

82 FNWD67 Galena Farm

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002207

PROPERTY FILE

W.A. NO.

NAME *External Publications*

SUBJECT

GSC MEM
398

Metalliferous Deposits

occurs mainly where the vein crosses the bedding planes; where the vein is parallel with the bedding ore is much less common. The wall-rocks adjacent to the vein were bleached and silicified before the ore minerals were deposited. In the branch veins, including the I vein, carbonates are less abundant in the gangue. Metallic minerals include sphalerite, galena, which in many places is gneissic, tetrahedrite, pyrite, and some chalcopyrite. Starr reports also a little ruby silver.

The Robin lode strikes about N60°E and dips 65°SE more steeply than the main lode. Cairnes speculated that the Robin lode might be the continuation of the I vein, but Starr states that it has not been identified in the Standard workings.

Galena Farm (19)

References: Minister of Mines, B.C., Ann Repts.: 1895-1956. Rept. of Zinc Commission, 1906, pp. 271-272. Cairnes, 1934, p. 85; 1935, pp. 43-48.

The Galena Farm property, comprising the Currie, Grover, Peerless Revised, and Kate Crown-granted claims is owned by Galena Farm Consolidated Mines, Limited, c/o Geoffrey Clarke, 4049 South Perry Street, Spokane, Washington. The property is about 2 miles by road south of Silverton and several hundred feet in elevation above Slocan Lake.

Cairnes states that the name "Galena Farm" was derived from the widely distributed galena float that led to the discovery of the vein. It was first exploited by Galena Mines, Limited, of London, England, and in 1915 was acquired by Patrick Clarke of Spokane, who died shortly afterward. It was operated profitably for many years by the Clarke estate, and the operating company was known successively as Northland Mines, Limited, and Galena Mines Company. From 1925 to 1929 it was operated by several groups of lessees, then it passed into the hands of the present owners. The property has been active intermittently since that time, principally by lessees, and mainly since 1947 by Frank S. Mills of Silverton.

Production of ore began in 1900, and to the end of 1953 totalled 87,412 tons, from which 9,556,399 pounds zinc, 6,133,773 pounds lead, 580,578 ounces silver, and 62 ounces gold were obtained.

An examination of the property was made by A. B. Irwin of the Geological Survey in June 1950.

The veins are chiefly in granitic rocks of the Nelson batholith near its northern contact, but small to large inclusions of metamorphosed argillite and quartzite of the Slocan group are widely distributed within the granitic rocks. One such belt of metamorphic rocks some 80 feet thick forms the hanging-wall of the Noonday vein. Metamorphic rocks form part of the hanging-wall along the outcrop of the main vein, where exposed, but in the shaft these are on the foot-wall side.

Two veins have been discovered on the property, the Main lode and the Noonday lode. Cairnes has pointed out that the two veins may be parts of the same vein separated by a fault, but as he believed the fault is reverse rather than normal, he favoured the view that the veins are different.

The more southerly, or Main, lode is by far the more productive. Early development was done east of the main crosscut; but in 1948 Mr. Mills and his

associates found new ore west of the main crosscut and in 1950 most of the mining was done in this part. Four levels, the 25-, 75-, 100-, and 125-foot levels, and two raises were driven there.

The Main lode strikes N70°W and dips in general 25° to 35°N but flattens for a short distance about 50 feet from the bottom, where it terminates against a fault. The vein is from a few feet to 20 feet wide and extends more than 500 feet west from the east end, where it is cut off by a fault that strikes N20°W and dips 75°E. A continuation of the vein east of the fault has not been found. The Main lode is offset by a number of faults of small displacement. One of these, observed by Irwin, is about 150 feet west of the main shaft. There the vein is about 5 feet wide and is offset 7 or 8 feet by a normal fault containing 18 inches of breccia. Four or five feet of breccia overlies the vein south of the fault, but none occurs to the north.

The vein matter is largely quartz, with lesser siderite, calcite, and, locally, fluorite. Cairnes observed that the last-named mineral is abundant in places. Sphalerite and galena form lenses and streaks up to 5 feet thick within the vein, and in some places are distributed across the full width of the vein. Some pyrite was also noted. Sphalerite is more abundant than galena, and this appears to be particularly so in the western workings.

The Noonday lode, so named because it was early regarded as the continuation of the vein on the Noonday property to the east, is parallel with the Main lode. When Cairnes visited the property in 1928 it had been explored underground for a length of 400 feet. Little further development has been done on it since that time, but some ore has been removed from the old stopes, particularly in 1949.

Cork-Province (103)

References: Minister of Mines, B.C., Ann. Repts.: 1900-1954. Rept. of Zinc Commission, 1906, pp. 169-173. Cairnes, 1935, pp. 206-210.

The Cork-Province property is owned by Base Metals Mining Corporation Limited, 62 Richmond Street West, Toronto, Ontario. It comprises thirteen claims, some Crown-granted. The mine is on the south side of Keen Creek and may be reached by a road about 9 miles long from Kaslo.

The Cork group of claims was staked about 1900 and ore production began in that year. The Province group was staked in 1901. The two properties were developed separately until 1914 when they were amalgamated under the ownership of Cork-Province Mines Limited. The mill that was on the Cork property was expanded to a 120-ton capacity in 1917, and in 1918 a flotation unit was installed. The mine was operated until 1930 when it was closed and in 1931 the mill machinery was sold. In 1937, 1940, and 1948 the mine was leased, and in 1949 it was acquired by the present owners who operated it until 1953. Until the erection of a new mill in 1951 the ore was custom-milled.

Total production of ore from the property from 1900 to 1953 was 169,433 tons, containing 14,986,081 pounds zinc, 11,278,513 pounds lead, 456,973 ounces

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The orebodi adits, but only th open at the time shaft sunk 250 fe No. 3 adit, whic in a direction S29 form sharp folds southerly beds ha About 920 feet f N50°E and dips the east. These rake steeply east. and diamond-drill and about 60 feet was seen in the 50

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References: Minister c p. 204; 19

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The property from 1898 to 190 extended the und they installed an

little barite are associated locally with the quartz gangue. A little stoping had been done on a couple of these fissures at the time visited. The possibilities of finding other pockets or bodies along fissures seemed particularly good.

GALENA CLAIM

The Galena Crown-granted claim is on the summit of the divide at the head of the south fork of McGuigan creek and east of Payne mountain (See Figure 1). It is owned by the Silver Cord Mining Company, % A. C. Stewart, 525 Seymour Street, Vancouver.

On this claim, at an elevation of about 7,500 feet, a tunnel 490 feet long has been driven through the ridge, along a vein-lode striking north 55 degrees east and dipping 52 degrees southeast. The lode cuts metamorphosed argillites of the Slocan series intruded by many quartz porphyry dykes and sills. It carries vein matter composed chiefly of zinc blende and siderite. It extends northeast into Antoine basin in the vicinity of Antoine mine.

An attempt was made years ago to pick up the Galena lode by a long crosscut from the No. 4 level of the Last Chance mine (Figure 3), situated at an elevation of 6,685 feet on the Carpenter Creek slope. At 1,590 feet from the portal this crosscut intersected a shear zone, presumably the downward continuation of the Galena lode. This shear zone was drifted on to the southwest for 534 feet and, for much of this distance, was well defined and carried small bunches of vein matter consisting of zinc blende associated, here and there, with a very little galena. The average dip along this drift varies between 70 and 75 degrees southeast. To the northeast of the crosscut a little tunnelling was done, but nothing of interest discovered, though the possibilities in this direction were not exhausted.

GALENA FARM MINE (CURRIE GROUP)

References: Ann. Repts., Minister of Mines, B.C., 1896, p. 68; 1904, p. 174; 1925, p. 245; 1926, pp. 255-256; 1928, pp. 290-291.
Rept. of Zinc Commission, 1906, pp. 271-272.
Geol. Surv., Canada, Sum. Rept. 1925, pt. A, pp. 193-194.

The Currie group is owned by Galena Farm Consolidated Mines, Limited, % Jas. Anderson, Stock Exchange Building, Vancouver, B.C. The group comprises the Currie, Grover, Peerless Revised, and Kate Crown-granted claims, 1½ miles, by road, south of Silverton and a mile east of and between 700 and 900 feet above Slocan lake.

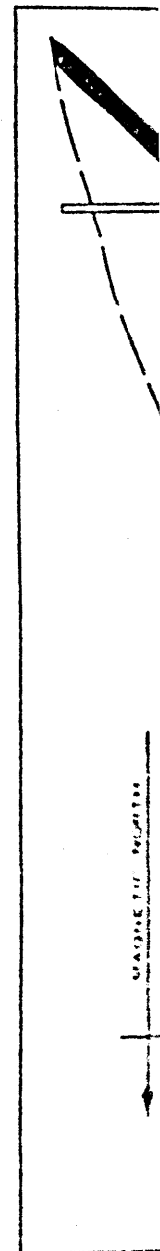
In the mid-nineties a considerable amount of galena float was discovered in the vicinity of the lode outcrop and from there to the shore of Slocan lake, near the mouth of Gold creek. In consequence of the considerable area covered by such float the mine received the name "Galena Farm." At an early date the property was secured by C. W. Callahan for English investors, who organized Galena Mines, Limited, of London, England. Operations by this company were not successful and the property lay idle for a number of years. It was subsequently acquired and successfully operated during the period of the war by Patrick Clarke of Spokane. A mill, operated by waterpower from Gold creek and with a rated capacity

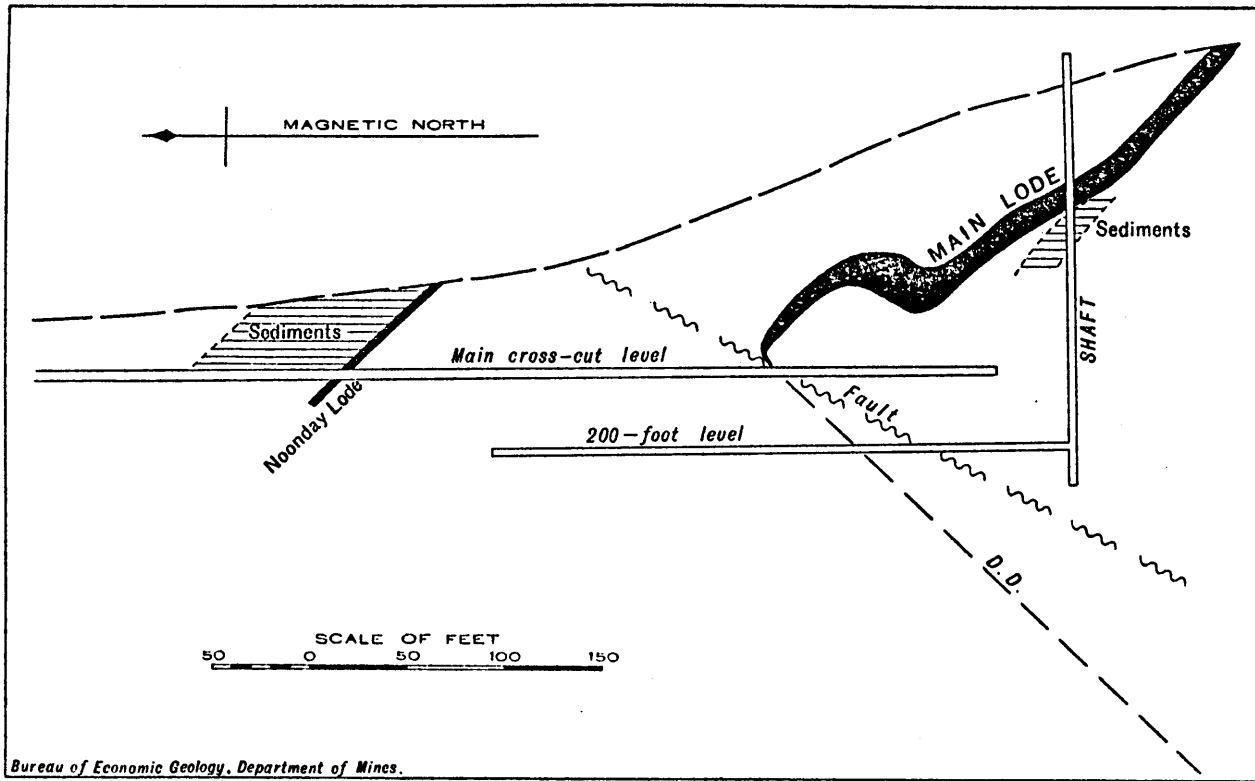
of 100 tons a day, was erected in 1916. After the war and up to 1925 production was due chiefly to small scale leasing operations. In 1925 the property was leased by Porcupine Goldfields Development and Finance Company and exploratory work carried on for a short time. In 1926 a lease was obtained by Messrs. Johnson, Matthews, Jones, and Walton of Silverton. A year or so later the property was acquired under terms of a lease and bond by W. L. Sheeler, J. Johnson, and associates, who remodelled the old mill and continued production until March, 1929, when the property passed into the hands of the present owners.

The productive periods include the years 1915 to 1919 and 1922 to 1930. Total production to the end of 1926 is recorded as being over 58,000 tons of ore, averaging about 6.5 ounces in silver to the ton, 4 per cent lead, and 5 per cent zinc. The mill in June, 1928, was turning out 50 to 55 per cent zinc and 60 per cent lead concentrates. The principal mine workings (See Figure 6) are a vertical shaft 220 feet deep, a crosscut adit 160 feet below the outcrop, and three main levels at approximately 50, 100, and 125 feet, respectively, below the outcrop. Access to the mine is either by the crosscut adit, which is the main working level, or by stopes leading to the surface 130 feet to the south of the main shaft. The shaft is inaccessible, but it connects underground with the 100-foot level and with the 200-foot level at which an old crosscut 300 feet long is reported to have been run north from the shaft. Mine cars are hauled from the main level to the concentrator about 300 feet north of the portal. The main crosscut, on the 160-foot level, was driven in a southerly direction and at 550 feet from the portal encountered a lode referred to as the "Noonday" (See Figure 6). Two hundred and ten feet farther along the crosscut a drift was run to the southeast to explore the main lode at this depth. Beyond the entrance to this drift the crosscut was continued for 115 feet without encountering vein matter.

The rocks outcropping on the Currie group are chiefly granitic types forming part of the Nelson batholith near its northern contact with sediments of Slocan series. Surface exposures are, however, limited both in number and extent, and underground the mine workings have exposed lenses and belts of metamorphosed quartzitic and argillaceous sediments of the Slocan series. A belt of these sediments about 80 feet thick forms the hanging-wall rock of the "Noonday" vein-lode. The belt strikes north 70 degrees west and dips 40 degrees northeast, and not unlikely forms part of the much larger body of sediments exposed about 1,000 feet farther east along the banks of Gold creek at and below Noonday mine. Elsewhere the workings on Galena Farm mine have exposed irregular inclusions of sediments along or close to the main lode. To some extent at least these sediments appear to have influenced the course of fissuring followed by both the Main and Noonday lodes.

The lode system on the Currie group is thought to occur in the western continuation of the zone of shearing and brecciation developed at Van Roi and Hewitt mines. At Galena Farm mine the main lode has a known length, on the 100-foot level, of about 900 feet. It is claimed that this lode was traced on the surface in the early years for 1,600 feet and that in places it carried from 12 to 14 feet of milky white quartz associated with siderite, fragments of slate and granite, and some galena and zinc blende.





Bureau of Economic Geology, Department of Mines.

Figure 6. Diagrammatic vertical section, Galena Farm mine.

The lode has a general strike of north 55 to 60 degrees west and a general northeast dip at an average angle of about 50 degrees.

The hanging-wall is mostly well defined but the foot-wall has been determined by the grade of the mineralization rather than by any marked break. Though the lode has a general northeasterly dip, the angle of dip varies greatly and the ore-bodies, as they extend down the dip of the lode, flatten and then rise in low arches 15 or 20 feet high whose northern limbs steepen and continue downwards with the usual northerly or northeasterly, steep dip (See Figure 6). The arch-like structures are accompanied by, and are partly the result of, slipping that occurred in late or post-mineral time. The lode narrows in the lower workings and is lost a few feet before reaching the main crosscut level, owing apparently to the presence of a fault striking about north 75 degrees west and dipping at a low angle (28 to 30 degrees) to the south (Figure 6). A crosscut driven for 300 feet north from the main shaft at the 200-foot level is reported to have failed to pick up the downward continuation of the lode. Diamond drilling from the surface and from the 160-foot crosscut level likewise failed to find vein matter in the foot-wall country. This exploratory work led to the belief that the Main lode had been displaced by the strong fault encountered in the 160-foot crosscut level and that its continuation below the fault plane was the "Noonday." The latter is parallel to the Main lode, and if it is the faulted continuation of it the fault is a normal fault with an apparent displacement of about 160 feet. But if the two lodes are one and the same, the amount of movement along the fault must have been much greater than 160 feet, as is indicated by the character of the hanging-wall rocks of the two lodes. The Noonday lode, where intersected by the main crosscut level, has a belt of sediments forming the hanging-wall, whereas the hanging-wall rock of the Main lode is granite. As the main belt of sediments lies east of the workings a correlation of the Main and Noonday lodes implies that the block holding the Main lode moved from west to east, a point to be kept in mind in view of the possibility of finding further ore mineralization on the Noonday lode west of the present workings at a place opposite the ore-bearing section of the Main lode prior to faulting. On the other hand, for reasons given on a later page, it is not improbable that the Main and the Noonday lode are two distinct lodes, in which case no reason exists for supposing ore might occur farther west along the Noonday lode.

Most of the development work on the Main lode has been done east of the crosscut, and much of the ground from the 125-foot level to the surface and over a length of about 350 feet has been stoped out. The vein matter in this section formed one continuous ore shoot raking, in general, slightly to the east. Work in this direction on the various drifts was in each case terminated on entering a faulted, broken, and highly oxidized zone in which recent deposits of rounded boulders, including fragments of silicified wood, occupy an old stream channel that extends below the 125-foot level and follows a nearly north-south course along the broken zone referred to above, the excavation of the channel evidently having been influenced by this zone of weakness in the underlying rocks. Until the summer of 1928 no attempt had been made to explore the course of the Main lode through and beyond this broken zone. In 1928, how-

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dip to the west
Recent work has
revealed good ore
The 100-foot level
the face shows a
quartz containing
along this zone
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carrying downward

In addition
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The vein ore
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The Noonday
(100-foot level)
according to
receives its name
of the lode area

ever, the operators extended the 100-foot level easterly for 150 feet beyond the old face. This work passed through the channel deposit and encountered a width of about 100 feet of broken, oxidized rocks including metamorphosed sediments and altered intrusives of doubtful composition, all with a heavy coating of iron oxide. Beyond the broken ground a more solid formation was revealed. A scattered mineralization was encountered in crossing the broken zone and the ledge matter has been faulted along a series of slips which offset it for a few feet, in some cases to the north and in others to the south. Values are considerably impoverished within the zone of oxidation, but beyond it several feet of good mill feed have been encountered. This discovery has been most encouraging as it opens up an entirely new block of ground whose possibilities give a new lease of life to the property.

Towards the west at points above the main crosscut, and on and above the 100-foot level, a shear cuts across the granitic rocks with a steep dip to the west and has offset the vein-lode a few feet to the north. Recent work to the west of this fault, and above the 100-foot level, has revealed good concentrating ore in the hanging-wall section of old stopes. The 100-foot level has been extended for 320 feet west of the fault and at the face shows several feet of sheared and broken wall-rock cemented by quartz containing bunches and streaks of zinc blende. About midway along this westerly drift a little stoping has been done above, and a winze sunk for 30 feet below, the level on a width of about 5 feet of vein matter carrying disseminated zinc blende.

In addition to the above-mentioned fault, other steeply dipping and nearly north and south fractures were observed in the upper workings, but these show little evidence of displacement. They strike nearly at right angles to the slips that cross the arched parts of the lode. These slips dip southerly at angles of from 30 degrees to nearly perpendicular and in each case are reverse faults with a pronounced movement to the west.

The vein matter is quartz associated with a varying proportion of ore minerals. It forms a series of roughly parallel veins separated by varying widths of brecciated wall-rock. The ore minerals are chiefly zinc blende and galena. A little siderite and, locally, considerable fluorite are present. In places the vein matter is strongly brecciated. The country rock, particularly the granite, associated with the vein matter, is mostly altered and partly replaced by the mineral-bearing solutions. In the main ore shoot lenses and streaks of mixed galena and sphalerite up to 4 or 5 feet thick were encountered, but in general the ore is of concentrating grade requiring fine grinding to separate the lead and zinc minerals. The fluorite is evidently one of the later if not the last of the ore and gangue minerals to be deposited as it coats and includes fragments of the others. It is, however, involved in the slipping that produced the arches in the main lode and is abundant towards the tops of these arches. Some native silver has been reported as occurring in Galena Farm ore.

The Noonday lode has been explored for over 400 feet on the crosscut (160-foot) level, mostly to the east of the crosscut. The east drift is accessible (1928) for only about 60 feet from the crosscut. The lode receives its name from the assumption that it may be the western extension of the lode developed on the adjoining Noonday property. In Galena

Farm workings this lode is marked by more or less shearing along the contact of a belt of sediments, already referred to, with underlying granitic rocks of the Nelson batholith. Very little ore mineralization was observed along the section of the lode open for examination. A little stoping has been done above the level to within a few feet of the surface. Some mill feed is reported to have been encountered in these operations, but mineralization has nowhere been found to be encouraging.

Galena Farm mine is remarkable for the amount of ore recovered from its comparatively shallow workings. These workings are not yet exhausted and encouraging discoveries have recently been made towards both the eastern and western ends of the main drifts. Nor has the full width of the main lode been investigated, the foot-wall country still presents possibilities above the 160-foot or main crosscut level.

The main lode appears to narrow rapidly below the 125-foot level and where, above the big fault, it approached most closely to the 160-foot level, would probably not average over 3 feet in width. It is possible that it may never have extended, in minable widths, much below the main crosscut level. If it did, an obvious interpretation of the available information is that the Noonday lode is its faulted continuation, as stated on a preceding page. That this may not be the case is, however, possible, as is indicated by the following considerations. In the accompanying sketch (See Figure 6) neither the 200-foot crosscut, the drill hole DD, nor the main crosscut 160-foot level encountered any mineralization (except the Noonday lode) that might be regarded as being a continuation, below the fault, of the Main lode. If the Noonday lode is a continuation of the Main lode the fault is a normal fault. There is, however, little to suggest that the fault is normal. The degree of shearing and brecciation accompanying the fault rather suggests that it is a thrust fault. If so, the continuation of the Main lode should be sought in the opposite direction from the Noonday lode, that is, south of the point of intersection of the fault and main crosscut, and beneath the fault. If the fault is a thrust the lode should have been picked up either in the 200-foot crosscut or by the drill hole, unless the thrust was so great as to have displaced the vein beyond the depth reached by the drill hole, or unless the shearing and brecciation along the fault obscured the lode where it was cut in the crosscut and in the drill hole. The first possibility would require heavy expenditure to investigate. The second possibility, however, could be tested by a comparatively short drill hole because the lode, if present, cannot lie far below the 200-foot level. A diamond drill hole sunk from the main crosscut level well out in the foot-wall of the fault, say 75 feet north of and parallel with the existing drill hole, would encounter the continuation of the Main lode, if present, within a comparatively short distance.

GEM CLAIM

Reference: Ann. Rept., Minister of Mines, B.C., 1925, p. 244.

The Gem claim is on Carpenter creek above Cody and is owned by Hervey P. Jackson, of Paulson, B.C.

The property is interesting in that the production, amounting to 59 tons of silver-lead ore, has been won as float from the bed of Carpenter

| | | | | | | | |
|-----|-------------|-----|---------|---|---|---|----------------------------------|
| C-3 | Echo | 815 | 107,781 | 1 | 2 | 3 | |
| C-4 | Elkhorn | 157 | 9,065 | 2 | 1 | | 1 oz. gold |
| C-3 | Emily-Edith | | | | | | Shipments included with Standard |

| | | | | | | | | | | | | |
|-------|-----|---------------------------|---|---|---|---|---|---------|-----------|---|---|-----------------------------------|
| E-MEN | C-3 | Empire | | | | | | 1 | 132 | 1 | 2 | |
| | C-3 | Eyening and Jonnie | | | | | | 16 | 1,169 | 1 | 2 | |
| | F-4 | Fisher Maiden | X | X | | | | 717 | 40,642 | 1 | 2 | |
| | C-4 | Froddie Leo | X | X | | | | 817 | 104,989 | 1 | 2 | 3 ozs. gold |
| | C-2 | Galena Farin | | | | | | 79,822 | 1,322,245 | 3 | 2 | 150 ozs. gold |
| | C-4 | Gem | | | | | | 59 | 8,400 | 2 | 1 | |
| | C-4 | Goodenough | X | X | | | | 403 | 42,761 | 1 | 2 | |
| | D-4 | Great Western | | | | | | 64 | 4,477 | | | Records incomplete |
| | C-5 | Greenhorn | | | | | | | | | | See Home Rule |
| | C-4 | Grey Copper | | | | | | 41 | 5,527 | 2 | 1 | 1 oz. gold |
| | C-3 | Hartney | | | X | X | X | 264 | 16,050 | 1 | 2 | |
| | D-4 | Holomita | | | | | | | | | | See Rio |
| | C-3 | Hewitt and Lorna Doone | | | X | X | X | | | | | |
| | C-5 | Home Rule (and Greenhorn) | | | X | X | X | 112,613 | 1,530,323 | 1 | 2 | 375 ozs. gold |
| | C-4 | Hope | | | | | | 2 | 164 | 2 | 1 | Other small shipments |
| | C-3 | Idaho and Alamo | X | X | X | X | X | 24,022 | 832,174 | 1 | 2 | 35 ozs. gold |
| | C-4 | Ivanhoe | X | X | X | X | X | 19,879 | 475,978 | 1 | 2 | 3 |
| | C-3 | Jenny Lind | | | | | | | | | | See Carnation |
| | C-4 | Last Chance | X | X | X | X | X | 4,721 | 498,501 | 1 | 2 | Incomplete records |
| | C-4 | Leadsmith (Noonday) | X | | | | | 389 | 29,963 | 2 | 1 | 3 |
| | C-3 | Lone Batchelor | | | | | | | | | | See Victor |
| | H-4 | Lou Dillon | | | | | | | | | | Small shipments, no returns |
| | D-4 | Lucky Jim | X | X | X | X | X | 134,653 | 2,219,451 | 3 | 2 | 151 ozs. gold |
| | C-3 | Lucky Thought | X | | | | | 8,070 | 165,224 | 1 | 2 | 7 ozs. gold |
| | C-4 | Madison | | | | | | | | | | No returns |
| | C-4 | Majestic and Unexpected | | | | | | 241 | 22,331 | 2 | 1 | |
| | C-3 | Mammoth | | | | | | 1,290 | 103,019 | | | |
| | C-3 | Margaret | | | | | | 4 | 193 | 1 | 2 | |
| | C-3 | Marion | | | | | | 52 | 5,588 | 1 | 2 | |
| | D-4 | Mascot | | | | | | 1 | 53 | 1 | 2 | |
| | C-4 | McAllister | | | | | | 17,595 | 426,212 | 1 | 2 | 42 ozs. gold |
| | C-4 | Mercury | | | X | X | X | 193 | 23,524 | 1 | 2 | |
| | C-3 | Metallic | | | | | | 106 | 5,740 | 1 | 2 | 1 oz. gold |
| | C-3 | Miller Creek | | | | | | | | | | Shipments included with Wonderful |
| | D-4 | Miner Boy | X | | | | | 3 | 878 | 1 | | |
| | C-3 | Minniehaha | | | | | | 99 | 2,200 | | | 2 ozs. gold |
| | D-3 | Molly Hughes | | | X | X | X | 1,960 | 127,634 | 1 | 2 | 542 ozs. gold |
| | D-3 | Monitor (and Ajax) | | | | | | | | | | |
| | C-3 | Mountain Chief | X | X | X | X | X | 4,495 | 341,966 | 1 | 2 | 3072 ozs. gold |
| | C-3 | Mountain Con. | X | X | X | X | X | 3,085 | 304,310 | 1 | 2 | 5 ozs. gold |
| | | | | | | | | 494 | 119,350 | 1 | 2 | 12 ozs. gold |

Numbers in this column refer to Maps 272A and 273A, in pocket.

13

GSC MEN 173

GSC Summary Report 1925
Part A

193A

The property includes thirteen claims and is situated on the east side of Mansfield (south fork of Kaslo) creek at a distance of 9 miles from Kaslo and $4\frac{1}{2}$ miles from Zwicky station (Nashton post office). A good road leads from Kaslo to the mine, which lies at an elevation of about 1,600 feet above Kootenay lake.

The ore-bodies of the Cork-Province mine occur where a well-defined vein, striking about north 50 degrees east and dipping to the southeast at an average angle of 65 degrees, intersects beds of crystalline limestone striking north 65 degrees east and dipping from 75 degrees to 85 degrees southeast. The limestone is interbedded with more or less metamorphosed and argillaceous sediments and forms beds up to about 90 feet in thickness. Three of these beds have been encountered in the underground workings and have developed ore at the vein intersections. A fourth has not yet been reached by the easterly extension of the drift on the vein in No. 3 level. The vein is a fissured and sheared zone, averaging from 5 to 6 feet in width, in which the hanging-wall side has dropped with respect to the foot-wall and thereby offset the limestone beds in each case about 80 feet to the west.

The vein filling consists chiefly of altered limestone and siderite with some quartz and calcite. Galena and zinc blende are the important ore minerals, but subordinate amounts of pyrite and chalcopyrite are also present. In general the vein is sparsely mineralized, but important ore-shoots occur where the limestone beds have been intersected. The vein at these intersections is much enlarged, since the ore replaces the limestones for distances up to 100 feet from the vein on the hanging-wall side. On the foot-wall side the concentration of ore minerals is less noticeable.

The mine is developed by three adit tunnels, giving a vertical depth of about 400 feet below the surface. No. 3 adit is on the level of the mill and represents the lowest tunnel site that can be obtained. It reaches the vein by a crosscut 930 feet long. A shaft from No. 3 reaches to No. 4 drift, the lowest workings in the mine. Future work involves the sinking of a new shaft from No. 3 crosscut about 50 feet north of the drift in order to further develop the property below this level. It is the intention, also, to explore the intersection of the main vein with a fourth limestone band, mentioned above, by extending No. 3 drift farther to the east, and eventually to investigate the intersections of two other veins on the property with these limestone beds. One of these veins crosses No. 3 crosscut about 250 feet north of No. 3 drift. The other vein known as the "Dublin vein" has not yet been reached by the extension of No. 3 crosscut south of No. 3 drift. It is stated that values improve with depth on these veins.

GALENA FARM

Galena Farm, property of Northland Mines, Limited, is largely owned by the estate of the late Patrick Clarke of Spokane and until recently was under the management of his son, P. W. Clarke of Spokane. During the last three years the property was operated under lease to R. Ainslie, of Silverton. Lately the Porcupine Goldfields Development and Finance Company has taken a lease and bond on the property with R. H. McLaughlin, Silverton, B.C., in charge of operations. The property was formerly

known as the Currie group and includes about 193 acres of mineral land, situated $1\frac{3}{4}$ miles south of Silverton and about a mile east of, and 1,000 feet above, Slocan lake.

The property was discovered and development begun on it in the late "nineties." No record of its early production could be obtained and it lay idle for many years before recommencement of work in 1915. In that year an adit tunnel was driven to connect with the old workings from a point about 850 feet north of the main shaft which is down 220 feet. A mill with capacity of 100 tons per day was erected.

The vein appears to lie in the same strong zone of fissuring as the Van Roi, Hewitt, and Noonday mines and cuts granitic intrusives in which are inliers of older sedimentaries. The vein strikes north 60 degrees west and dips from 50 to 65 degrees northeast. It varies from 9 to 14 feet in thickness and is stated to have been traced for about 1,600 feet. Ore minerals are chiefly galena and blende associated with a gangue of quartz, siderite, and fragments of wall-rock. Some native silver is also present. The ore includes high-grade lenses suitable for hand sorting, but is, in the main, complex in composition and essentially a concentrating proposition.

HEWITT

The Hewitt mine is the property of "Hewitt Mines, Limited," a private company of five owners with headquarters in Spokane. M. S. Davys of Kaslo, B.C., is manager and one of three directors. The property includes fifteen claims and fractions covering about 600 acres. It is situated on a spur of Eightmile ridge and is reached from Silverton by road and trail. An aerial tramway, 5,270 feet long, connects the mine workings with the Hewitt mill. The latter has been erected on the north side of Silverton (Fourmile) creek and is reached from Silverton by a good road over a distance estimated at about $3\frac{1}{2}$ miles.

Discovered in 1892 the property has been worked at intervals since that time by several individuals and companies. Up to the end of 1910 it produced about 18,500 tons of ore which gave net returns of \$222,663.65, nearly all in silver. Development work continued from 1917 to 1919 resulted in opening up large shoots of ore between Nos. 7 and 8 levels. This property is developed by eight tunnels, giving a vertical depth of about 1,200 feet below the apex of the vein. No. 9 crosscut, 375 feet, vertically, below No. 8 level, is now in 420 feet and is expected to cut the vein at 1,800 feet from the portal. In recent years leasers have been opening up the older workings on the upper levels and continuing development on No. 9 crosscut, which is being driven from the northern slope of the hill overlooking Silverton creek and 865 feet west of the portal of No. 8 adit. In addition to developing the main vein it is expected that this crosscut will intersect, at about 600 feet from the portal, another vein which outcrops below the portal of No. 8 tunnel.

The country rocks include black, massive to laminated, argillaceous sediments including pyritic, carbonaceous, calcareous, and siliceous types. These strike about north 80 degrees east and dip to the north at an average angle of 70 degrees. They are intruded by dykes and by tongues from the Nelson batholith whose contact with the sediments appears in the mine workings.

The zone Slocan and p has a general includes a sye are ore-bearing "North" and largely of cou quartz. The predominating pale and dark occasionally, both blende observed, the forms. Pyrit ounces in silve Stibnite also On the upper The highest g

The Luck Spokane, Was Zincton post and two fracti at Zincton sta

The Luck in 1892 and developed into times was ship The disastrous ing a new tra by a number debt. About of Spokane, ut and during the zinc producer

The mine of 930 feet. T on the Big Fra ore above this partly depend up a block of

The ore-b stone and calc striking north the northwest calcareous stra strikes about 1 from 40 degree

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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 drill 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 deposit¹ (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.²

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 batholith³ 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 anticlinorium⁴ (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 echelon*, 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

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

² 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.

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

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

⁵ 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 angle and an ore pocket, if present. On the contrary, if the country rock is rule, undulating and makes acute angles or cross fissures. The intersections localization of workable ore shoots.

General Geology. The main problem is to determine the structural relations of the series and correlate them with similar to the regional structure was found in the heads of Davis and Cooper creeks in the

Fossils were found near the base of the West Kootenay sheet¹, on both limbs of the Milford syncline (F₁ and F₂) on sections west by an anticlinal belt of Selkirk schists and on the east by a reverse fault which has thrust the Ainsworth series into juxtaposition with the underlying Kaslo schists and locally with the underlying Kaslo traverse plotted on the scale of 400 feet from the Kaslo schists eastward to the Milford syncline. The schists of the lithological members, their synclinally folded nature of the series southward the Milford syncline becomes east and on that account the structure is clinal. Northward in the Lardeau appears to be intruded by granitic material.

Eight new fossil localities were discovered in a belt of Slocan series southwest of the lithology of the series on both sides. The localities are indicated on the accompanying map. The following preliminary report (F₃-F₆)² from the district east of Slocan mentions of fossils in dark schistose, limestone present in great numbers. A few of the gasteropods comprise the only other fossils that can with certainty be referred to any order or class. It is to be used to use this material for correlation however, plainly indicates a post-Cambrian beds are probably of middle or upper Cambrian age. It warrants a more definite correlation of the series.

"Lots S. F. 1 to S. F. 56 (F₁-F₆) to those just mentioned. In addition to the gasteropods and a small coarsely ribbed One of the gasteropods though present to leave little doubt that it represents of this specimen, the horizon is probably may be noted that the numerous small first glance incline one to surmise much smaller than those most commonly of diameter of 1 or 2 mm. represents the

¹ Geol. Surv., Can., 1904. Map No. 792. Heil
² 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 Slokan series and correlate them with similar formations in East Kootenay. The key to the regional structure was found to the north of the Slokan 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 sheet¹, 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 Slokan 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)² from the district east of Slokan 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)² 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."

¹ Geol. Surv., Can., 1904. Map No. 792. Here the Niskonlith is really an isolated infold of the Slokan series.

² See map 1667.