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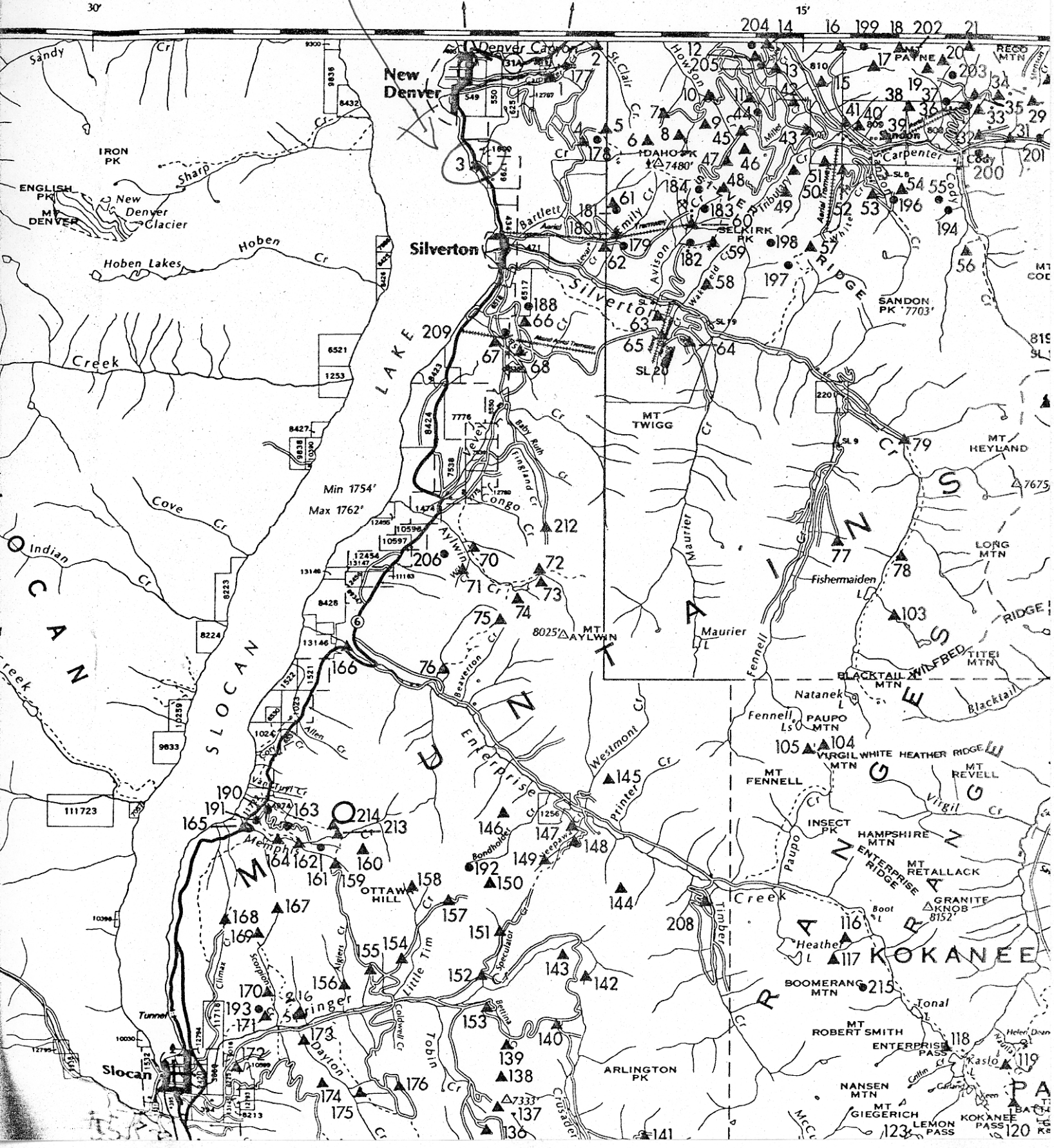
*BOSUM*

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PROPERTY FILE -04*

**001955**

BOSON

To Rosebery-3 miles To Kaslo-28 miles



Nelson Map-Area, West Half, British Columbia

In the southeast part of the map-area only two deposits of the silver-lead-zinc type have produced ore. The Maple Leaf in Porcupine Creek valley is typical of the group. It comprises veins of quartz in quartzite and schist, and contains argentiferous galena, sphalerite, and pyrite. On Aspen Creek, to the south, the Aspen mine has produced silver, lead, zinc, and gold in that order of value. The deposit, however, appears to contain much more sphalerite than galena, and should more properly be classified as a zinc-lead-silver deposit, of which it is typical; it comprises disseminated sulphides in dolomitized limestone.

The remainder of the silver-lead-zinc deposits form a small cluster of four properties on the south side of the Rossland camp. These are the Nature Boy, Mayflower, Red Eagle, and Hattie Brown. The last two have yielded no zinc. Of the four, only the Mayflower has been adequately described. It differs from the type deposit in containing more sphalerite than galena, and by the presence of pyrrhotite and arsenopyrite. It is a fault-fissure vein of quartz and calcite in augite andesite in which some ore minerals are disseminated, one of which has been identified as boulangerite. The four properties in this group are the only ones of this type that occur in volcanic rocks.

#### Bosun (1)

*References:* Minister of Mines, B.C., Ann. Repts.: 1898-1956. Rept. of Zinc Commission, 1906, pp. 209-213. Cairnes, 1934, p. 86; 1935, pp. 20-23.

The Bosun mine is on the east shore of Slovan Lake, about 1½ miles south of New Denver. It is owned by New Santiago Mines Limited, formed in 1951 by reorganization of Santiago Mines Limited, who acquired it in 1945 from Colin J. Campbell of New Denver, B.C. The property consists of eight Crown-granted claims and fractions.

Production, which began in 1898, totalled 69,516 tons of ore up to the end of 1952. This ore yielded 1,938,812 ounces silver, 10,795,026 pounds lead, 6,873,851 pounds zinc, 101 ounces gold, and 928 pounds cadmium. The property was examined in June 1950 by A. B. Irwin of the Geological Survey.

Along the shore of Slovan Lake north of the compressor-house the rocks are well exposed and comprise impure quartzite and slate, some tuffaceous, and a few beds of limestone. These strike about N65°W and dip 45° to 75°SW, with some reversals of dip. This trend continues across the Bosun property. The beds, according to Cairnes, are transected by dykes of melanocratic biotite quartz monzonite from 2 or 3 feet to 85 feet in width.

The vein has been developed by six main adits, several intermediate levels, and two levels (Nos. 7 and 8) reached by shafts. (See Figure 9, in pocket.) Two intermediate levels have been driven between No. 7 and No. 8 levels and since 1950 others have been driven above No. 7 level. The main working level, No. 6, is about 3,700 feet long and passes beneath the highway about 40 feet above the high water level of the lake.

The vein matter occupies a fracture that strikes on the average N60°E and dips from 35° to 65°SE. The gangue consists of quartz and siderite, with a little

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*References:* Minister of  
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calcite, and the metallic minerals are galena, sphalerite, tetrahedrite, ruby silver, native silver, possibly other silver minerals, and a little chalcopyrite.

The vein is discontinuous, varying in width from a few inches to more than 5 feet. It is intersected by several cross-faults that strike  $N45^{\circ}$  to  $55^{\circ}W$ , nearly parallel with the bedding planes. In the eastern part of the mine there is a strong shear that strikes  $N60^{\circ}W$  and dips  $50^{\circ}$  to  $85^{\circ}SW$ , from which one sharply defined branch shear dips  $75^{\circ}$  to  $80^{\circ}NE$ . Cairnes has pointed out that the "lode was most difficult to follow, for it presented numerous small irregularities, the footwall lacked definition, and slips or faults leading off into the hanging wall were common . . . the structure . . . is further complicated . . . by a split commencing a little below No. 4 level."

Along the vein from west to east are three orebodies known as the West, Central, and Third, respectively. The West orebody rakes westward at a low angle, but the Central and Third do not show this trend. The company operated the West orebody on No. 6 level in 1947, where the zinc content was high. In 1950 and subsequently, the Central orebody was worked between No. 5 and No. 8 levels. The Central orebody has a high zinc content on and above No. 5 level but on No. 8 level galena is much more abundant than sphalerite. Smelter returns show that the silver content of ore rich in zinc is only slightly less than that rich in lead.

On No. 8 level southwest of the Pilot shaft, the vein is clean and about a foot wide. It contains galena in coarse cubes and lenses, and irregular strands of fine-grained galena that cut small bunches of sphalerite. There the vein strikes  $N25^{\circ}$  to  $50^{\circ}E$  and dips about  $60^{\circ}SE$ , and is exposed for 15 feet to where it pinches out to the southwest. East of the shaft the vein strikes  $N50^{\circ}E$  and dips  $45^{\circ}SE$ . It is composed of irregular stringers of quartz and siderite with small bunches of galena. Above, in the 730 sublevel, the vein is 1 foot wide but contains brecciated wall-rock.

The company ceased work in 1953 and allowed the lower levels to flood. Unwatering was begun in 1955 but operations were suspended before the lower levels were accessible. In 1956 a lease was given to W. H. McLeod of Silverton who, with two partners, attempted to locate a vein reported in a diamond-drill hole many years previously.

#### *Metallic (Midnight) (17)*

*References:* Minister of Mines, B.C., Ann. Repts.: 1918, p. 171; 1923, p. 228; 1924, p. 199; 1929, p. 314; 1948, p. 147; 1949, p. 190; 1950, p. 149. Cairnes, 1935, p. 82.

The Metallic property, comprising five claims held by location, is owned by A. E. MacAulay, L. S. MacAulay, and R. S. White of Silverton. It is about 2 miles from Silverton and is served by a short branch road from the Hewitt mine road.

The Midnight claim, Crown-granted in 1900, subsequently reverted to the Crown and was incorporated into the group. Initial production, in 1909, was from the Metallic claim. Further shipments were made in 1922 to 1927, in 1929, 1935, 1938, 1940, and from 1948 to 1950, mostly by lessees. In all 230 tons of

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The workings on the Stranger claim are inaccessible. They include two main adits about 85 feet apart vertically and one short adit about 25 feet above the lowest. There is some evidence of stoping having been done, but no data as to production are available. The elevation of the portal of the lowest adit is the same as that of No. 4 adit on the Bluebird slope. The trend of the principal lode in these workings appears to have been influenced by well-defined jointing in the country rocks. The joint planes strike north 55 degrees east and dip 75 degrees southeast. This attitude corresponds closely with that of the "Big" and "West" vein lodes on the Bluebird claim and it is probable that these veins are the southwesterly continuation of the zone of mineralization on the Stranger claim. The Little vein lode, if it maintains the same strike as on the Bluebird claim, would pass close to the Stranger workings. Ore specimens seen on the dumps of the Stranger workings are chiefly of sphalerite and pyrite with some galena. The lode matter is brecciated, as is characteristic of exposures on the southern slope of the ridge.

## BOSUN

*References:* Ann. Repts., Minister of Mines, B.C., 1898-1928.  
Rept. of Zinc Commission, 1906, pp. 209-213.  
Geol. Surv., Canada, Sum. Rept. 1925, pt. A, pp. 190-191.

The Bosun mine, owned by Colin J. Campbell, New Denver, B.C., is on the east shore of Slocan lake about  $1\frac{1}{2}$  miles south of New Denver. The property comprises the Boatswain fraction, Fidelity, Fidelity fraction, Tyro, Tyro fraction, Broken Lock, Cracker Jack, and Sielig fraction Crown-granted claims.

An outcrop of vein matter in the Bosun lode or lode system was discovered in 1898 on the Fidelity fraction about 400 feet above the lake. Development work that year, including a couple of adits and a shaft, provided some 420 tons of ore averaging 100 ounces in silver to the ton and 50 per cent lead. Subsequently, the vein was picked up nearer the lake shore and energetic development work was carried on in 1900 and following years by Bosun Mines, Limited, a consolidation of the N.W. Mining Syndicate and the Fidelity Mining Company jointly controlling the Bosun and Fidelity groups. The property was distinguished in these early years of operation by the high silver values contained in both its zinc and lead ores. The Zinc Commission reports that up to February, 1904, 1,440 tons of zinc ore averaging 71.3 ounces in silver to the ton, 41.8 per cent zinc, and 1.8 per cent lead were shipped. Government statistics for the period show shipments of 4,599 tons of silver-lead ore averaging 84 ounces in silver to the ton and 20 per cent lead. After a further shipment of 173 tons of silver-lead ore in 1906, the mine lay idle until 1916 when it was taken over by the Rosebery-Surprise Mining Company. The Bosun mine was operated continuously by this company until 1928 when it was acquired by the present owner and operations continued. The heaviest production was during the years 1918 to 1924, inclusive, and in particular in the year 1919 when 18,637 tons of crude ore was shipped averaging nearly 14 ounces in silver to the ton, 3.7 per cent lead, and 2.9 per cent zinc.

The property has been developed by six main adits, several intermediate levels, a shaft from the lowest or No. 6 adit, and a level (No. 7)

driven from the bottom of this shaft. From the vein outcrop to No. 7 level the depth is about 470 feet. The portal of No. 6 adit, the main working level, is about 30 feet above the lake. This adit, the longest level in the mine, follows an irregular course and is about 3,700 feet long. During the period of development various parties of lessees have produced a considerable tonnage, mostly from older workings abandoned by company operations.

A cross-section of the formations in the mine is exposed along the shore of Slocan lake, south of the compressor house. The rocks are mainly massive, argillaceous, quartzitic, and tuffaceous varieties but include some limestone beds and other calcareous strata. The sediments are intersected by dykes varying from 2 to 3 feet to 85 feet wide and striking about with the bedded rocks. They are mostly rather dark and carry much biotite and considerable quartz. Under the microscope they were observed to contain a large proportion of both alkalic and lime-soda feldspars, and may be classified as quartz monzonite.

The Bosun lode cuts across the country rocks on a strike of about north 55 degrees east, dips southeast at an angle averaging 50 degrees, and varies in thickness from a few inches to over 5 feet. Vein matter is discontinuous and forms several veins composed in part of galena and sphalerite associated in the richer parts with grey copper, ruby silver, native silver, and small amounts of other silver minerals. Some chalcopyrite is also present. As followed northeasterly along the drifts the lode is offset to the southeast at intervals by strong zones of shearing which strike about north 55 degrees west and rather closely follow bedding planes in the country rocks. These shear zones lie along, or near, what appear to be narrow, highly altered dykes or sills of, probably, quartz monzonite. The lode was most difficult to follow, for it presented numerous smaller irregularities, the foot-wall lacked definition, and slips or faults leading off into the hanging-wall were common. These slips are in several instances accompanied by more or less mineralization and are difficult to distinguish from the main lode, which in places swings in the same direction as these slips for considerable distances before assuming its regular course. The structure of the Bosun lode is further complicated in the vicinity of the "Main" or "Central" ore shoot by a split commencing a little below No. 4 level. The ore followed, principally, the hanging-wall section of this split and has provided most of the production from workings in this section of the mine; the foot-wall split has been only partly investigated.

In the central part of the mine workings ore persisted almost continuously from the surface to the lowest (No. 7) level and has been largely stoped out from a block of vein matter nearly 500 feet long within which the ore raked to the northeast or into the hill at about 55 degrees. This block, for the most part, is bounded by strong faults following the bedding of the sediments and the course of narrow, highly altered dykes. It is also intercepted about midway of its length by another shear zone, on either side of which vein mineralization is almost continuous.

Southwest of this ore-body considerable stoping has been done on a vein deposit that closely adjoins the main ore-body in the uppermost workings, but diverges from it downwards as it dips more steeply and,

in this respect, is analagous in position to the foot-wall split of the "central" ore zone. This southwesterly deposit is fairly continuous to some distance below No. 5 level. It included an ore-body whose average length hardly exceeded 200 feet and which narrowed appreciably on the lower levels where the lode tightens to negligible proportions.

Development work in the last few years has been largely concentrated on exploring a third ore-body, encountered towards the face of No. 6 level and developed by this and an intermediate level above. It furnished some good silver-lead and zinc ore, but has been stoped out without affording much encouragement for further development in this section of the mine. The ore was cut off above the intermediate level by a wide zone of brecciated and slickensided rocks striking northwesterly and dipping north-easterly at an angle of 25 degrees. No encouraging mineralization has yet been encountered within or northeast of this zone, the position of which is marked at the surface by a depression several feet deep. To the north-east and southwest of this zone very similar rocks are encountered, and the zone seems due to slipping along bedding planes, which here have a low dip, rather than to any pronounced displacement of the formations. Had the main lode continued strongly up to the fault zone there would appear to have been good possibilities of picking it up again on the other side, but the Bosun lode apparently becomes very tight on approaching the zone on the lower levels and, consequently, the situation affords little encouragement that anything of importance will be discovered beyond the fault zone.

Other recent development work includes the sinking of an incline shaft from No. 6 level and the exploration of the lode on the downward continuation of the Central ore-body by means of a level (No. 7) about 100 feet below No. 6. The lower level, at the time it was visited in 1928, included some 1,400 feet of lineal work, chiefly drifting. This work had proved the downward continuation of the Central shoot which, however, decreased in size and carried a lower content of silver and of lead and zinc minerals. At this depth the vein-lode also narrowed and gives the impression that it does not continue much deeper. The level in 1928 was being extended northeasterly to get under the more easterly ore shoot. Most of the galena encountered at this lower level is strongly sheared and gneissic, indicating considerable post-mineral strain.

Vein matter in the more productive parts of the lode has a width varying up to more than 5 feet and is contained between well-defined walls, which are commonly more or less sheared. It is composed of varying proportions of clean ore and mixtures of ore minerals, and gangue minerals, and, in addition, commonly large proportions of crushed wall-rock and gouge. The clean ore occurs either as somewhat tubular or cigar-shaped masses lying nearly horizontally or at a slight pitch, or as bands along one or other walls of the veins, chiefly the hanging-wall. The gangue minerals include quartz, siderite, and a small amount of calcite. With depth, or as the lode is followed into the hill, it becomes progressively narrower, in places being a mere crack, but abruptly widening to include lens-shaped masses a foot or more wide composed chiefly of siderite lying between tightly "frozen" walls. Such siderite may, in places, carry or be inter-

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banded with ore minerals that locally form veins several inches wide of nearly clean galena or zinc blende. On either side of these lenses the lode is hard to follow for, on the one hand, the slightest fracture must not be overlooked as it may lead to an important body of ore, and on the other hand promising fissures when followed may prove barren and it is difficult to decide where to cease exploration.

#### BUFFALO GROUP

The Buffalo property, comprising the Buffalo and Evelyn Crown-granted claims, is on the north slope of Silverton Creek valley about 2,000 feet above the stream and near Arison (Buffalo) creek. It is owned by the Buffalo Mining Company of Slocan, % D. S. Wallbridge, 525 Seymour Street, Vancouver, and is accessible by road and trail from Silverton.

All workings are on the Buffalo claim and comprise three adits and an intermediate level between the lower two. They represent a vertical development of about 250 feet on a lode that strikes north 50 degrees east and dips 55 degrees southeast. The lode is a shear zone that intersects compact, hard, argillaceous sediments of the Slocan series and averages 4 to 5 feet in width. In it vein mineralization formed paystreaks along both the foot- and hanging-walls, the better grade ore favouring, in general, the hanging-wall. The ore minerals include galena, a conspicuous amount of grey copper, and zinc blende. They are associated with a quartz gangue and abundant crushed fragments of the wall-rocks partly silicified and replaced by vein minerals.

Production has been small and has been mostly won by lessees. Altogether shipments of 71 tons of silver-lead ore were recorded to the end of 1915. This ore averaged 150 ounces in silver to the ton and 32 per cent lead. In 1925 a shipment of 23 tons of zinc ore carried an average content of 40 ounces in silver and 20 per cent zinc.

#### CALIFORNIA AND CLIPPER CLAIMS

This property owned by California Clipper S. L. Mines, Limited, Box 1101, Nelson, B.C., is on the northwest slope of Idaho mountain at an elevation of about 3,600 feet above Slocan lake. It is accessible by wagon road and trail from New Denver. The property was worked intermittently from 1896 to 1907, during which period shipments of 343 tons were recorded. This ore averaged 88 ounces in silver to the ton and 52 per cent lead.

The workings include two crosscut adits and drifts from them. They give a vertical development of 70 feet on a vein that strikes north 75 degrees east and dips 75 degrees southeast. The vein occupies a fissure cutting siliceous argillites and impure quartzites, and varies from a few inches to over a foot in width.





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## BOSUN

The Bosun mine was taken over by the Roseberry-Surprise Mining Company in 1916 and is being operated by them under the management of Mr. J. P. MacFadden, New Denver, B.C. The property, including eight mineral claims covering about 200 acres of mineral land, is located on the east shore of Slocan lake about  $1\frac{1}{2}$  miles south of New Denver.

The mine has been developed by six adit tunnels, giving a vertical depth of about 500 feet below the vein outcrops. The portal of the lowest or No. 6 adit is about 50 feet above Slocan lake.

The property was discovered in 1898 and worked until 1906, during which time it produced several thousand tons of silver-lead and silver-zinc ore. Zinc shipments up to February 1904 are said<sup>1</sup> to have totalled 1,440 tons, averaging 71.3 ounces silver, 1.8 per cent lead, and 41.8 per cent zinc. Several shipments of this zinc ore, aggregating 620 tons, were shipped to Antwerp at an original cost of \$21 per ton freight, afterwards reduced to \$16. Following this period of production the mine lay idle until taken over by the present owners in 1916.

The vein is a fissure striking about north 55 degrees east, dipping to the southeast at an average angle of 50 degrees, and varying in thickness from a few inches to over 5 feet. The pay-streak is much narrower and is composed of galena and sphalerite, associated, in the richer portions of the ore-shoots, with a more or less abundant dissemination of grey copper. The vein is offset to the right at intervals along its course by strong zones of shearing which strike about north 55 degrees west or closely in line with the bedding planes of the enclosing rock. These sheared zones are localized along, or near, what appear to be narrow dykes or sills of rather basic composition. In addition to these larger offsets the course of the vein has proved most difficult to follow by reason of numerous smaller irregularities, the general lack of definition to the foot-wall, and the common occurrence of slips or faults leading off into the hanging-wall. These slips are commonly accompanied by more or less mineralization and are in many places difficult to distinguish from the true vein which on occasion may itself roll in the direction of these slips for considerable distances before assuming its regular course.

The greater part of the ore above the lowest or No. 6 level has already been removed, but no work has been done below this level. The company is at present developing an important shoot of silver-lead-zinc ore above No. 6 lying between 400 and 600 feet of the face. Another high-grade ore-shoot has been encountered along a distance of about 300 feet in No. 6 level between 1,500 and 1,800 feet of the portal. Other showings between this and the portal are worthy of further investigation. Different parties of leasers are engaged in working out the old ore-shoots above No. 5 level.

An interesting cross-section of the formations represented at the Bosun mine is exposed along the shore of Slocan lake to the north of the compressor house. The rocks are mainly sedimentaries composed of massive argillaceous and quartzitic types, including some limestone beds and a large proportion of more or less calcareous strata. These sediments are intersected by a number of dykes varying in width up to 85 feet and

<sup>1</sup>Dept. of Interior, Mines Branch—Rept. of Zinc Commission, 1906, p. 209.

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with a strike about that of the bedded rocks. Some of these dykes have a close resemblance in size, position, and composition to those encountered underground.

#### CALEDONIA

The Caledonia claim, situated at Blaylock station to the east of the mouth of Rossiter creek, is owned by George E. McCready, Kaslo, B.C.

The vein on this claim is a faulted fissure striking a little south of east and dipping to the south at about 75 degrees. It cuts across laminated slaty rocks and several beds of limestone varying from about 3 to 15 feet in thickness. The sediments strike about northwest and southeast and dip to southwest at an average angle of 70 degrees.

The vein is tapped by a crosscut tunnel 140 feet long and has been drifted on for about 60 and 65 feet respectively to the west and east of this crosscut. The principal ore-body is encountered on the north side of the west drift about 10 feet from the crosscut and at the intersection of one of the limestone beds with the vein. A raise driven a few feet east of the crosscut encounters this ore-body about 30 feet above the level, from which point it has been stoped to the surface, a farther distance of about 35 feet. What is probably the same limestone bed is exposed on the surface and is mineralized for 100 feet or more to the northwest of the vein. Faulting along the line of the vein fissure has abruptly terminated both limestone beds and ore in this direction.

The ore has evidently resulted from replacement of limestone and is composed of clean lenses of galena, as well as a more intimate mixture of galena and zinc blende, in a gangue of calcite and siderite with, in places, a little quartz.

#### CANADIAN GROUP

The Canadian group of five claims, including the Adams, Brandon, Sarah B., Katie D., and Hill Top Fraction, comprises in all 162.18 acres and is located on the summit and north and south slopes of Silver ridge at the head of Ivanhoe basin, 3 miles distance, by road and trail, from Sandon, and between 3,000 and 4,000 feet above it. The group is owned and operated by J. M. Brandon, Silverton, B.C.

The property shipped some 216 tons of silver-lead ore during the years 1904 to 1908. Following this period of production work was discontinued until about 1918, since which time development work has been actively resumed and, up to the end of 1924, some 210 more tons of silver-lead ore shipped.

Most of the development work has been done on two veins known as the Ivanhoe-Canadian and No. 1 vein, respectively, situated near the summit and on the northern slope of the ridge. Other promising vein exposures occur on the south slope, where very little work has yet been done. The Ivanhoe-Canadian vein has been drifted on into Canadian ground (Katie D. claim) from No. 4 and No. 8 levels of the adjoining Ivanhoe property and connected by a raise. No. 1 vein is developed on the Adams claim by three tunnels, including some 1,200 feet of crosscuts and drifts, giving a depth on the vein of about 600 feet below the summit. Two shoots of silver-lead ore were discovered in the upper or No. 1 adit on this No. 1 vein. No. 2 adit has also reached a prominent shoot of mill-

ected up before tackling underground development. Much broken-up granite and float lie on the surface and make it difficult to trace the ore between outcrops. Should the short season, when this high rocky summit is free from snow and ice, prevent this surface work, it might be advisable to tunnel in on the main showing a couple of hundred feet below the summit, keeping with the ore, and to drift in toward the neighbouring occurrences. Both walls should always be tested for parallel ore bunches along joint planes, and for intervening milling ore. It is to be expected that in this pneumatolytic type of deposit<sup>1</sup> (stock work) much blocky unproductive granite will be encountered between the various ore zones. For this reason it would be well to obtain all the surface data possible regarding position of ore zones, joint systems, variations in composition of granite, etc., and have all the information assembled and plotted on one plan before undertaking extensive underground development.

### Slocan Area, Ainsworth and Slocan Mining Divisions.<sup>2</sup>

**Economic Geology.** Owing to the present high price of metals, mining and prospecting in the Slocan silver-lead-zinc district is being energetically carried on. Since discovery in 1891, the district has produced metals to the value of approximately \$40,000,000.

During the course of the field work, over twenty working mines and as many prospects were visited. The main vein fissures, which generally correspond in strike and dip with the master joint planes, are shown on the accompanying outline map as well as a few of the more important replacement veins. The replacement veins in contrast to the fissure veins, carry low values in silver and lead and high values in zinc. They also strike and dip with the replacement formation which is invariably limestone. The map and structure sections further indicate the location of the most productive metalliferous belts within the closely folded roof rocks of the batholith<sup>3</sup> as well as their position with respect to the granitic intrusions and main contacts. Considerable faulting along certain axes of folding and offsetting of vein fissures and master joint planes along bedding planes have taken place both before and after mineralization. The faulting and fracturing are systematic and indicative of the nature of the torsional and compressional crustal stresses set up during late Jurassic time along this northern margin of the Nelson batholith. What appears to be a down-faulted block or graben of Slocan series between the Kootenay Lake and Slocan Lake horsts of the Ainsworth (Shuswap) series, has been upbowed in the middle by the Nelson batholith forming thus a local anticlinorium<sup>4</sup> (see structure section A-B). As a result of differential movements both horizontally and vertically consequent upon batholithic invasion and crustal readjustment in this broad belt of much folded and crushed Slocan series, a great variety of vein deposits have been formed. All transitions from true fissure veins with well-defined walls, to fissure zones made up of a series of interrupted torsional or crevasse-like fissures in line or *en échelon*, exist. The fissure veins and zones may pass into stock works or a series of connected veins between the hanging and foot-wall fissures. The ore shoots and pockets occur frequently where a formational slip or fault intersects the vein fissure or mineralized master joint plane. Where the country rock is massive

<sup>1</sup> "Notes on the geology of the Molly molybdenite mine, Lost creek, Nelson mining division, B.C.", Trans. Can. Min. Inst., 1915, pp. 247-255.

<sup>2</sup> For preliminary reports by O. E. LeRoy on geology and ore deposits of the Slocan district, see Geol. Surv., Can., Sum. Rept. 1908, pp. 67-68; 1909, pp. 131-133; 1910, pp. 123-128; 1915, p. 93.

<sup>3</sup> Batholith means the largest kind of intrusion of molten rock, generally granitic and characteristically found in great mountain ranges.

<sup>4</sup> The direct opposite of graben or trough, a horst is an upfaulted block bounded by diverging downward fault planes.

<sup>5</sup> Anticlinorium means a broad anticlinal belt or composite anticline compounded of minor folds whose axes in this case converge downwards, or in other words a bowed-up mass of folds.

and tight, the angle between the vein plane, along which the shifting movement takes place, and an ore pocket, if present. On the contrary, if the country rock is massive, undulating and makes acute angles with the vein fissures. The intersections of the veins and the localization of workable ore shoots.

**General Geology.** The main problem is to determine the structural relations of the Slocan series and correlate them with similar series in the region. The regional structure was found to be that of Davis and Cooper creeks in the west and east.

Fossils were found near the base of the West Kootenay sheet<sup>1</sup>, on both limbs of the Milford syncline (F<sub>1</sub> and F<sub>2</sub>) on the west side by an anticlinal belt of Selkirk series and on the east by a reverse fault of the Ainsworth series into juxtaposition with the Selkirk series and locally with the underlying Kootenay series. A traverse plotted on the scale of 400 feet from the Kaslo schists eastward to the Milford syncline, shows the synclinally folded nature of the Selkirk series southward the Milford syncline because of the fact that account the structural relations. Northward in the Lardeau series appears to be intruded by granitic rocks.

Eight new fossil localities were discovered in the belt of Slocan series southwest of the Selkirk series. The lithology of the series on both sides of the belt is indicated on the accompanying map. The following preliminary report (F<sub>1</sub>-F<sub>8</sub>)<sup>2</sup> from the district east of Slocan shows the presence of fossils in dark schistose, limestones present in great numbers. A few of the fossils comprise the only ones of which there is any certainty be referred to any order or class. The use of this material for correlation purposes, however, plainly indicates a post-Cambrian age. The beds are probably of middle or upper Cambrian age and warrant a more definite correlation.

"Lots S. F. 1 to S. F. 56 (F<sub>1</sub>-F<sub>56</sub>) to those just mentioned. In addition to the gasteropods and a small coarsely ribbed bryozoan. One of the gasteropods though present in small numbers, leaves little doubt that it represents a new species. The horizon is probably of the Cambrian. It may be noted that the numerous small gasteropods on first glance incline one to surmise that they are much smaller than those most commonly known. A diameter of 1 or 2 mm. represents 1

<sup>1</sup> Geol. Surv., Can., 1904. Map No. 792. Hebert's map.

<sup>2</sup> See map 1667.

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and tight, the angle between the vein fissure or master joint plane and the bedding plane, along which the shifting movement took place, is apt to be nearly a right angle and an ore pocket, if present at such intersection, is small, though rich. On the contrary, if the country rock is crushed and loose the vein fissure is, as a rule, undulating and makes acute angled intersections with the formational slips or cross fissures. The intersections are in this case more favourable for the localization of workable ore shoots.

*General Geology.* The main problem in the field work of 1916 was to determine the structural relations of the Selkirk, Niskonlith, Shuswap, and Slovan series and correlate them with similar formations in East Kootenay. The key to the regional structure was found to the north of the Slovan map-area at the heads of Davis and Cooper creeks in the southern Lardeau mountains.

Fossils were found near the base of the Niskonlith series as mapped on the West Kootenay sheet<sup>1</sup>, on both limbs of a compressed syncline known as the Milford syncline ( $F_1$  and  $F_2$  on section A-B). This syncline is bounded on the west by an anticlinal belt of Selkirk series (now named the Kaslo volcanic group) and on the east by a reverse fault which upthrusts as a horst the Shuswap or Ainsworth series into juxtaposition with the eastern limb of the Milford syncline and locally with the underlying Kaslo schists (see section A-B). A plane-table traverse plotted on the scale of 400 feet to 1 inch was run across the syncline from the Kaslo schists eastward to the Ainsworth series. This detailed survey of the lithological members, their sequence, and dips undoubtedly proves the synclinally folded nature of the sedimentary series at this locality. Traced southward the Milford syncline becomes more compressed and overthrust to the east and on that account the structure might be determined erroneously as monoclinical. Northward in the Lardeau mountains this synclinal belt widens and appears to be intruded by granitic masses.

Eight new fossil localities were discovered during the past season in the main belt of Slovan series southwest of the Kaslo schist anticline. The fossils and the lithology of the series on both sides of the anticline are similar. The fossil localities are indicated on the accompanying outline map. E. M. Kindle submits the following preliminary report on the collection: "Lots S. F. 57 to S. F. 90 ( $F_1$ - $F_6$ )<sup>2</sup> from the district east of Slovan lake show numerous fragmentary specimens of fossils in dark schistose, limy material. Sections of crinoid stems are present in great numbers. A few detached crinoid plates and imperfect sections of gasteropods comprise the only other fossil remains that can with any degree of certainty be referred to any order or group of fossils. It is accordingly impossible to use this material for correlation except in the broadest way. The material, however, plainly indicates a post-Cambrian age for the beds represented. The beds are probably of middle or upper Palaeozoic age. The fossils alone do not warrant a more definite correlation for the fauna."

"Lots S. F. 1 to S. F. 56 ( $F_1$ - $F_2$ )<sup>2</sup> are in fragmentary character very similar to those just mentioned. In addition to numerous crinoid stems they show two gasteropods and a small coarsely ribbed fossil fragment of undetermined affinities. One of the gasteropods though preserved only in section is sufficiently preserved to leave little doubt that it represents a species of *Raphistoma*. On the evidence of this specimen, the horizon is provisionally determined as Ordovician. It may be noted that the numerous sections of crinoid or cystid columns, which at first glance incline one to surmise a Carboniferous horizon for the fauna, are much smaller than those most commonly met with in the Carboniferous. A diameter of 1 or 2 mm. represents the average size of these columns."

<sup>1</sup> Geol. Surv., Can., 1904. Map No. 792. Here the Niskonlith is really an isolated infold of the Slovan series.

<sup>2</sup> See map 1667.