped; 515 feet of drifts were sampled. From the underground workings 1,780 feet of diamond drilling was done.

[Reference: *Minister of Mines, B.C.,* Ann. Rept., 1936, E 37.]

* By J. E. Merrett.

A compact power plant, about 100 feet from the portal of the No. 3 tunnel, consists of a Gardner-Denver 2-stage compressor of 360-cubic-foot capacity at sea-level and a 440-volt alternator, both driven by a 100-horsepower Hercules motor. A bit grinder and a Ventair fan are driven by electric motors. Ventube, 16 inches in diameter, is used for ventilation. Because of the wet conditions in the drift, all blasting is done electrically from the light wires and is controlled by a safety-switch at the portal. Even without the fan running, the working is quickly cleared of smoke by natural draught during the warm summer days. Only one shift was working in mid-August.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1935, pp. E 12, E 13.]

**Parridice.** (50° 116° S.E.) The property is owned by Sheep Creek Gold Mines, Limited. Work done during 1946 was confined to a geological examination by A. G. Pentland and to the salvaging of tram-line and other equipment not necessary for possible future operation.

## VERMONT CREEK (50° 116° N.E.).*

***Silver-Lead-Zinc.***

**Ruth Vermont.**—It is reported that two men were employed at this property during the summer of 1946.

## REVELSTOKE (51° 118° S.E.).*

### CARNES CREEK.

***Gold-Silver-Lead-Zinc.***

**J and L, Raindor Gold Mines, Ltd.** Company office, 184 Bay Street, Toronto 1, Ont.; mine office, Revelstoke. G. H. Rainville, President; John E. Riddell, Manager. Capital: 3,000,000 shares, $1 par value; issued, 1,300,006. This is an Ontario company controlled by Quebec Gold Mining Corporation and Noranda Mines, Limited, and registered in British Columbia. The company is developing a group of claims which lies between Carnes Creek and its east fork.

After acquiring the old J and L group of Crown-granted claims, the nucleus of the property, additional claims were located. The company now holds or controls a total of sixty-one claims and seventeen fractional claims, extending 12,000 feet along Carnes Creek and easterly for a width of about 10,000 feet.

The camp is on the south bank of the east fork of Carnes Creek at elevation 2,600 feet, and is reached by 8 miles of good pack-horse trail from the Big Bend Highway at the mouth of Carnes Creek, 24½ miles north of Revelstoke.

A tent-camp was established in May, 1946, a short distance below the portal of the upper adit on the J and L vein. A contract to extend this adit was given to I. Skeen, of 966 Thirty-eighth Avenue East, Vancouver, who sent a picked crew of hand-miners to the property. On August 21st this adit had been advanced 70 feet, and it was planned to advance it another 200 feet to get below any possible surface oxidation. The manager reports that the oxidation extends to at least 125 feet below the outcrop, and that the effects of oxidation were noted in the last face of the adit at 230 feet below the outcrop, possibly because of transverse slips cutting the ore-zone at that point.

This adit follows a vein consisting of massive sulphides of lead, zinc, iron, and arsenic, with minor amounts of quartz and carbonates. The vein lies between a limestone foot-wall and a sericite schist hanging wall. The strike is north-westerly and the dip from 40 degrees to 50 degrees to the north-east. There are two shafts and a number of open-cuts on the property, but these were not visited.

* By J. A. Mitchell.

tion in bedded limestone which strikes north 30 degrees west and dips at 40 degrees north-easterly. The mineralized beds are overlain by limy slates. At the portal there is 12 to 13 feet of mineralized limestone above the floor. At the raise the upper contact is 7 feet, while at the face of the drift it is 6 feet above the floor. The mineralization is quite variable, consisting of pyrite, galena, and sphalerite, intimately mixed, and again in fairly pure segregations of the several minerals. The report of microscopic examination given above refers to specimens from both the Upper and Lower Nelson adits.

The Lower Nelson adit, at about 5,975 feet elevation, starts at the lower contact of limestone. The bluffs expose a thickness of 25 feet of limestone striking north 55 degrees west and dipping 45 degrees north-easterly. A white quartz vein, 1 to 2 feet thick, follows the bedding below 3 feet of limy slate immediately underlying the limestone. The adit follows the quartz vein south-easterly on a curving course for 110 feet. Comparatively little mineralization shows, except pyrite in the slate and some fine mixed sulphides in the roof. The raise is at about 40 feet from the portal. Under the raise a winze goes down on the dip to the north-east, with a 1-foot seam of mixed sulphides at the collar which assayed: Gold, 0.02 oz. per ton; silver, 14 oz. per ton; lead, 13.3 per cent.; zinc, 13.9 per cent. The mineralization in the lower part of the raise is weak. Twenty feet beyond the raise a crosscut runs north-easterly for 20 feet into the limestone. On the north wall 10 feet in there are 2 feet of fine-grained mixed sulphides. The white quartz vein contains a little galena and sphalerite. The following samples are of selected mineral from the upper level:—

| Gold. | Silver. | Lead. | Zinc. | Description. |
|---|---|---|---|---|
| Oz. per Ton. | Oz. per Ton. | Per Cent. | Per Cent. | |
| 0.02 | 4.0 | 3.6 | 7.0 | Upper Nelson, 6 inches, chiefly pyrite. |
| Trace | 56.4 | 46.6 | 13.5 | Upper Nelson, selected galena. |
| Trace | 23.6 | 17.2 | 36.0 | Upper Nelson, selected sphalerite. |

The mineralization is variable and bulk-sampling would be required to obtain a fair average. Much more work would have to be done to determine the extent of the deposit. It is apparent that a considerable volume of material contains sufficient lead and zinc to be regarded as good milling-ore. The silver content is high for replacement ore. The size of some particles, as indicated by microscopic study, is rather small, but it is probable that testing would indicate a good release of mineral grains within the limits of commercial grinding.

West of the Nelson workings is a wide rock-slide. To the east across the narrow slide, at the crosscut adit and the powder-house 50 feet to the west, there is some limestone which extends for 20 feet above the floor-level of the adit; it is somewhat warped and is slightly mineralized at the powder-house. The adit starts in limestone but runs out of it about 75 feet from the portal. Another outcrop of limestone is at the creek 250 feet east of the adit and at an elevation of about 6,075 feet.

**Ruth-Vermont Mines, Ltd.**

The Crown-granted claims, *Syenite Bluff*, *Agnes*, and *Black Horse*, and the following claims or fractions: *Agnes Fr.*, *Eureka*, *Mezeppa*, *Wildhorse*, *White Horse*, *Lion*, *Unicorn*, *Ruth No. 2*, *Charlotte Fr.*, and *Minnie Extension*, held by location, are in the name of G. W. Edwards. They are referred to as the property of Ruth-Vermont Mines, Limited, which is closely associated with the Witwatersrand Syndicate. These claims are situated on Vermont Creek, principally on the very steep north side, north-west of the holdings of the Galena Syndicate. The Crown-granted claims are of long standing. They are normally 6,000 by 1,500 feet. The *Agnes* and *Black Horse* were located in 1889 and surveyed for Crown grant in 1894. The locations were staked in 1930 and 1931 and some more recently. Some of these claims have been surveyed for Crown grant.

The workings on this property are all shallow and are quite limited. Lead-zinc mineralization has been exposed at several widely-separated points. At one of these, disseminated sulphide occurs in conglomerate and in the slate underlying the conglomerate. At another point lead-zinc mineralization occurs in bedded limestone.

The most conspicuous feature of the property is a narrow vein mineralized with galena, sphalerite, and boulangerite. The boulangerite, a sulph-antimonide of lead, forms a considerable part of the sulphide mineralization. Oxidation of this mineral yields the yellow oxide

of antimony. This marks the outcrop of the vein, which is traceable along a talus-slope and down a steep slide course for a horizontal distance of 1,800 feet from the crest of the divide between Vermont and Copper Creeks, at 8,300 feet elevation, to a point in the slide of 7,750 feet elevation. Cuts made in either the talus, or in the slide, fill in quickly. The vein is easily traced by the yellow-coated float and is usually easily found in place by a little digging. The actual vein, however, is rarely exposed. It appears to have a width of from 6 inches to 2 feet of mineralized quartz, which may include a considerable quantity of siliceous schist which the vein appears to follow. Sphalerite forms an important part of the vein-mineralization. The following analyses of two samples give an idea of the more valuable metallic contents:—

| Gold. | Silver. | Lead. | Zinc. | Description. |
|---|---|---|---|---|
| Oz. per Ton. | Oz. per Ton. | Per Cent. | Per Cent. | |
| 0.34 | 3.6 | Trace | 10.6 | From vein near crest of ridge. |
| 0.12 | 21.6 | 0.2 | 24.8 | From vein well down in slide. |

The report of a microscopic study of two specimens of this material made by J. M. Cummings at the Department of Mines' laboratory:—

"Ruth-Vermont; mixed sulphides. One section was prepared from massive sulphides consisting of arsenopyrite, sphalerite, and boulangerite. Arsenopyrite occurs as subhedral to euhedral grains and crystalline aggregates, surrounded by and in contact with relatively large, irregular masses of sphalerite. Boulangerite is disseminated throughout, replacing, in some places, both the other sulphides up to 25 per cent. of their area. This association is very intimate and it would be almost commercially impossible to make a clean separation, should this be desired.

"Ruth-Vermont; mixed sulphides. One section prepared from typical ore consists of massive boulangerite containing a few tiny rounded arsenopyrite crystals in a gangue of quartz and minor amounts of carbonate."

Though the nature of the outcrop is not favourable for permanent workings, it would be possible to reach the vein from a safe place on the ridge to the west by driving a curving crosscut, probably not more than 100 feet in length.

## SPECIAL REPORTS.

A limited number of mimeographed copies are available to those who specially request reports on the following properties:—

Salmo-Malartic Mines, Limited.
Golden Fawn Mining Company, Limited.
Northwind Group, Paulson.
Silver Basin, Bugaboo Creek.

The properties described in these reports are not considered to have reached a stage of development that would be of sufficient interest as yet to warrant the inclusion of lengthy descriptions in the Annual Report.

A special report is also available on part of the Rossland Camp, where sufficient work has not yet been done by the Department to warrant a full report.

# PROGRESS NOTES.

## LODE-GOLD DEPOSITS.

BY

H. E. MIARD.

### CRESTON AREA.

*Creston Hill.*—Situated west of Kitchener; operated by the Creston Hill Mining Syndicate; manager, Silas E. Jones. A crew of seven (four underground) was employed for some time, but operations had to be suspended in the fall owing to the failure of the water-supply.

### Hydro-electric Development.

Largely in connection with the fertilizer undertaking, additional power facilities are being provided by the West Kootenay Power and Light Company, the subsidiary company of the Consolidated Mining and Smelting Company. A large force of men is at work in connection with construction of a fourth plant on the Kootenay river at Corra Linn falls, where three 19,000-horse-power units are to be installed. This new plant will bring this company's capacity on the Kootenay river to well over 200,000 horse-power. The same company proposes to construct a huge dam on the Pend d'Oreille river which ultimately will result in the additional development of over 200,000 horse-power. This will constitute the largest single power-development in the Province. The site of the big dam is on the Pend d'Oreille river, about 1 mile above its confluence with the Columbia river. Borings have demonstrated that a suitable footing can be obtained for the dam, which will be some 365 feet or more in height above the bed of the river.

### Geological Survey Work.

Recent publications of the Geological Survey of Canada include: Memoir 161, "Lardeau Map-area," with General Geology by J. F. Walker and M. F. Bancroft and Mineral Deposits by H. C. Gunning; "Mineral Developments in Salmo Map-area," by J. F. Walker, Summary Report, 1929, Part A. During the past field season B. R. MacKay made a study of the Corbin coal area in the East Kootenay. This lies about 12 miles south of Crowsnest pass and within 2 miles of the British Columbia-Alberta boundary.

### Production.

| Mine or Group. | Tonnage. | Character of Ore. |
|---|---|---|
| **Ainsworth Mining Division—** | | |
| Banker | 56 | Silver, lead. |
| Whitewater | 47 | Silver, lead, zinc. |
| **Fort Steele Mining Division—** | | |
| Sullivan | 1,923,767 | Silver, lead, zinc. |
| **Golden Mining Division—** | | |
| Monarch | 75,054 | Silver, lead, zinc. |
| Ruth-Vermont | 63 | Silver, gold, lead, zinc. |
| **Lardeau Mining Division—** | | |
| Lead Star | 13 | Silver, gold, lead. |
| **Nelson Mining Division—** | | |
| California | 18 | Silver, gold, lead. |
| Goodenough | 1,086 | Gold, silver, lead. |
| Reno | 9,670 | Gold, silver, lead. |
| Second Relief | 1,479 | Gold, silver. |
| **Revelstoke Mining Division—** | | |
| Regal | 24 | Silver, lead. |
| **Slocan Mining Division—** | | |
| Black Colt and Palmita | 358 | Silver, lead, zinc. |
| Bosun | 203 | Silver, lead, zinc. |
| Canadian Group | 40 | Silver, lead. |
| Elkhorn | 47 | Silver, lead, zinc. |
| Galena Farm | 2,830 | Silver, lead, zinc. |
| Great Western | 64 | Silver, lead, zinc. |
| Lucky Thought | 80 | Silver, lead, zinc. |
| Mary Ryan | 10 | Silver, lead, zinc. |
| Noble Five | 1,736 | Silver, lead, zinc. |
| Ruth-Hope | 2,080 | Silver, gold, lead, zinc. |
| Silversmith | 150 | Silver, gold, lead. |
| Slocan King | 11 | Silver, lead. |
| Slocan Rambler | 77 | Silver, lead, zinc. |
| Sovereign | 50 | Silver, lead, zinc. |
| Standard | 164 | Silver, lead, zinc. |
| **Slocan City Mining Division—** | | |
| Treasure Chest | 2 | Silver, lead. |
| **Trail Creek Mining Division—** | | |
| Gold Drip | 20 | Gold, silver. |
| I.X.L. | 35 | Gold, silver. |
| Midnight | 33 | Gold, silver. |
| Total tonnage | 2,019,267 | |

outcrop workings as regards crosscutting, driving, and sinking at these two points, which represents an additional footage of 400 feet."

**Ruth-Vermont.**

This group is situated on Vermont creek, tributary of Vowell creek, which flows into Bobbie Burns creek, about 38 miles by rough road from Spillimacheen, on the Kootenay Central Railway. No development-work was done in the area during 1930, but the property was examined in June in connection with an application for assistance towards improving transportation. The property, consisting of some ten claims, of which the *Ruth*, *Charlotte*, and *Minnie* Crown-granted claims form the nucleus, is held by the Galena Syndicate, Limited, a private company incorporated in England and registered in British Columbia. The company's interests also include some five or six claims in the adjacent area and a group of five claims on McMurdo creek, but no appreciable activity has yet occurred in connection with them. H. G. Lockwood, barrister and solicitor, of Golden, is the local representative of the company.

Previous references to the *Ruth-Vermont* are contained in the Annual Reports for 1926, 1927, and 1929. The geology of the area, which lies some 28 miles north of the Windermere Map-area (Geological Survey of Canada, Memoir 148, by J. F. Walker), has not yet been mapped, but the north-westerly extension of the same rocks has been traced by Walker to Bobbie Burns creek (*see* Summary Report of the Geological Survey of Canada for 1925, Part A, "Reconnaissance in the Purcell Range West of Brisco, Kootenay District, B.C."). The presence of pebble conglomerates, presumably the Toby conglomerate, at no great distance from the *Ruth-Vermont* holdings, would indicate that the deposits occur in rocks of the Mount Nelson formation, a subdivision of the Upper Purcell series of late pre-Cambrian age. The country-rocks of the deposits are limestones, calcareous schists and shales, the beds being contorted, fractured, and considerably metamorphosed. No igneous intrusives were noted in the immediate vicinity, but granite, probably Jurassic, is reported to be exposed north of Vermont creek. The general strike of the formation is north-westerly, with varying dips to the south-west. The workings are situated on the precipitous mountain-slope, formed of rock bluffs and talus, on the southern side of Vermont creek, the camp being situated at an elevation of 5,500 feet above sea-level on a bench near the creek-level.

Exploration has been done on two distinct types of deposits, fissure-veins cutting the formation, and replacement mineralization. In regard to the first mentioned a considerable amount of preliminary development and prospecting work has been done on the series of small fissure-veins which, in general, parallel the strike of the formation, but dip to the south-west at steeper angles. These veins, varying in width from 3 to 30 inches, are mineralized with pyrite, galena, and sphalerite in a siliceous gangue. This ore in some cases contains low gold values and generally a small percentage of copper. No copper mineral was noted, but the comparatively high silver values may be due to the presence of a grey-copper mineral. Ore-shoots so far developed are short and their continuity in vertical extent has not yet been tested to any appreciable extent. Of this type are the Blacksmith and Pine Tree, on which most of the work has been done, the Mountain, Slide, West, and other similar small veins. The general strike of these fissures is from S. 50° to 60° E. (into the hill), with steep dips, up to 75°, to the south-west.

The Blacksmith vein, at the north-eastern extremity of the area examined, has been explored by three tunnels driven in from the abrupt mountain-side at elevations (aneroid) of approximately 6,185, 6,335, and 6,385 feet. These workings are known respectively as the Lower, Intermediate, and Upper Blacksmith tunnels. This last working, said to be 90 feet long, was blocked by snow at the time of the writer's examination in June. A grab sample from a pile of ore, roughly estimated at 30 tons, assayed: Gold, 0.12 oz. to the ton; silver, 23.1 oz. to the ton; lead, 21.6 per cent.; zinc, 10.4 per cent.

In the Intermediate tunnel, which has only been driven a short distance, the vein, varying in width from a streak to 5 inches, consists of oxidized quartz containing some grey copper associated with the iron, lead, and zinc sulphides. The Lower Blacksmith tunnel, about 140 feet long, has been driven along a narrow and somewhat indefinite vein for a length of 60 feet to where a cross-vein is encountered and a small stope has been opened up from a 45-foot raise. In the stope, which is about 20 feet long, the ore varied in width from 24 to 30 inches. In the back some oxidized decomposed material, containing a little galena, has been left, and at the south-eastern end of this working the ore apparently peters out. Going south-easterly along

the tunnel, beyond the raise, an unimportant stringer is followed to the face. Selected ore from the stope assayed: Gold, 0.07 oz. to the ton; silver, 65 oz. to the ton; lead, 27 per cent.; zinc, 13 per cent.

Below the Lower Blacksmith tunnel and at about 6,000 feet elevation the Old Timers tunnel has been driven to explore the downward continuation of the fissure-zone. This tunnel, driven many years ago, is chiefly a crosscut which for the first 150 feet goes south-easterly to where a sharp turn is made, and then south-westerly for some 235 feet. At the inner extremity of the crosscut a vein is cut and drifted on to the south-east for a short distance. In the stope, which extends above this drift for a length of about 30 feet and a height up to 20 feet above the level, the vein is well mineralized with galena and sphalerite over a width of from 4 to 12 inches. The strike here is N. 55° W. and dip 75° to the south-west. A grab sample from four sacks of ore from this stope assayed: Gold, 0.10 oz. to the ton; silver, 40.3 oz. to the ton; lead, 21.4 per cent.; zinc, 25.2 per cent. Going back 30 feet along the crosscut from this drift, a zone about 16 feet wide is cut which contains several north-westerly-striking quartz stringers mineralized chiefly with sphalerite. The stringers, up to 12 inches wide, dip at about 65° to the south-west and in strike parallel the last previously described vein in the stope. An 18-foot drift, run south-easterly to explore the stringer-zone, does not show any appreciable continuity in that direction. At other points on the Old Timers tunnel-level prospect-tunnels have been driven without making any further mineral discoveries.

A few hundred feet south-westerly from the portal of the Lower Blacksmith tunnel, and at approximately the same elevation, the Pine Tree vein has been explored by a drift 74 feet long. The dip and strike here are similar to the previously described veins. This quartz vein is well mineralized over short lengths and across widths up to 2 feet. A little stoping has been done on two ore-shoots, 10 and 20 feet long respectively. The two shoots are separated by a 20-foot section of vein which is mostly quartz. A grab sample of broken ore from the 20-foot shoot at the inner end of the tunnel assayed: Gold, 0.05 oz. to the ton; silver, 43.5 oz. to the ton; lead, 23.2 per cent.; zinc, 14.2 per cent. One or two other short tunnels are understood to have been driven to explore the same vein in the precipitous bluffs, but these were not seen.

Below the Upper Pine Tree tunnel are the workings on the "Nelson ore-body," which is a different type of deposit to those previously described. Two short tunnels, at elevations of 6,005 and 6,085 feet respectively, are connected by an inclined raise. The upper tunnel contains a short raise to a stope which connects with the surface. Together these workings develop a wide zone of mineralization, known as the replacement ore-body, which occurs in highly metamorphosed, pyritized, and silicified calcareous rocks. Fracturing and folding of the strata is much in evidence in the vicinity of the workings. The mineralization consists of the disseminated sulphides of iron, zinc, and lead, the iron and zinc apparently being the most abundant, though there are nice showings of galena in places. Owing to the precipitous character of the ground along the outcrop considerable time would be necessary to investigate the possible extent of the mineralization, and a large amount of sampling would be necessary to arrive at a fair average of the grade of the material. From the cursory examination made of the Nelson workings it seemed that the strongest mineralization occurs over widths up to 13 feet on and above the upper tunnel-level, where a little stoping has been done for a length of 25 feet. Assays of samples quoted in a mining engineer's report, made available to the writer, show good milling values starting at 15 feet from the portal to the face over widths of 12 feet in the stoped area and 6½ feet in the tunnel beyond. In the raise below the working just described the mineralization seems scattered and indefinite. The lower tunnel, about 80 feet long, is mostly in argillaceous rocks in the foot-wall country, which, however, contain some quartz stringers mineralized with pyrite and sphalerite.

A shipment of sorted ore was made early in 1930 by C. W. Riley, of Golden, then in charge of the property. Several hundred sacks of similar ore remain at the mine, a grab sample from which assayed: Gold, 0.10 oz. to the ton; silver, 51.6 oz. to the ton; lead, 30.2 per cent.; zinc, 17 per cent.

The high cost of mining and sorting such ore from small, widely separated shoots in the fissure-vein workings and the long expensive haul to the railway would preclude the possibility of shipping at a profit even with much better metal prices and transportation conditions. The future of the property would seem to depend on the possibility of developing a large tonnage warranting milling and other equipment for production.

The writer was accompanied by S. D. H. Pope, Assistant District Engineer of Public Works at Golden, who subsequently made a comprehensive report on transportation conditions to his Department. This will be available for reference in the event of resumption of exploratory activity in the area. The report is of interest in connection with the whole area embracing the Spillimacheen river, Bobbie Burns creek, and their tributaries, now reached by three routes starting respectively from Parsons, Carbonate Landing, and Spillimacheen, on the Columbia river.

**Quartz Creek.*** This property, owned by N. T. Edwards, Sam Indebrigsten, T. Edwards, *et al.*, of Revelstoke, consists of the *Fata Morgana*, *Dominion*, *Manitoba*, and *Amanada* claims. They are located at the head of Porcupine creek, the left tributary of Quartz creek, and are served by a 16½-mile trail from Beavermouth, a small station on the main line of the Canadian Pacific Railway. An interesting sight near the junction of Quartz and Porcupine creeks is the now abandoned and desolate placer-mining camp, established presumably about the year 1865 by men on their way into the Big Bend placer mines.

The *Fata Morgana* group is located on an outcrop of quartz which contains disseminated through it small quantities of malachite, chalcopyrite, and pyrite. The work to date consists of a few open-cuts at elevation of 7,050 feet, and exposes a large ledge of quartz occurring in quartzites.

In the uppermost open-cut the mineralized quartz would appear to strike N. 70° W., with a dip 55° to the north, and has about 10 to 12 feet of its width definitely exposed. A sample of selected ore from this open-cut assayed 1.41 per cent. copper. In a second open-cut, about 50 feet to the east and at 40 feet lower altitude, a channel sample across a width of 100 inches of copper-stained quartz assayed: Gold, 0.02 oz. to the ton; silver, 0.4 oz. to the ton; copper, 0.57 per cent. The outcrops are loose-looking and indefinite in character, though it is understood that a limited amount of trenching since the property was examined has proved them solid bed-rock and not slide material as might have been thought.

**Zinc Mountain.*** During 1930 the Zinc Mountain Mining Company, Limited, of Calgary, Alta., under F. Henderson, president, spent considerable time and money in prospecting claims located on the north-west side of Moose creek in the vicinity of Zinc mountain. When the property was visited late in August four men were employed, with D. McLeod as foreman.

This property, consisting of twenty-three claims held by location and assessment-work, is 10½ miles in an easterly direction from Leanchoil, a small station on the Canadian Pacific Railway west of Field. However, the route taken to the property is about 27 miles in length, the first 12 miles from Leanchoil to Ice River Cabin being over a rough wagon-road, and the remaining distance following the old Kootenay trail up the Beaverfoot river to Moose creek and thence northward to the tent camp on Moose creek at 5,900 feet elevation, directly east of Mount Helmet and the Washmawapta snow-field.

The development-work has been done on a small showing of blende, pyrrhotite, chalcopyrite, and galena, which occurs in limestone and calcareous shales in close proximity to a series of basic dykes, the area being located close to the contact of the limestone with rocks classified by J. A. Allan, in Memoir No. 55, Geological Survey of Canada, as transition members of the igneous complex outcropping in the Ice River and Moose Creek area.

Two short tunnels and several open-cuts at 7,000 feet elevation constitute the development-work to date. The No. 1 tunnel at 6,950 feet elevation is 30 feet long and runs N. 70° W. At the present portal and on the left wall a lens of pyrrhotite, blende, and galena averaging possibly 1.8 to 2 feet in width, conforming with the strike (N. 50° to 80° W.) and dip (35° to S.W.) of the limestone and shale, has been uncovered. The lens is about 15 feet long, its northern end terminating on a fault-slip (N. 75° E.), the ore apparently following along this slip to the upper right-hand wall of the tunnel portal, where minor amounts of galena were noted in association with a basic biotite-porphyry dyke. The ore from this level, amounting to 20 tons in all, was piled at the portal of the tunnel and a careful sample representing the dump assayed: Gold, 0.06 oz. to the ton; silver, 7.2 oz. to the ton; lead, 12.3 per cent.; zinc, 15.7 per cent.; copper, 3.26 per cent.

The No. 2 or lower tunnel at 6,900 feet elevation is 126 feet long, and starting at a point 50 feet below and 55 feet S. 23° E. from the No. 1 tunnel portal it runs N. 36° W. for 35 feet and thence west 63 feet to the face. From a point 40 feet from this face a 28-foot crosscut has

The Victoria Syndicate has done extensive exploration by diamond-drilling and tunnelling in the Pend d'Oreille area of the Nelson Division and a considerable amount of underground work in the Slocan. Drilling in the Kimberley area was continued by R. M. Bennett and associates, of Detroit, and by the Western Exploration Company.

At the *Big Ledge*, near Nakusp, American interests did a considerable amount of drilling; the *Wigwam* group near Revelstoke was also subjected to an extensive diamond-drilling campaign by Tacoma interests.

### Geological Survey Work.

The Geological Survey of Canada had two parties in the field in the West Kootenay, one under C. E. Cairnes in the Slocan and the other under J. F. Walker in the Lardeau, while C. S. Evans was working in the Golden Division.

A notable event was the visit of the Empire Mining Congress to the district early in September. After spending a day at Fernie the Congress visited the *Sullivan* mine and concentrator, where a most interesting day was spent. On the following day the two special trains left for Kootenay Landing, whence an enjoyable excursion was made up Kootenay lake to the *Bluebell* and then on to Nelson. After visiting the plant of the West Kootenay Power and Light Company at Bonnington Falls the party returned to their trains at Nelson for the night. The next morning was spent at the Trail reduction-works and after a luncheon provided by the Consolidated Mining and Smelting Company the two specials pulled out for the next point of interest, which was the *Allenby* mine of the Granby Consolidated Mining, Smelting, and Power Company.

The writer wishes to acknowledge with many thanks the courtesies extended by the mine-owners and prospectors during his travels in the district, also his appreciation of the co-operation received from members of the Geological Survey of Canada.

## GOLDEN MINING DIVISION.

Mining activities in this Division were principally confined to the area tributary to the Spillimacheen river in the Purcell range, where development and exploration work undertaken at the *Giant* and *Ruth-Vermont* properties give rise to hopes that production may be expected within the not-far-distant future. It is too early to make definite statements, but if the results of further development come up to expectations a great deal more activity will be evidenced and the attention of mining men will be attracted to this section of the country, in which a number of claims await exploration.

List of Producing Mines in the Golden Mining Division, 1927.

| Mine. | Locality. | Tons. | Character of Ore. |
|---|---|---|---|
| Anderson, L. E. | Kaslo | 1 | Gold. |
| Ruth-Vermont | Golden | 5 | Silver-lead-zinc-gold. |

In the past prospecting and mining operations in the mineralized zone, which lies some 20 or 30 miles to the west of the Columbia river, has been greatly handicapped by lack of transportation facilities. Supplies had to be packed in over steep and tortuous trails and ore had to be packed out, but now that a road has been constructed up Spillimacheen river to Vermont creek a large area of mineralized country is brought within comparatively easy reach of the railway. This route provides a means of establishing at no very great cost an easy and uniform grade which can gradually be converted into a good trunk road for motor-haulage, with branches extending up the main valley, should ore in sufficient quantity be developed to warrant the additional cost of improvements and construction.

Although the area traversed by the road has not yet been covered by the Geological Survey of Canada, it is logical to assume that it is underlain by the rocks of the Windermere series, as great masses of pebble conglomerate similar to that of the Horsethief series outcrop near Farnham creek, indicating the northerly extension of the Mount Nelson formation near the head of Vermont creek. It is in this formation most of the ore-deposits in the Windermere area occur.

**Giant.** Situated on the Spillimacheen river at a distance of about 7 miles by road from the railway at Spillimacheen. During the last two years exploration by diamond-drilling and otherwise has thrown a good deal more light on the

and 300 feet to the east of the crosscut, the ore shows a width of about 18 feet, so there was, apparently, a good chance for the development of an ore-shoot of considerable dimensions between these two workings, with possibilities for its extension in an easterly direction for about 500 feet, judging by surface indications. To prove its continuation in this direction a crosscut tunnel was being driven on the *Rothchild* at a distance of about 800 feet to the east of the crosscut. The indications were considered favourable for the downward continuation of the ore below the present lowest level.

Milling tests made on the ore demonstrate that it responds favourably to separation by oil-flotation; the recovery obtained being as high as 99.4 per cent. of the lead and 90.6 per cent. of the silver. As a by-product, barytes could be saved by table separation of the flotation concentrates, yielding about 25 tons of barytes to 100 tons of ore. The high specific gravity of the barytes which forms the gangue is an important factor in favour of low mining and milling costs.

The property is equipped with good cabins for the accommodation of about twenty men and a small power plant consisting of a 25-horse-power Fairbanks-Morse oil-engine and an Ingersoll-Rand compressor. The total operating cost to the foot advance is given as $20.30. For further reference *see* Annual Report for 1923.

**Ruth-Vermont.** Situated near the head of Vermont creek at a distance of about 35 miles from Spillimacheen, on the Kootenay Central Railway. The property was acquired by the Galena Syndicate, of London, last year. G. W. Edwards, whose address is Golden, B.C., is their local representative and manager. Soon after operations were started it was realized that lack of transportation facilities was a decided handicap to any substantial progress being made in the development of this property, while the shipment of any high-grade ore which might be won in the process of development was not practical under existing conditions; so it was decided to construct a road from the end of the old logging-road up Bobbie Burns creek. Crossing the Powell near its confluence, the road follows the valley of the latter to Vermont creek and thence to the mine. This was quite an undertaking, for it meant the reconditioning of about 10 to 15 miles of the old logging-road and 10 miles of new construction. Besides greatly facilitating mining operations at the property, the road will be of great benefit to prospectors in the surrounding country.

Since visiting the property last year, work at the mine has been principally confined to the development of the ore exposed in the old Nelson tunnel. Here the formation consists of thinly bedded argillites striking N. 40° W. and dipping at 43° to the north-east. The occurrence of pebble conglomerates at no great distance from the mine would indicate that these rocks belong to Mount Nelson formation of the Windermere series, in which many deposits have been found to occur in the Windermere Mining Division. The development so far accomplished has disclosed the ore to occur in a mineralized zone, apparently 30 to 50 feet wide, conforming to the dip and strike of the formation. In this zone the mineral-bearing solutions have apparently followed the lines of least resistance by replacing the more readily soluble beds, with the result that sulphide ore has been deposited in parallel bands and streaks separated by bands of sparsely mineralized country-rock.

The old Nelson tunnel, which has been driven into the face of a bluff some 900 feet above the creek, had been advanced to a total length of 50 feet and lay for most of this distance in the foot-wall side of the ore. At 25 feet from its portal a short crosscut driven to the foot of a raise exposes a width of 4 feet of massive sulphide ore similar in character to that sampled last year, which gave the following returns: Gold, 0.02 oz. to the ton; silver, 26.01 oz. to the ton; lead, 24.8 per cent.; zinc, 25.7 per cent.

A 50-foot raise connects this tunnel with an upper tunnel which had been driven for 30 feet on a parallel band of ore, with fairly heavy sulphide mineralization in either wall. The best grade of ore was apparently confined to a width of about 30 inches, across which a sample gave the following returns: Gold, 0.03 oz. to the ton; silver, 12.4 oz. to the ton; lead, 14.3 per cent.; zinc, 20.6 per cent. Besides this there were evidently good possibilities for mining a considerable quantity of lower-grade mill-feed. Above this tunnel ore had been stoped from a small cross-fissure.

On other parts of the property a considerable amount of development and prospecting work has been done on a series of small fissure-veins which cut the formation and from which some high-grade ore has been extracted. Judging by the character and extent of mineralization, the

possibilities for the development of important ore-bodies would appear to fully warrant gradual and systematic exploration of the property with a view to blocking out sufficient tonnage to warrant its equipment for production, which it is understood is the intention of the management.

Mining activities at the *Monarch* and *Kicking Horse* at Field were temporarily suspended, pending arrangements being made for additional capital to place them on a producing basis.

PLACER-MINING.

Small-scale hydraulicking operations were carried on during the year on Quartz creek, near Beavermouth, by the Quartz Creek Syndicate. Results of the work are not known at the time of writing. Reference to the property may be seen in the 1926 Annual Report.

## WINDERMERE MINING DIVISION.

The operation of the *Paradise* by the Victoria Syndicate will undoubtedly stimulate mining activities in this Division and possibly lead to other important operations. While there is ample evidence of a mineralized zone covering a large area of rugged mountain country, its economic importance cannot be fully appreciated until more systematic exploration of the numerous prospects has been undertaken, which necessarily requires the expenditure of a considerable amount of capital before returns can be expected. Excellent work has been done in recent years by the Geological Survey of Canada in this Division, and J. F. Walker's report with its accompanying map is a most useful guide for the prospector and field engineer.

**Paradise.** Since this property was acquired by the Victoria Syndicate its development has been aggressively proceeded with under the direction of R. H. Stewart. As a preliminary step a detailed geological survey of the mine-workings was made by J. J. O'Neill. During the summer it was considered that the ore blocked out, together with the favourable possibilities disclosed by development, justified the erection of a concentrator at the mine of a rated daily capacity of 50 tons. This meant the haulage of all the building material, machinery, and equipment for a distance of 18 miles from Invermere through a vertical distance of 5,000 feet. This was accomplished by means of motor-trucks to the foot of the mine road and thence by two caterpillar tractors to the mine.

The plant, which is expected to be in operation during the early part of 1928, is designed for oil-flotation, and its equipment will include, besides the usual coarse-crushing machinery, a ball-mill, Dorr classifier, M.S. flotation-cells, American filter, and necessary accessories.

The new underground work undertaken by the Victoria Syndicate has been confined chiefly to the body of sulphide ore first exposed in an intermediate level 90 feet above the low adit-tunnel, or what is now called the 7,800-foot level, so designated on account of its elevation above sea-level. The approximate length of this sulphide ore-body on the intermediate is 350 feet, with an average width of 10 feet. In order to prospect its downward continuation the 7,800-foot level was advanced to a point below the strongest ore-exposures. Disappointment was manifest when no ore was encountered at this point. However, a careful study of the structural conditions revealed the fact that the ore occurrence was controlled by the folding of the strata and that this particular ore-body lay in a transverse fold which raked to the west or into the hill at an angle of about 20°, and its downward continuation was finally intersected by the further advancement of the 7,800-foot level.

It is logical to assume that further exploration may reveal a repetition of these foldings. The mineral-bearing solutions have apparently replaced a thin band of limestone and have been controlled to a certain extent by a narrow band of slate under which the ore has been found to occur. During construction seventy-five men were employed, but when the mine is on a producing basis a crew of about forty-five men will probably be sufficient.

**Grotto.** The mine-workings are situated near the base of Starbird ridge at an approximate distance of 15 miles by road from Wilmer. The formation underlying the area which has been prospected consists of limestones and quartzites of the Beaverfoot and Brisco series of the Palæozoic era. The results of the earlier attempts to prospect surface showings of iron-stained ledge-matter finally revealed the presence of a large cave in the limestones; hence the name, *Grotto*.

In the bottom of this cave a small pocket of galena and some low-grade carbonates were exposed. To prospect this ground a 190-foot crosscut was driven and some 50 feet of drifting done, but without obtaining any conclusive results. Under the direction of R. A. Ballentine

In the southern part of the district the famous deposits of the *Sullivan, St. Eugene, North Star*, and *Stemwinder* all occur in the Aldridge quartzites of Pre-Cambrian age in an area which has been subjected to the intrusion of igneous rocks as above mentioned. These Pre-Cambrian rocks, known as the Purcell series, have been correlated with the belt terrain of Idaho and Montana.

Throughout the Purcell range mineralization is widely scattered, there being hardly a creek on which some prospect has not been located, and it is only a matter of time when further development and exploration will disclose other important ore-bodies and entirely new discoveries will be made. Although mining has been carried on in the district for a number of years, prospecting has not been nearly so active as conditions would appear to warrant and large areas of practically unexplored territory still await the prospector.

Considering the great extent of the mineralization at the *Sullivan* mine, it does not seem unreasonable to suspect the presence of other important ore-bodies even at considerable distances from this phenomenal deposit, providing geological conditions are favourable. Fortunately part of the *Sullivan* ore-bodies outcropped, hence the discovery; but the great northern ore-body does not outcrop and nowhere on the surface are there indications that would allow the wildest imagination to picture the present huge dimensions of the underground workings. The logical conclusion to be drawn from the above would appear to be that any surface showing in the possible continuation of the mineralized zone should be worthy of careful attention from the prospector.

GEOLOGICAL REFERENCES.

Memoir 76, G.S.C.: Geology of Cranbrook Map Area, by S. J. Schofield.
Memoir 148, G.S.C.: Geology & Mineral Deposits of Windermere Map Area, by J. F. Walker.
Memoir 55, G.S.C.: Geology of Field Map Area, by John A. Allan.

## GOLDEN MINING DIVISION.

This Division, occupying the northerly portion of East Kootenay, has experienced more mining activity than for a number of years. In this connection it is very gratifying to note that important interests are directing their attention to the development and exploration of several well-known properties which have been lying idle for a number of years.

**Monarch.** This property, which is situated at Field, was acquired last year by the Pacific Mines Petroleum and Development Company, Limited, of Vancouver. A. W. Davis was in charge during the year. The development principally consisted of driving a 700-foot incline raise, 7 by 8½ feet, which now provides connection between the old and new workings. The installation of a 3-rail tram is contemplated in this raise to connect with an aerial tram to the mill, which will probably be built next year. The mill-site is in the Kicking Horse valley, near the main line of the Canadian Pacific Railway. For further reference *see* Annual Report for 1925.

**Giant.** This property was acquired under option by the Pacific Mines Petroleum and Development Company, Limited, during the summer. Surveying followed by diamond-drilling was undertaken, with results which are reported to have been highly satisfactory and sufficiently encouraging to warrant further development by tunnelling. A. W. Davis, who is in charge of the work, estimates from diamond-drill records a probable 15,000 tons assaying: Silver, 11 oz. to the ton; lead, 25 per cent.; and a probable 100,000 tons of low-grade ore. In the area prospected one drill is reported to have cut 8 feet of ore averaging: Silver, 18 oz. to the ton; lead, 35 per cent.; also a foot-wall streak having a width of 4 feet and assaying 6 oz. silver to the ton and 34 per cent. lead. A 600-foot crosscut is now being driven to tap this ore, from which, it is anticipated, shipments will be made in the spring.

**Ruth-Vermont.** This property, comprising a group of claims including the *Ruth, Minnie*, and *Charlotte*, was acquired during the year by the Galena Syndicate, in which British capital is interested, on the recommendation of G. W. Edwards, a mining engineer, who came out from London to look over the field in 1926. The claims are situated on Vermont creek, a tributary of the Spillimacheen river, and about 23 miles by trail from Carbonate Landing on the Columbia river.

When the property was last operated, a good many years ago, a winter sleigh-road was built from the mine to Wells Landing, some 8 miles farther up the Columbia. This old road, which has now become more or less obliterated, is not a practical route on account of long grades which cannot be avoided. The only feasible route appeared to be down the valleys of the South

and Middle forks of the Spillimacheen. Since visiting the property in September this latter route was chosen and according to recent reports a new sleigh-road will be cut through to connect with the mine by the end of the year. The length of haul to the railway at Spillimacheen will be approximately 32 miles. The mine cabins are situated in timber at an elevation of 5,650 feet and at a short distance from the workings, which are located in the rugged hillside rising abruptly for several thousand feet to the summit of the ridge.

Since the acquisition of the property development and exploratory work has been vigorously pursued with a crew of about seventeen men and it is intended to carry on underground work during the winter with a smaller crew.

The area examined appeared to occupy a fractured zone in which a number of veins had been exposed having a north-westerly strike and cutting the formation of slate and limestone at a steep angle. Development was being confined to two of these veins on which no previous work had been done. The old workings, from which a small tonnage of ore had been shipped many years ago, consisted mainly of a deep open-cut located farther to the west.

On the easterly or No. 1 vein there had been three tunnels driven, briefly described as follows: At an elevation of 6,400 feet the No. 1 tunnel had been driven on the vein for about 20 feet. The ore, consisting of galena, zinc-blende, and iron sulphides in a quartz gangue, outcrops at the portal of the tunnel and can be seen in the bluffs above. A sample taken across 20 inches at the portal of the tunnel gave the following returns: Gold, 0.22 oz.; silver, 50.78 oz. to the ton; lead, 43.8 per cent.; zinc, 10.1 per cent.

At an elevation of 6,350 feet the No. 2 tunnel had been driven on the vein for 26 feet in loose ground. The ore-streak here was narrow but the ore was of good grade, as indicated by a grab sample taken from a small pile of sorted ore, which gave the following returns: Gold, 0.06 oz.; silver, 88.56 oz. to the ton; lead, 63.4 per cent.; zinc, 4.1 per cent.

At an elevation of 6,200 feet the No. 3 tunnel has been driven on the vein for 60 feet, for which distance the ore is continuous along the roof of the drift and has an average width of from 10 to 12 inches. A sample taken across 10 inches assayed: Gold, 0.08 oz.; silver, 96.48 oz. to the ton; lead, 50.1 per cent.; and zinc, 7.5 per cent. The strike of the vein as determined in this tunnel was N. 35° W. and dip 75° to the south-west.

The No. 2 vein is similar in character to the No. 1 and had been explored by two short tunnels, which disclosed similar widths and character of ore. These two veins are well-defined fissures traceable over a vertical range of 500 feet. Ore was exposed at all the various workings and conditions appeared promising for continuity, but not sufficient drifting had been done to determine the length of the ore-shoots. While the width of ore was narrow, it is not unreasonable to expect that conditions in this respect might easily improve with further development, due to changes in the character of the wall-rock or to the influence of structural movements.

However, that which appealed to the writer as one of the most interesting features of the property was the disclosure in the face of an old tunnel (called the "Nelson" tunnel, elevation 6,100 feet) of a width of 3 feet of sulphide ore which appeared to be a replacement deposit conforming to the dip and strike of the enclosing argillites. Its continuation on the dip was exposed in the face of a bluff some 150 feet higher up the hill.

A sample from the ore exposed in the Nelson tunnel, composed of a finely crystalline mixture of lead, zinc, and iron sulphides, gave the following returns: Gold, 0.02 oz.; silver, 26.01 oz. to the ton; lead, 24.8 per cent.; zinc, 25.7 per cent. This, of course, is a very desirable grade of milling-ore and judging by indications there should be good possibilities for developing an important ore-body.

The old workings from which ore was formerly extracted for shipment could not be examined on account of snow, but at an elevation of 6,100 feet an old tunnel, now known as the "Blacksmith," had been driven into the hill with, presumably, the objective of exploring the downward continuation of the ore in these old surface workings. This old tunnel affords probably the best and safest place to carry on future exploration of the vein system at depth, and preparations were being made to carry on development-work from this point during the winter months.

### Iron Ore.

Rumours have been current during the last year or so that a large body of magnetite-iron ore had been discovered near the headwaters of Moose creek in the Rocky mountains, which resulted in a few inquiries being made at this office.

# LIST OF CROWN-GRANTED MINERAL CLAIMS.

## CROWN GRANTS ISSUED IN 1904.

### CASSIAR.

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| Yellow Jacket | Atlin | North Columbia G. M. Co | 191 | 51.65 | July 9 |

### EAST KOOTENAY.

| | | | | | |
|---|---|---|---|---|---|
| B. C. | Windermere. | H. E. Forster and Celina M Kimpton | 1732 | 51.65 | Sept. 27 |
| Black Watch | Fort Steele. | Henry B. Thomson | 3329 | 30.72 | Mar. 29 |
| Blackwater | " | " | 3330 | 34.10 | " 29 |
| Bodie | " | Robt. W. Riddell *et al.* | 3458 | 51.65 | May 14 |
| Celt | " | David Griffith | 6205 | 46.30 | Mar. 25 |
| Charlotte | Golden | Wm. G. Carlin | 405 | 51.65 | Oct. 31 |
| Erin | Fort Steele. | Henry B. Thomson | 3332 | 37.20 | Mar. 29 |
| Gold Bug Fr. No. 2 | " | Eugene B. Braden | 6191 | 2.76 | Feb. 15 |
| Hot Punch | Windermere. | Willis B. Abel *et al.* | 5100 | 51.65 | Sept. 30 |
| Isaac | " | Harold E. Forster | 5344 | 31.43 | " 27 |
| Lentz Lode | Fort Steele. | David Griffith | 6203 | 39.25 | Mar. 7 |
| Malachite | " | Henry B. Thomson | 3331 | 22.10 | " 29 |
| Minnie | Golden | Wm. G. Carlin | 419 | 51.65 | Oct. 31 |
| Ruth | " | " | 418 | 49.75 | " 31 |
| Sweepstake | Fort Steele. | Luke Creek Gold Copper Mg. Co., Ld. (N.P.L.) | 6577 | 51.65 | Dec. 16 |
| Tilbury | Windermere. | Harold E. Forster and Celina M. Kimpton | 1733 | 40.81 | Sept. 27 |
| Tit for Tat | Fort Steele. | David Griffith | 6202 | 44.80 | Mar. 25 |

### WEST KOOTENAY.

| | | | | | |
|---|---|---|---|---|---|
| Agnes | Trout Lake | Henry H. Johnstone *et al.* | 5696 | 51.65 | Nov. 11 |
| Aice | Lardeau | Wm. Howard Jackson | 4237 | 46.03 | Jan. 14 |
| Alhambra | Slocan | Frank L. Christie *et al.* | 1607 | 35.12 | Sept. 30 |
| Alice | Nelson | Geo. W. Chisholm | 5627 | 50.98 | Mar. 9 |
| Alma | Ainsworth | King Solomon Mg. Co | 6284 | 49.86 | Nov. 7 |
| Alma No. 2 | Lardeau | Wm. Howard Jackson | 3501 | 20.69 | Jan. 14 |
| Alva | Ainsworth | King Solomon Mg. Co | 6283 | 51.65 | Nov. 7 |
| Antonio | Nelson | Gordon M. & M. Co., Ltd. | 3276 | 49.14 | June 29 |
| Archer | " | Arthur V. Powys | 3202 | 32.60 | Mar. 28 |
| Archie Fractional | Slocan | Wm. J. McMillan and Robt. J. McMillan | 3631A | 48.34 | June 20 |
| Astral | Nelson | Venus G. M. Co., Ltd. | 4296 | 35.07 | " 21 |
| August Fract. | Ainsworth | King Solomon Mg. Co | 6287 | .09 | Nov. 7 |
| Bayonne | Nelson | Frank C. Risdon and George Harrison | 5083 | 45.53 | " 19 |
| Belle Smith | Slocan | Alice Trenery *et al.* | 3824 | 34.59 | July 22 |
| Big Duluth | Nelson | Geo. W. Chisholm | 5626 | 49.42 | Mar. 9 |
| Black Beauty | Slocan City. | Eric Lemieux *et al.* | 2823 | 47.21 | Dec. 8 |
| Black Eagle | Trout Lake. | John Grant | 4735 | 45.35 | April 28 |
| Black Eagle | Ainsworth | King Solomon Mg. Co | 6266 | 41.66 | June 22 |
| Black Eagle Fr. | " | " " | 6270 | 28.70 | " 22 |
| Blue Bell | Trout Lake. | John Stauber *et al.* | 5707 | 39.70 | Sept. 8 |
| Blue Jay | Lardeau | Imperial Dev. Synd., Ltd. | 5184 | 21.43 | Feb. 22 |
| B. N. A. | Ainsworth | The B. N. A. Mines Co., Ltd. | 5994 | 51.62 | May 30 |
| B. N. I. | " | King Solomon Mg. Co | 6264 | 51.65 | June 22 |
| Bobbie Burt | " | F. A. Devereux | 6335 | 51.65 | Sept. 23 |
| Bonner | Nelson | David G. Porter and Jacob C. Porter | 6296 | 37.38 | " 27 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| St. Eugene | Moyie Lake | 20 | Gooderham-Blackstock | Toronto | 800 ft. tunnel; 200 ft. tunnel; 90 ft. shaft, tramway and concentrator | | 60-70 | 40-60 | |
| Building Stone | Bull River | 120 | E. Dilse | Fort Steele | | | | | |
| Chickamon Stone | Bull River | 20 | John Fink | " | 300 ft. tunnels and drifts | $40 in | all val | ues. | |
| Martin M. C. | St. Mary's | 20 | N. A. Wallinger | " | | | | | |
| North Star | Mark Creek | 70 | N. Star Mining Co. | " | 1,200 ft. tunnels, shafts and drifts | | | | |
| Estella | Tracy Creek | 30 | Johnson & Roberson | " | 800 " " | | | | |
| Dibble Group | Law Creek | 10 | C. M. Keep | " | 400 " " | | | | |
| Stemwinder | Mark Creek | 5 | N. M. McLeod | " | 200 " " | | | | |
| Ram's Horn | Tracy Creek | 10 | A. B. Grace | " | | | | | |
| Big Chief | Boulder Creek | 25 | " | " | 300 " " | | | | |
| Brittle Silver Gp. | Sheep Creek | 20 | J. W. Arthur | " | | | | | |
| Yontin | Bull River | 20 | C. M. Keep | " | 150 " " | | | | |
| Paris Exposition | Tracy Creek | 15 | Geo. Bushby | Victoria | Auriferous copper pyrites | | | | |
| Wasa | Wasa Creek | 10 | A. B. Grace | Fort Steele | " " | | | | |
| Hope | Mark Creek | 40 | J. Houghton | " | | | | | |
| Gold Bug | Fort Steele | 10 | N. A. Wallinger | " | | | | | |
| Col. Henderson | Six Mile | 10 | R. O. Jennings | " | | | | | |
| Last Chance | Lost Creek | 10 | C. M. Keep | " | | | | | |
| Phillips | Tobacco Plains | 5 | N. A Wallinger | " | | | | | |
| Bruce | Lost Creek | 10 | " | " | | | | | |
| Sullivan Group | Mark Creek | 90 | Sullivan M. Co | " | Lead, 100 ft. wide; 300 ft. tunnels, drifts, &c. | | | | |
| Bill Nye | Tracy Creek | 90 | Wm. Violet | " | | | | | |
| *Kootenay Chief | Wild Horse Creek | | | | | | | | |
| Crow's Nest Pass Coal Co. | Fernie | | Crow's Nest Pass Coal Co. | Fernie | Samples coal, 2 ft. x 2 ft. x 2 ft | | | | |
| Ditto | " | | " | " | Samples coke | | | | |

## East Kootenay District. Golden Mining Division.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Anaconda (Group) | Vermont Creek | 60 | Upton & Dainard | Golden | Copper and iron pyrites | | | | |
| " " | " | 10 | " " | " | Copper sulphides | | | | |
| Minnie | " | 10 | M. Carlin | " | Galena and carbonates | | | | |
| Charlotte | " | 25 | F. H. Bacon | " | Galena | | | | |
| Ruth | " | 20 | F. P. Armstrong | " | Galena and iron sulphides | | | | |
| Good Luck | McLean Creek | 40 | Alexander McLean | " | Chalcopyrite | | | | |
| Blue Bell | Vermont Ck. Sl. rd. | 15 | Wm. Logan | " | Copper | | | | |
| Hidden Treasure | Spillimachene Mtn. | 50 | Henry Croft | Victoria | Copper | | | | |
| " | " " | 20 | " | " | Asurite and malachite | | | | |
| " | " " | 15 | " | " | Galena | | | | |
| Mountain Daisy | Jubilee Mountain | 15 | Stephen Redgrave | Golden | Copper glance | | | | |
| Lancaster | " | 25 | John McRae | Winnipeg | " | | | | |
| Atlanta | " | 15 | Osler & Hammond | Toronto | Copper and galena | | | | |
| Rothschild | Spillimachene Mtn. | 20 | Stephen Redgrave | Golden | Galena | | | | |
| Monday | M. F. Spillimachene | 60 | George Heffner | Galena | Copper | | | | |
| Ellen D. | " " | 20 | Joliffe & Keyser | Golden | Grey copper | | | | |

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sample of which can be seen in the Museum, differs entirely in appearance from those of the Cameron Falls Creek and Akamina or Kish-e-ne-nah Creek. Some of it was of a light lemon-yellow, but most of it nearly the colour of pale brandy and with a very powerful petroleum odor."

## WINDERMERE—GOLDEN—DONALD DISTRICTS.

Some prospecting work was done during the past season, most of it in the Selkirks, but also some in the Rockies, and from the very fine samples of ore seen, and the reports of the characteristics of the ledges, a large and rich section of the country is awaiting easier means of access, and the transport of ore to smelting centres.

The *Thunder Hill* property, 1½ miles west of Upper Columbia Lake, was standing idle, the ore having proved unsuitable for concentrating, for which purpose a mill was erected on the lake, but recently this property has been tested for its gold values, but with what result is not known. The ledge is reported to be very large, and if it contains gold in paying quantity, it should be thoroughly exploited.

*Bugaboo Creek.*—Six miles west of the Spillimacheen Landing or Galena, Mr. F. W. Aylmer of Golden, was working the "Balrath" group of two claims, on which crossing the slates and quartzites, was a wide vein strike, N. W. and S. E., dip 70°, about 16 feet wide, of which 11 feet were solid fine-grained opaque quartz, and 5 feet broken slate and quartz stringers. A cross-cut tunnel, 150 feet long, cuts the vein, where is 9 feet of quartz carrying about 20% iron pyrites. Mr. Aylmer has got assays of $2.50 to $36 in gold per ton, and if it proves to be profitable enough for milling, there is abundant and excellent water power right at the mine.

*Toby Creek.*—Prospecting was in progress in this country, now opened up by a trail, and veins 10 to 22 inches wide of silver-bearing galena were being located.

*Vermont Creek.*—From Well's Landing, 30 miles north of Golden, a sleigh road leads back 22 miles up the south fork of the Spillimacheen to Vermont Creek, where on the "*Minnie*," "*Ruth*" and "*Charlotte*," located in 1893, Capt. Armstrong had mined over 150 tons of galena ore, carrying zinc blende.

*McMurdo District.*—Some prospecting was being done, and assessment work, but nothing was doing on the "*Bobbie Burns*" and "*International*," gold quartz veins situated along branches of the Spillimacheen.

Some have waited long and patiently for the wave of mining interest to flow through this large territory, and it will not be long now before the hidden resources here will receive that careful examination they merit.

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## BY J. F. ARMSTRONG, GOLD COMMISSIONER.

The chief statistics are—

| | 1895. | 1896. | Increase. |
|---|---|---|---|
| Free Miner's Certificates | 404 | 537 | 33 per cent. |
| Other Mining Receipts | $ 2,203 10 | $ 2,873 26 | 76 " |
| Value of Mineral Output | 17,575 00 | 154,427 00 | 779 " |

The value of the output from placer mines has decreased in consequence of several properties formerly worked by hand passing into the hands of hydraulic companies, who did not get their plant into operation until the best part of the season was over. The wash-up for the balance of the season was satisfactory to the proprietors, and both companies on Wild Horse Creek are now well prepared for next year's work. A little desultory placer mining was done on other creeks, but the proceeds were small.

The output from lode mines is practically confined to shipments from the North Star Mine. This would have been larger but for accidents to two of the largest steamers transporting the ore, one being laid up for a month, and another being sunk at the beginning of the best stage of water. The shipments from this mine consisted of 2,544 tons of ore, yielding 83,220 ounces of silver and 3,179,807 lbs. lead.

Development work has been done on the Sullivan group, on Mark Creek, on the Cronin group, on Moyie Lakes, on the Dibble group, on Lost Creek, and on a few others, while the

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## EAST KOOTENAY.

### MR. CUMMINS' REPORT.

"*Placer Mining.*

"SIR,—It will be seen from the accompanying tabular statement relating to the placer mining of the district, that the total value of gold obtained from the various creeks this season amounts to $37,400, an increase of $1,100 on the results of last year.

"The yield from Wild Horse Creek exceeds that of last year by $12,000, the increase being mainly due to the fact that a clean-up of between $8,000 and $9,000 was realized by Mr. David Griffiths, the result of several seasons' hydraulic working. Other creeks show a diminution. The creeks which have been this year productive of placer gold lie all in the southern portion of the district. Very promising prospects have been obtained on Quartz Creek, about 18 miles from Donald. A company of miners took up ground there last fall, and have been constructing a ditch about a mile and a half in length, and intend to put in hydraulic plant in the spring.

"*Quartz Mining and Mineral Discoveries.*

"The East Kootenay District offers at the present time probably, for many reasons, the most promising field for the prospector, and for prospecting and developing companies, in the Province.

"Although systematic prospecting can hardly be said to have commenced, experienced and successful mining men, who saw the development of the Cœur d'Alene and other rich mineral districts to the south, and who visited this district during the past summer, unhesitatingly state that the prospects they have seen in East Kootenay, and the extent of the mineral discoveries, promised better for the future than had been the case in any district to the south, at a *similar stage in their development.*

"The opinion of the best authorities who have reported on the minerals of British Columbia agree that the mineral zones and belts, which have been clearly defined in the various ranges in the United States to the south, extend regularly into British Columbia.

"The mineral belts of the Selkirk Range in Kootenay are direct *extensions* of those in the most prosperous districts of Idaho and Western Montana immediately south on the same range. The ores of these districts are found to be identical with those of Kootenay and their occurrence similar. Mr. James Brady, M.E., who is familiar with this district, pointed out this connection of the Kootenay mineral discoveries with those of Montana and Idaho very clearly in a paper read in 1889 regarding Kootenay.

"The portion of the district in which prospecting has been so far most active lies south of the Canadian Pacific Railway, extending up the Columbia valley to the Columbia lakes, in the ranges lying on both sides of the river, the Selkirk Range to the west, and the Brisco, Stamford and Hughes Ranges of the Rockies proper to the east, the latter exposing (according to Dawson) the limestone formations of the Devonian and carboniferous periods. The eastern slope of the Selkirks has not yet been examined by a competent geologist, but it may be safe to state that the formation is composed chiefly of the metamorphic slate and other rocks of an older period, with beds and intrusions of igneous rocks. The contact between the more recent limestones of the Rockies and the older formation of the Selkirks lying in a north-westerly and south-easterly direction along the Columbia valley, crosses into the Hughes Range on reaching the Kootenay River.

"The mineral of the district, as far as at present ascertained, lies in two main belts. The mineral at Ottertail and Field, in the Rockies, appears to be local, no continuation of large extent having been traced. The first of these belts commences in the Selkirk Range, at the head of the North Fork of the Spillemcheen River, near Mount Sir Donald, and runs thence in a south-easterly direction on the easterly slope of the Selkirks, passing through the McMurdo District, including Cariboo Basin, Carbonate Basin, and cutting McMurdo Creek, Copper Creek, Vermont Creek, Horse Thief Creek, Toby Creek, etc., gradually approaching the Columbia valley and passing into the Rockies to the south of the Columbia lakes.

"The minerals discovered up to the present in this belt are gold in sulphurets (free milling at the surface), silver-bearing galena and grey copper, antimony, bismuth and other minerals

occurring casually. The formation in the immediate neighbourhood is generally slate, with frequent dikes of syanites, mica schists and various granitic rocks, also true porphyry in certain localities. I have not met with any true granite *in place*, though float is found in the creeks, proving its existence, also dierites and greenstone abound in some of the creeks. The formation is thus seen to be that which has proved the most abundant source of the precious metals further south.

"The minerals of this belt are *high grade*, especially the grey copper and antimonial copper ores, assays as high as 1024 oz. to the ton having been obtained. Test lots of ore, amounting to about 50 tons, shipped last season from the neighbourhood of Vermont Creek, gave excellent results.

"The second important belt, mentioned above, runs about parallel to the Selkirk mineral belt, generally in the limestones and quartzites at or close to their contact with the slates (Cambrian) of the Selkirk formation, along the valley of the Columbia southwards, crossing the valley and passing into the Rockies near the Columbia lakes. The discoveries in this belt are probably some of the most important of the district, though less continuous than those of the Selkirk belt, viz.: Jubilee Mountain, Spillemcheen Mountain, Steamboat Butte, Windermere Mountain, and various promising discoveries of copper ore in the Hughes Range, east of the Kootenay River. The bulk of the ore so far extracted is of copper and lead, carrying silver. Some high assays in silver and gold have been obtained, principally from Jubilee Mountain.

"The Field discoveries, of which the 'Monarch' mine is the most important, also those in the neighbourhood of Ottertail, both quite close to the Canadian Pacific Railway in the Rockies, would appear to be more local in their character, no continuous belts having been traced for any considerable distance.

"The region down the Columbia to Canoe River, north of the railroad, has not yet been prospected for quartz.

"*Communications of the District*

"The Columbia and Kootenay valleys are exceptionally favoured by their topography for transportation purposes. The present communication of the district is effected by the Kootenay mail line of steamers plying from Golden Station, on the Canadian Pacific Railway, southwards for 120 miles to the Columbia lakes; thence the Government waggon road carries the traffic to Fort Steele and Cranbrook in the southern portion of the district. This road has been likewise extended northward from the lakes down the Columbia valley to within 25 miles of Golden, and it is expected to complete the waggon communication with the railroad at that place next summer.

"The mines are at present reached by pack trails up the various creeks branching from the main line of transportation. As the mines develop, a trunk line of railway will be constructed up the Columbia and down the Kootenay River, to join the projected Crow's Nest road in the southern portion of the district; the mines being reached by branch mineral lines and waggon roads up the creeks.

"The climate of the Columbia and Kootenay valleys is comparatively mild, and will offer no hindrance to continuous working of the mines or to communication.

"A decided stimulus has been given to mining and prospecting by the erection of the Golden Mining and Smelting Company's works at Golden, which are now complete, particulars of which are given elsewhere.

"The mineral discoveries have been steadily extending in the district during the past few years, and are unquestionably of the greatest promise, but the prospectors are as a rule without means to develop them. Opportunities are, therefore, exceptional for the acquisition of mineral ground by individuals or companies having the necessary capital to develop mines and place them in a marketable shape, as well as for greater undertakings.

"NOTICE OF VARIOUS IMPORTANT CLAIMS IN THE DISTRICT.

"*Field.*

"The 'Monarch' mine, situated on Mount Stephen, near the summit of the Rockies, a quarter of a mile from and at an elevation of 850 feet above the Canadian Pacific track, is at present the only fully equipped working mine in the district. The company has resumed work

this fall. A force of ten miners is now at work, terms having been arranged to supply the Revelstoke Smelter Company with 200 tons of ore per month. The shipping ore averages about 60 per cent. lead with 10 of silver to the ton.

"The ore occurs in somewhat irregular chambers, pockets and other deposits in the limestone, with but little gangue, and seems abundant. It is expected that the mineral will lie in more regular form and even greater body when more depth into the mountain has been reached. The mine was discovered in 1884. About 1500 tons of ore have been extracted and shipped up to the present time. The underground workings amount in the aggregate to about 450 feet of tunnelling, with larger chambers opened out in places where ore was more abundant A considerable amount of work has also been executed on the outside, consisting of a tramway, galleried out of the face of the mountain, leading to the principal ore bins, and a gravity road from thence to the bins on the railroad, together with all the necessary plant for working the mine.

"On the various other claims in the vicinity of Field, little more than prospecting and assessment work has been done, though some of the prospects look as favourable as the 'Monarch' did before it was opened up.

"The ores so far found in the locality have been very pure galena ores, low grade in silver, containing occasionally a small percentage of zinc.

"*Ottertail.*

"No work of consequence has been done in this locality for several years.

"*Selkirk Mineral Belt, including McMurdo District.*

"*Cariboo Basin,*

"On the north side of the Middle Fork of the Spillemcheen, or McMurdo Creek, on which a number of claims, showing good croppings, have been located, has not received much development work this season beyond assessment work on some of the claims.

"*Carbonate Mountain,*

"On the south side of McMurdo Creek, has many important claims. Messrs. Rand Bros., of Vancouver, on behalf of English capitalists, purchased a property of ten claims in the fall of 1889, to which they have added other locations. The most important of these prospects, showing on the surface, occur on the 'Monitor,' 'Southern Cross' and 'Polly Brown' claims. The previous development done on these claims was unimportant. The vein can be traced continuously along the whole length of the property, extending from McMurdo Creek along the summit of Carbonate Mountain into Copper Creek. This main lead, like most of the mineral in the belt, runs in a south-easterly and north-westerly direction, lying almost vertically between walls of slate, mica-schist and granitic rock. The width of the vein on the surface is estimated as varying in width from 2 to 5 feet, fairly well mineralized. The property was examined by Mr. Giffard, the well known English expert, in the summer of 1889, in the interest of Messrs. Rand Bros., prior to their purchase, whose report, of course a private one, was understood to be favourable. Messrs. Rand Bros. have been actively at work since that time prospecting their property, and are at present engaged in driving a tunnel and cross-cut from McMurdo Creek, which is expected to cut the lead at a depth of 2,500 feet from the croppings along the top of the mountain. From the latest reports the tunnel was in 300 feet and the cross-cut commenced. The ore of the croppings is composed of sulphides of lead, iron and antimony, averaging about 50 oz. to the ton of silver.

"About three miles further up McMurdo Creek from the above line of claims, near the summit of the range, a number of claims have been located, amongst the most important of which are the 'Bobby Burns' and 'Chief of the Selkirks,' the original discovery claims of the locality. Little work has been done heretofore on these. The 'Bobby Burns' contains a large vein of gold quartz, free milling on the surface. A 3-stamp mill has been purchased by the owners, and is now at Golden, to work on this claim next summer Gold is visible in some of the surface rock, and assays of 35 oz. of gold have been obtained.

"The 'Chief of the Selkirks' and adjoining claims at the summit contain galena and grey copper ores.

"Continuing south-eastward from the Carbonate Mountain claims, between Copper Creek and the South Fork of the Spillemcheen, several claims have been located on which only assessment work has been done. These are favourably reported on. On the southern slope of this divide, running down into Vermont Creek, occur the 'Dark Horse,' the 'Agnes,' and the 'Syanite Bluff.' A 6-ton sample lot of galena ore was shipped from the Dark Horse claim last summer, also a shipment from the Agnes claim. Both gave very favourable results.

"On the south side of Vermont Creek, near its junction with the South Fork, a block of claims, discovered in the summer of 1889, contain a number of veins of galena and grey copper, about ten in number, varying in width from 2 inches to 20 inches, in the slate formation. It is considered that these veins will in some cases run together. Thirty-five tons of ore were packed out on horses from these veins to the Columbia River, a distance of about 21 miles, thence by steamboat to Golden and by rail to Revelstoke, realizing, under all these difficulties, a handsome profit to the owners. The ore was pronounced to be of excellent quality at Revelstoke.

"Good prospects have been located, further south, on Crystal Creek and Bugaboo Creek in the same belt. The country between this point and Horse Thief Creek has been but little prospected. In this latter locality, and on Toby Creek, very promising new discoveries were made last season and a number of claims recorded. The 'Little Fellah' claim, on Horse Thief Creek, is described by a reliable and disinterested person as a magnificent prospect. It is stated to be a well-defined lode in talk slate, about 20 feet in width. Assays from 20 to 50 per cent. of copper and 20 to 100 oz. of silver have been made. Several other good copper prospects have been located on this creek.

"New discoveries, stated to be large veins, containing high grade galena, are also reported from about 20 miles up Toby Creek.

"MINERAL LOCATIONS ALONG THE COLUMBIA VALLEY BELT REFERRED TO IN GENERAL DESCRIPTION.

"*Jubilee Mountain,*

"Situated about 42 miles up the Columbia River from Golden, on the Canadian Pacific Railway, has mineral claims located along its ridge and western slope for a distance of over four miles. A large amount of work has been done on this mountain for several years back in searching for the principal mineral body, pronounced by experts of high standing employed to examine some of the properties, to lie on a contact between the limestone and slate formation on the western slope of the ridge. The ore extracted so far is supposed, on this theory, to have been forced up through the limestone formation from the larger and more continuous body supposed to exist on the contact. About 30 tons of copper glance and carbonates of very fine quality, averaging 55 per cent. copper, were shipped from the 'Lancaster' claim, owned by John McRae, during last summer to Swansea, as a sample lot, by C. F. Law, agent for Toronto capitalists. A good body of silver-bearing galena ore has been opened up on the 'Constance' claim this winter, and development work on a large scale is looked farward to in the spring. The claims on which most development work has been done are the 'Constance,' 'Lancaster,' 'Horseshoe,' and 'Alice.'

"*Spillemcheen Mountain.*

"A considerable amount of work has been done on various claims on this mountain during the past few years. Messrs. Wells and Pollock have been at work this winter driving a tunnel to reach the 'Big Lead,' understood to lie at the contact between the lime quartzite and the slate, at a low depth. They have drifted altogether 260 feet up to date, and expect to cut the lead within 20 feet further. The results of other prospecting work recently done on the mountain have been very favourable; a large quantity of ore has been taken out. The claims showing most development work are the 'Spillemcheen,' 'Homestake,' 'Rothschild,' 'Tiger,' and 'Eureka.'

"*Windermere Mountain,*

"Situate about four miles north of Windermere, on the Lower Columbia Lake, has been drawing much attention during last summer. Mr. O. A. Brown, of Spokane, became interested in claims on this mountain in July last, and has been actively developing with excellent results,