

W.A. NO.

NAME *Ministry Dept*

SUBJECT

*Standard*

BZFNW 180-02  
PROPERTY FILE  
002451

## CHAPTER I.—INTRODUCTION

Sandon is a small mining settlement in the Slocan Mining Division. It is situated in the Selkirk Mountains 6 miles east of Slocan Lake, 9 miles by road from New Denver.

The Sandon area as outlined in this bulletin (Fig. 1) comprises about 10 square miles southwest of Carpenter Creek, between Sandon and Three Forks, and an additional 1½ square miles northeast of Carpenter Creek. It includes many well-known mining properties, the more productive of which have been the Silversmith-Slocan Star, Ruth-Hope, Ivanhoe, Mammoth, Queen Bess, Payne, Wonderful, and Idaho-Alamo. The Standard mine is about 1 mile southwest of the area.

The total value of metal production from the Sandon area, combined with that from the nearby Standard mine, is roughly half the value of metal production from the entire Slocan Mining Division.

The area has a maximum relief of about 5,000 feet, from Alamo Siding on Carpenter Creek to Selkirk Peak, elevation about 7,650 feet. Slopes are precipitous at many points along Silver Ridge, which forms the height of land between the drainage basins of Carpenter and Silverton Creeks. Slopes of 30 degrees average inclination are common, and some are greater than 35 degrees. Most of the region can, however, be scaled, with the chief exception of bluffs on the north face of Selkirk Peak. Timber cover is heavy, mostly second growth or alpine, although much of the ground in the angle between Howson and Carpenter Creeks and on the slopes of Payne Mountain has not fully recovered from early forest fires and is thickly overgrown with brush. Few remnants of the original forest remain except in the alpine sections. Growth includes fir, hemlock, cedar, balsam, spruce, and tamarack, and brush consists of alder and willow at lower elevations and snowbrush and huckleberry at higher elevations.

The precipitation is heavy, and snow is a severe winter handicap. Snowslides are common during winter and spring months. June is commonly a wet and rather cold month, and snow can be expected to return to the summits in early October. The working season on the surface at higher elevations is short.

The area is served by a line of the Canadian Pacific Railway which runs between Nakusp on Upper Arrow Lake and Kaslo on Kootenay Lake. A branch extends from Three Forks to Sandon. The Kaslo-New Denver auto road passes through Three Forks, 4 miles by road from Sandon. The area is well served by mine roads, some of the extensions of which are in poor repair. In 1950 all roads were passable by auto from Sandon with the exception of that to the upper Ruth and Hope workings, which was passable by jeep. The road up Howson Creek was open as far as the Queen Bess. On the south slope a steep one-way road extends from the Standard to the Mammoth. There were at one time many trails, most of which can still be used, although some have not been brushed out for years.

### HISTORY

Sandon is centrally situated in the most productive part of the Slocan silver-lead-zinc camp. Founded in 1892, it grew to be a headquarters and an outfitting point for a score of mines and many prospects, and was a thriving and lively community. Now, only about a dozen people live there permanently, and staffs and crews of current operations are quartered in the old buildings. J. M. Harris, who maintains the only hotel and store and supplies water and electricity to the community, has been a resident of Sandon since 1892.

The history of the Slocan camp is one of initial rapid growth and of subsequent booms and recessions reflecting the market price of silver, lead, and zinc. The first claim recorded was the Payne, located on September 9th, 1891, and before the end of the year some eighty locations were made in the district at large, including several in the vicinity of Sandon. The following year 750 locations were made, sixteen properties were in operation, and shipments were made by pack-horse from six properties, including the Freddie Lee, east of Sandon. The earliest locations were made under the Apex

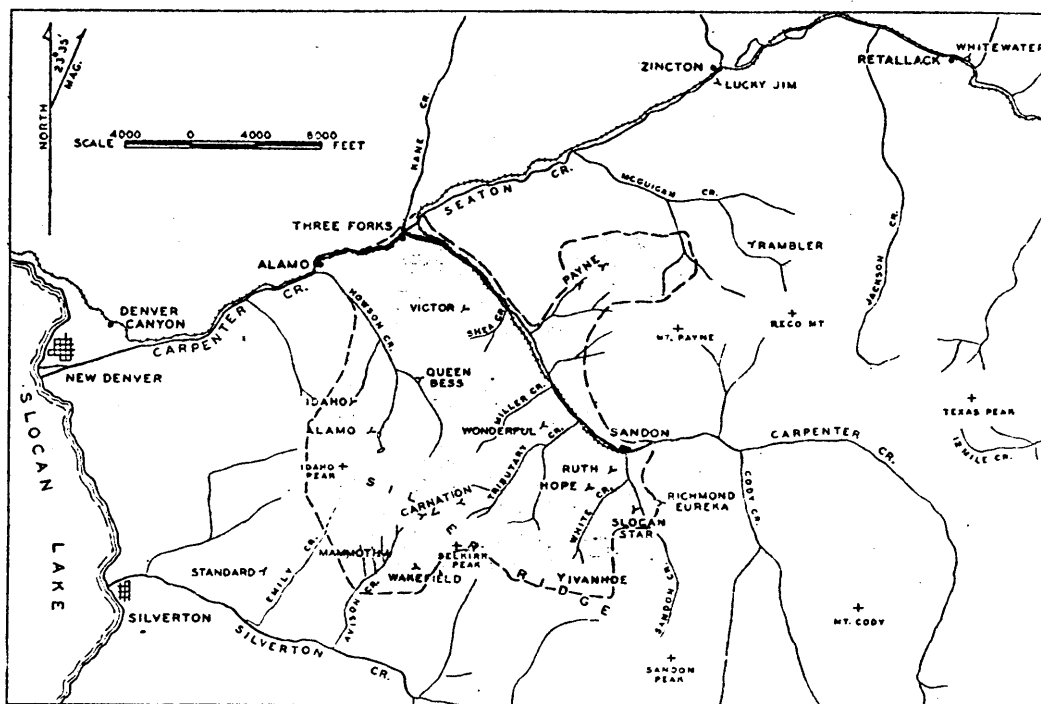


Fig. 1. Part of Slovan mining camp. Sandon area shaded.

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limited occurrence. Examples of ore in "porphyry" have been cited as evidence that the sills, dykes, and stocks are favourable wallrocks as such, but close investigation proves that they are favourable only in particular situations.

One of the controls most widely referred to is the cross-fracture. There are good grounds for belief that cross-fractures may have an important bearing on the formation of orebodies, but there is little agreement on just what the term implies. A cross-fracture appears to be any fracture at an angle to the course of a lode and may be either systematic or random in occurrence. Mineralized cross-fractures may consist of: Joints crossing a band of limestone (in which case the band of limestone is the lode), planes of conjugate shear, tension cracks, bedded offshoots of a lode, crossover or linking fractures within a lode. The term is not used in this bulletin because of the uncertainty of meaning.

Perhaps the most fundamental fact is that ore is not as a rule deposited in or associated with strong gouge. Ore is reported to occur "right in the gouge" in the Standard mine, but such an occurrence is rare. The second most fundamental fact, related to the first, is that orebodies other than those of fissure-vein type occur in zones of shattering rather than of shear. A third fact, stemming from the other two, is that in the larger lodes orebodies do not as a rule form in the main plane of movement but in or associated with minor or accessory planes.

These facts are so important that, although exceptions and contradictions may be encountered, they should be kept uppermost in mind in the search for ore. It is true that conditions seldom can be foretold in detail but, in the broader field of exploration, settings which are apt to provide zones of shattering along a lode may sometimes be recognized in advance.

In general, sites that are apt to be marked by clean-cut fractures rather than by gouge may be listed as follows, although they are not necessarily in the following order of importance:—

- (1) Intersection zones of fissures, whether that involves two lodes, connecting links between lodes, or crossover links between branches of a single lode. In such situations a wedge of ground may shatter or a set of subsidiary fractures may form in or along the margin of the dominant fissure.
- (2) Where a bedded lode jumps across the bedding.
- (3) Where a lode crosses a band of rock of the right degree of competency that rock may be cleanly shattered, whereas other bands of lower competency may be reduced to gouge. On the other hand, if the rock is excessively hard a complex lode may, in crossing it, be reduced to a single gouge-filled fissure. The optimum competency depends largely on the strength of the lode or of any particular plane of it.
- (4) Where a lode crosses harder rocks in a pronounced roll.
- (5) Where a lode crosses bedding at a large rather than a small angle and, more than that, the direction of movement on the lode is across rather than with the bedding. By extension, this proposition applies to subsidiary fractures within a complex lode or adjacent to a main plane of movement and may apply specifically to the angular relation between tension cracks and bedding.
- (6) Where there is a component of tension in the lode movement, with the result that a zone of relatively low pressure occurs.

Propositions 1, 2, and 3 need no amplification. They are general principles, perhaps no more applicable to the Slocan than to any other camp. Propositions 4, 5, and 6 may involve situations that are not at once apparent, and for that reason merit some analysis.

Proposition 4 describes a situation involving several factors. As a rule a major lode rolls sharply only to approach parallelism with bedding, the most obvious example being a flattening of a lode to pass obliquely through a flat panel, in spite of the fact that the strikes of lode and bedding are normally at a comparatively large angle. The rolls,

whether formed along dip or strike or both, may be accentuated by passage from hard to soft rock. A roll in a lode may be accompanied by shearing in soft rock, whereas hard rocks may shatter in response to tangential stresses in the zone of curvature. Many pronounced rolls or deflections in a lode occur where the lode either follows around or is deflected by some particular structure. This is a matter of direct observation in some instances, but in others there is no obvious structural influence, and it is to be inferred that a roll may be initiated locally by some specific structure and may carry through into a completely different environment.

Proposition 5 refers to the general condition that dislocative movement is least likely to produce openings if directed along planes of bedding. A bedded lode may have a relatively large movement distributed along many bedding planes, or it may be localized along one or more soft beds which are reduced to gouge. It is recognized that dislocative movement may pry beds apart to form openings of some size, but such effects are as a rule local and rare. Even though the plane of dislocation meets the beds at a moderate angle, movement in the general zone of the dislocation may channel in and out of bedding, shattering the rock it is perhaps true, but often with the production of much gouge. If the dislocation is at a large angle, only a single or multiple plane of gouge may be produced, but there may also be a clean-cut shattering, providing the rocks are of the proper competency.

A good example of the effect of bedding-lode relations is seen in parts of No. 7 level in the Standard mine. The lode crosses the beds at a moderate angle in strike, and the lode movement appears to bleed off into the hangingwall rocks along numerous gouge zones which closely follow the bedding. The rock in this section of the mine is physically no less favourable than elsewhere, but the angular relation between the bedding and the lode is unfavourable.

The mere size of angle between planes of dislocation and bedding is not enough to account for differences in the nature of rock failure. It is the size of angle between the direction of movement and the bedding planes that is important. If a fault crosses bedding at right angles in terms of strike and the fault dips 45 degrees southeast, there is the same interplane angle whether the beds dip 45 degrees southwest or 45 degrees northeast. Further, if the movement on the fault is one of dip-slip alone, the angular relation between the line of direction of movement and the bedding is the same, whether the beds dip southwest or northeast. In the Sandon area, however, the lode-faults have a component of strike-slip as well as of dip-slip, and the direction of movement is easterly to southeasterly. It follows that stresses along the major lodes were relieved in a direction at a small angle to northeasterly dipping beds and at a large angle to southwesterly dipping beds. If the direction of lode movement makes a small angle with bedding the rocks are mashed and bedded-clay seams are common, whereas if the angle is large the rocks break cleanly and may shatter adjacent to the principal plane or planes of displacement (Fig. 8). This principle accounts for the fact that in several situations ore makes in a lode where it crosses the southwest-dipping beds in one limb of a fold and does not extend into the northeast-dipping beds on the complementary limb.

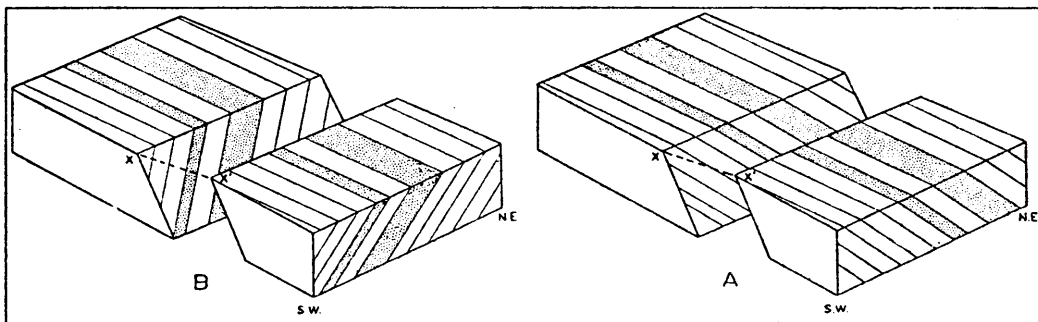


Fig. 8. Block diagram showing fault-bedding relationships.

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In 1951 No. 4 adit was started from a point below the Victor road, with the intention of crosscutting to the lode a distance of 700 to 800 feet to the northwest along the bedding.

**Mammoth** The Mammoth mine is owned by Western Exploration Company Limited and is worked jointly with the Standard. It is reached from the Standard camp by a steep one-way road. The ore is delivered to the mill at Silverton by a 16,000-foot aerial tram.

The present Mammoth ground must have been located many years ago, but the first mention of the group in 1922 (then known as the Monarch) implied a recent discovery at the apex of the lode above the present ore zone. The Standard Silver-Lead Mining Company did some work under option in 1923. Porcupine Goldfields Development & Finance Company Limited worked under option through R. A. Grimes in 1926, in which year the first four adits were started. In 1927 Grimes interested Western Exploration, who acquired the property and made immediate plans to bring it into production. During 1929 mill and tram-line were completed, air was delivered to the mine from the Standard power plant on Silverton Creek, and the orebody was opened up between Nos. 7 and 4 levels. The new equipment was given a trial run in 1930, and the property was then shut down pending better metal prices.

After a period in which lessees made small shipments, the mine was brought into production in 1935 at a rate of about 100 tons a day and was operated, with one major shut-down, through 1937. Following a period of inactivity when company attention was directed to reopening the Standard and reclaiming tailings from Slocan Lake, the mine again came into production in 1942. By 1944 the orebody between Nos. 7 and 5 levels was mined out, and a considerable amount of exploratory drilling was done, much of it below No. 7. The same year a new adit, the Monarch, was started to investigate intersections obtained by surface drilling. All work ceased in 1945.

In September, 1948, No. 9 level was started. The work stopped during the winter, but the crosscut to the lode was completed, and a raise in the footwall of the lode was driven to No. 7 level in 1949. In 1950 the tram-line was repaired, and production started late in the year from No. 8 level, which was driven from the raise.

The Mammoth is at about 4,650 to 5,700 feet elevation on a steep hillside subject to snowslides, which have impeded winter work in the past. No. 9 adit is collared on a bluff face between gullies in a situation so exposed to slides that winter work is impossible. No. 9 crosscut was driven to the lode and a raise was put through to No. 7 level in the summer. In the future, hoisting and servicing will be done from No. 7.

The orebody is developed by five adits, Nos. 1, 2, 4, 7, and 9. No. 3½ and two other short adits lie to the west of the main orebody, and an exploratory crosscut, the Monarch adit, lies farther to the west (*see* Fig. 10).

Complete production figures are not available because the ore has been milled jointly with that from the Standard and Enterprise. About 1,400 tons of ore was shipped prior to the start of milling in 1935. The total amount milled from 1935 to 1945 was 109,068 tons, with an average grade of about 12 ounces of silver per ton, 4 per cent lead, and 7 per cent zinc, according to company figures kindly supplied by Mr. Ham.

The main structural feature at the Mammoth mine is a compressed recumbent fold, concave to the west (Section F-F', Fig. 4). The axis of the fold, in the hangingwall of the lode, is just below No. 4 level. The axis in the footwall of the lode is hidden from view at a somewhat higher elevation, possibly 100 feet higher. The outline of the fold is not that of a simple arc, and because there has been strike-slip as well as dip-slip on the lode (the hangingwall moved down and east an undetermined distance) direct comparison across the lode of the two faulted segments of the fold is impossible.

Below the Mammoth workings a second compressed fold, concave to the east, plunges to the south and southeast at about 20 degrees. This fold can be seen in plan on the areal map but is not shown in section. This complementary pair of compressed

Such cross-fissures are common in these workings and in many places contain a little ore. They may cut across both walls of the main lode or lodes, but commonly stop at the hangingwall and run into the footwall rocks."

Workings on the Slocan Boy include three adits about 200 feet long extending to a depth of about 300 feet below the crest of the ridge. Early reports state that the lode was rich but narrow.

The rocks cut by the lodes are southwesterly dipping argillites with some quartzitic and limy strata. The workings are in the upper, right-side-up limb of the Payne recumbent fold, and the lower, overturned limb has not been recognized in the McGuigan Creek basin, as far down as the road crossing at an elevation of 5,200 feet. The axis of the fold on the Carpenter Creek slope is at an elevation of about 6,150 feet on the line of projection of the Washington lode.

To judge merely from surface exposures at the upper adit portals, the Washington lode is not everywhere a strong, well-defined zone, and the movement on it probably was not large in amount. At the portal of No. 2 adit it would appear that the movement was normal in character and possibly a few tens of feet in amount. To judge from Cairnes' remarks on variability of the lode, and to compare it with the nearby Payne lode, it is possible that there was considerable take-up along the course of the lode, and that the amount of movement on it varied from place to place.

The bulldozer stripping done in 1942 on the southwest slope was examined in 1948, after the banks had sloughed. An old 20-foot adit encountered at an elevation of about 6,300 feet was driven on brecciated material which may represent the extension of the Washington lode. The amount of breccia is, however, variable and is more widely distributed in the soil than would be possible if it all came from one lode zone. The structure is locally complex, with small rolls and strongly cleaved zones a short distance above the axis of the main fold, a situation which would probably strongly affect the course and behaviour of the lode and make its positive identification difficult.

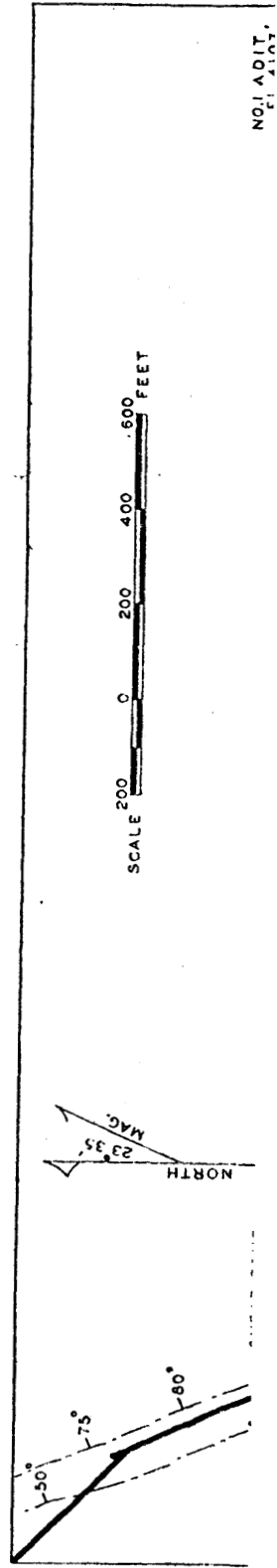
Head office, 38 South Dearborn Street, Chicago, Ill. M. P. McCullough, president; A. M. Ham, managing director; C. C. Starr, consulting engineer; R. A. Avison, superintendent. This company, with mill and offices at Silverton, bought the Mammoth and Standard mines in 1928 through R. A. Grimes, at a time when the Mammoth orebody was being developed and the Standard was being worked by lessees. A mill was built at Silverton and a 16,000-foot aerial tram-line was built to the mine under the management of Grimes. The new equipment was given a trial run early in 1930 before low metal prices forced closure.

Later, the Standard was rehabilitated and ore from the two properties was milled. The Enterprise on Enterprise Creek was bought in 1944 at about the time that the Mammoth orebody above No. 7 level was exhausted.

Recent development has again brought the Mammoth into production, and the three properties are being operated. Ore is transported by tram from the Mammoth and by truck from the Standard and Enterprise.

**Wonderful** The Wonderful property, 1 mile west of Sandon, was purchased in 1948 by Silver Ridge Mining Company Limited and added to that company's already extensive holdings. The Wonderful was among the earliest locations. Discovery of galena float led to ground-sluicing in 1894 and the uncovering of a train of boulders of almost massive galena. Total production of ground-sluicing operations, to the end of 1896, amounted to 400 tons, containing 120 ounces of silver per ton and 70 per cent lead.

Early development underground was not satisfactory. The first workings were purely exploratory, and apparently no definite lode was encountered by them. Some ore was mined, but it seemed doubtful whether the lode, which supposedly produced the large amount of detrital galena, had been discovered.



more "porphyry" was encountered than was understood to occur from knowledge of the areal geology. As is the general rule in this part of the Slocan, the lode does not represent a single fissure but appears to result from complex adjustment along a zone of movement. Diamond-drill stations were cut and 5,015 feet of drilling was done to explore the vein structures and look for new mineralized zones. No commercial amounts of ore were located, and the operation was shut down for the winter on December 15th. An average of 10 men was employed. (See Ann. Rept., 1963, p. 76.)

(49° 117° N.E.) Company office, 645 Hornby Street, Vancouver 1; mine office, Sandon. S. E. Cropper, president; **Reco (Reco Silver Mines Limited)\*** S. D. Anfield, secretary. Capital: 5,000,000 shares, \$1 par value. The property consists of 26 Crown-granted claims and 5 recorded claims situated immediately northeast of Cody. Work done on the Reco during 1964 includes the rehabilitation of four adit portals, cutting of 18,000 feet of base-line and cross-lines, and the taking of 250 soil samples. The perimeter of the holdings was tied in by survey.

A crew of four men worked for the company for a period of four months, under the direction of W. S. Ellis, engineer in charge.

(49° 117° N.E.) The Deadman lode, part of the Noble Five property at Cody, is held under lease by L. Fried, of New Denver. During 1964, Mr. Fried shipped 9 tons of ore, grading 26 per cent lead and 58 ounces per ton silver, which he hand-sorted from old dumps. Several tons of milling ore was accumulated during the hand-sorting operation.

(49° 117° N.E.) The Shady recorded mineral claim is about 1 mile east of Cody, on Carpenter Creek. N. Sibilleau, of Rossland, did some bulldozer stripping, which uncovered boulders of lead-zinc mineralized material. This material was hand-sorted, and 7 tons was shipped to the Trail smelter.

#### SLOCAN LAKE

##### *Silver-Lead-Zinc*

(49° 117° N.E.) Company office, 1011, 2200 Yonge Street, Toronto 12; mine office, Silvertown. J. C. Byrne, president; R. C. Phillips, mine manager; R. T. Avison, mine superintendent. Capital: 3,500,000 shares, \$1 par value. This company was formed in 1962 as a result of an agreement between Western Exploration Company Limited, Rayrock Mines Limited, and Faraday Uranium Mines Limited. Work was confined to the Hecla drift, which is 3,300 feet long on the course of the Standard-Mammoth lode. The drift was not extended, but 4,764 feet of diamond drilling was done to investigate the lode, which had not been followed continuously by the drift. In addition, 960 feet of drifting and crosscutting was done and 250 feet of raising. Three oreshoots, ranging from about 100 to 150 feet long, were encountered, and stopes were started at approximately 700, 1,400, and 1,700 feet east of the portal crosscut. These stopes are down dip from and about 1,000 feet below the lode where it is exposed in the bed and western bank of Emily Creek. The stopes are west of the downward projection of the Monarch and Hecla zones.

\* By P. E. Olson.

† By P. E. Olson and M. S. Hedley.



Stoping commenced in August. Heavy timbering and mechanical ventilation were necessary before stoping could be successfully carried out. The mill operated continuously after August on a one-shift-per-day basis and treated 3,033 tons of ore. Production: Silver, 36,908 ounces; lead, 156,969 pounds; zinc, 165,155 pounds.

Twenty-one men were employed during the latter half of 1964.

The company decided to purchase custom ore from small producers in the Silverton area and installed a crusher to permit sampling of small lots. Milling on a custom basis amounted to 1,506 tons.

*Hecla Mine Lease.*—A. Elsmore and M. Fryters leased the Hecla ore zone on the Mammoth No. 7 level and produced 8 tons of mill-feed and 5 tons of shipping ore. The mill feed was purchased by Johnsby Mines Limited. Total metal production amounted to: Silver, 1,407 ounces; lead, 6,177 pounds; zinc, 3,307 pounds. Fryters and Elsmore operated their lease on week-ends and holidays.

**Hewitt\*** (49° 117° N.E.) This property is under lease to Frank Pho and Jack Kelly, of Silverton. The mine is on the south side of Silverton Creek, about 3 miles east of Silverton. Early in 1964 Kelly and Pho deepened the internal shaft to No. 12 level and developed the Hewitt oreshoot from No. 12 to No. 11 level. They mined 1,372 tons of mill-feed from the ore zone and then allowed the workings below No. 10 level to flood. The ore was treated at the Standard mill at Silverton and the concentrates were shipped to the Trail smelter. Production: Silver, 35,374 ounces; lead, 105,100 pounds; zinc, 155,878 pounds.

**Galena Farm\*** (49° 117° N.E.) The Galena Farm is 2½ miles south of Silverton, and is reached by a road that leaves the Slocan–New Denver highway at Silverton. The Galena Farm is under lease to Frank Mills, of Silverton, who worked the mine with the help of Joe Hambly during 1964. Mining was limited to pillar recovery and stoping adjacent to previously mined sections on the footwall of the Noonday vein. Production of 126 tons was treated at the Standard mill at Silverton. Concentrates contained: Silver, 594 ounces; lead, 1,919 pounds; zinc, 26,379 pounds.

**Freddy\*** (49° 117° N.E.) The Freddy fractional mineral claim is about 3 miles south of Silverton, immediately north of the Galena Farm mine. V. C. Hansen, the owner, and H. Lyon worked the property during the summer months and hand-sorted 16 tons of ore which was shipped to the Trail smelter. An attempt was made to collar a shaft over the vein, but heavy overburden was encountered and the shaft was abandoned.

#### ENTERPRISE CREEK

##### *Silver-Gold*

**Jumbo (Vern Mines Limited)\*** (49° 117° N.E.) Company office, Nelson. E. F. Reuther, president; J. H. E. Ebert, secretary. This is a private company with a capitalization of 100,000 shares, no par value. The Jumbo group of 10 recorded mineral claims is on the south side of Enterprise Creek, 8.3 miles from the Slocan–New Denver highway. S. Berisoff, of Silverton, the original locator of these claims, sold the property to Vern Mines Limited early in 1964. A bulldozer was used to strip the vein at four

\* By P. E. Olson.

**Silversmith,  
Richmond-Eureka,  
etc. (Carnegie  
Mining Corpora-  
tion Limited)\***

(49° 117° N.E.) Company office, 416, 25 Adelaide Street West, Toronto; mine office, New Denver. A. W. White, president; J. C. Black, manager. Capital: 5,000,000 shares, no par value. This company is controlled by Violamac Mines Limited. The property consists of 46 Crown-granted and 6 recorded claims and fractions, which include the Silversmith, Slocan Star, Richmond-Eureka, Ruth-Hope, and Slocan King mines on Sandon Creek, south of Sandon.

Lessees E. Perepolkin and son shipped 23 tons of crude ore to the Trail smelter and 463 tons to the Carnegie mill. Concentrates produced from the latter were 25 tons of lead concentrate and 81 tons of zinc concentrate.

Lessees E. Perepolkin and J. Irwin shipped 223 tons of ore to the Carnegie mill, from which 27 tons of lead concentrate and 10 tons of zinc concentrate were produced.

During 1963 the Carnegie mill treated a total of 1,754 tons of ore and produced 159 tons of lead concentrate and 287 tons of zinc concentrate.

Diamond drilling on Carnegie ground amounted to 2,103 feet of A core in six holes and employed two men for about six months.

**Wonderful (Silver  
Ridge Mining  
Company Limited)\*** (49° 117° N.E.) Company office, 373 Baker Street, Nelson; mine office, Sandon. H. F. Magnuson, president; R. A. Grimes, managing director. Capital: 5,000,000 shares, 50 cents par value. The property is about 1 mile west of Sandon on the Idaho Peak road. The surface plant was reconditioned, and the portals of No. 2, No. 3, and No. 4 levels were reopened. On No. 2 level 350 feet of crosscut was driven to test the downward extension of vein outcrops. Ten men were employed during the second half of 1963.

**Victor (Violamac  
Mines Limited)\*** (49° 117° N.E.) Company office, 416, 25 Adelaide Street West, Toronto; mine office, New Denver. A. W. White, president; J. C. Black, mine manager. Capital: 1,000,000 shares, \$1 par value. The Victor mine is 2½ miles by road southeast of Three Forks. Activity on the Victor in 1963 was limited to leasing operations. Lessees L. Fried and E. DeRosa worked on Nos. 9 and 5 levels and mined a total of 465 tons of ore; 10 tons was shipped to the Trail smelter and 455 tons was trucked to the Carnegie mill. Lessees E. Anderson and J. Stewart worked on No. 4 level of the Victor and produced a total of 627 tons of ore; 14 tons was shipped to the Trail smelter and 613 tons to the Carnegie mill. Production: 1,091 tons. Gross content in ore and concentrates: Gold, 28 ounces; silver, 23,579 ounces; lead, 178,687 pounds; zinc, 233,621 pounds; cadmium, 1,561 pounds.

#### SLOCAN LAKE

**Silver-Lead-Zinc**

**Hecla (Johnsby  
Mines Limited)†**

(49° 117° N.E.) Company office, Suite 1011, 2200 Yonge Street, Toronto 12; mine office, Silverton. J. C. Byrne, president; R. C. Phillips, managing director; R. T. Avison, mine superintendent. Capital: 3,500,000 shares, \$1 par value. The main shareholders in Johnsby are Rayrock Mines Limited and Faraday Uranium Mines Limited.

\* By P. E. Olson.

† By M. S. Hedley and P. E. Olson.

In 1962 work was begun to explore the hangingwall branch of the Standard lode, east of the Standard mine. This hangingwall branch follows a general easterly course to the Mammoth mine, which lies about 1 mile to the east. The average dip is about 45 degrees to the south, but the lode varies considerably in both dip and strike. The Mammoth orebody has been explored from the lode apex at 6,000 feet to No. 12 level at 4,300 feet. Between the Mammoth and Standard mines are the Monarch and Hecla ore zones, which have been mined above a westerly extension of the Mammoth No. 7 level.

An adit site was chosen on the north boundary of the Standard claim at 4,166 feet elevation, west of Emily Creek, and a road was built to it from the old Standard camp. The crosscut started in 1962 was continued to the northeast in 1963, to intersect the lode on the Robin claim at a distance of 1,400 feet from the portal. The intersection is northeast of the face of the Standard No. 5 level and about 500 feet above it. The Standard-Mammoth lode was followed, mostly in the footwall but partly in the hangingwall, for 3,300 feet almost due east. Drifting was then stopped. The drift face is down dip from and about 850 feet below the general Hecla ore zone on the Mammoth No. 7 level. The drift face is also about 2,400 feet short of and about 100 feet below the intersection of the lode on the Mammoth No. 12 level crosscut.

In many places where it was encountered in the drift or in diamond-drill holes, the lode was found to be mineralized, although nowhere did the mineralization constitute ore.

A total of 3,390 feet of drifting was done, 1,215 feet of crosscutting, and 3,558 feet of diamond drilling. The average number of men employed was 16.

(49° 117° N.E.) Company office, 535 Howe Street, Vancouver 1. R. W. Liversidge, president. The property consists of nine Crown-granted mineral claims and fractions on the north side of Enterprise Creek, opposite the Enterprise mine. Peter Lewontowitz and partner drove 240 feet of tunnel under the old Westmont workings. A large portion of this drive was in overburden, which required special timber support. A total of 500 feet of diamond drilling was done on the property during the year. Two men were employed at the Westmont for seven months.

**Westmont (Sterling Silver Mines Ltd.)\***

**SPRINGER CREEK**

*Silver*

**Anna (Silver King Mines Limited)\***

(49° 117° N.E.) The Anna group is owned by Silver King Mines Limited; mine office, Slocan City. Benjamin Marasek, president and manager. The workings are located on the northern side of Springer Creek and east of the Ottawa mine. It is accessible by 5 miles of good road from Slocan City.

The mine was worked intermittently for nine months by Mr. Marasek and his son. No. 4 level was driven 56 feet, and a 15-foot crosscut was driven toward the footwall from the end of No. 4 level. A band of mineralization up to 6 inches wide, containing native silver, was encountered while drifting, but was found to be discontinuous. Six feet of winze was driven on the ore from No. 4 level about 50 feet from the face. Fifty-one tons of ore was shipped to the Trail smelter from a section of weak mineralization about 450 feet from the portal of No. 4 level.

\* By P. E. Olson.

Operations were suspended in January, 1962, and resumed for a month in June. The length of this salvage operation was two months, with the men employed averaging twelve. A total of 589 tons was shipped to the Carnegie concentrator. A small amount of development and stope exploration was done.

Violamac leased certain sections of the mine. Lessees L. Fried and E. DeRosa shipped 193 tons of ore to the Carnegie mill and 62 tons of ore to the Trail smelter. The operational period was eight months. Lessees J. Stewart and E. Anderson shipped 270 tons to the Carnegie mill and 12 tons to the Trail smelter. The operational period was eight months. Lessees E. Perepolkin and son shipped 42 tons to the Carnegie mill. The operational period was one month. The total production from the Victor was 1,168 tons.

(49° 117° N.E.) Violamac Mines Limited has under option this group of claims adjacent to the Victor property. The adit that was started in 1961 was continued along the vein to a point 1,384 feet from the portal. The advance for the year was 350 feet. The vein was explored above the level by driving two short raises and subdrifting along the vein. The total development was 498 feet: raising, 126 feet; drifting and crosscutting, 372 feet. Two men were employed for six months.

#### SLOCAN LAKE\*

##### *Silver-Lead-Zinc*

(49° 117° N.E.) Company office, 801 Fina Building, 736 Eighth Avenue Southwest, Calgary; mine office, Silverton. **Mammoth (Loma Minerals Limited)** D. W. Hilland, president; R. T. Avison, mine manager; C. Towgood, mill superintendent. This company had under lease the holdings of Western Exploration Company Limited, in the Silverton area.

Development consisted mainly of 150 feet of drifting and 400 feet of raising on No. 9 and No. 10 levels. Production was from the 970 stope area immediately below the No. 9 level. Additional ore was found on the No. 10 level at the junction of the Mammoth and Buffalo shears. The ore was trucked from the mine to the concentrator at Silverton. The concentrator operated on a one-shift basis for a total of 185 days. A total of 7,506 tons of ore was treated—6,494 tons from the Mammoth, 1,012 tons of lessee ore, of which 625 tons came from the Hewitt, 345 tons from the Enterprise, and 42 tons from the Bosun. A total of fifteen men was employed, twelve of whom worked at the mine and three at the mill.

Operations were closed on October 22, 1962, when a new company, Johnsby Mines Limited, acquired all interests of the Western Exploration Company Limited, at Silverton. The main shareholders in Johnsby are Rayrock Mines Limited and Faraday Uranium Mines Limited. The crew from the Mammoth transferred to Johnsby to work on an extensive development programme on the Standard-Mammoth lode.

(49° 117° N.E.) Company office, 509, 25 Adelaide Street West, Toronto; mine office, Silverton. **Hecla (Johnsby Mines Limited)** J. C. Byrne, president; R. C. Phillips, project engineer; R. T. Avison, mine superintendent. This company was formed in November, 1962, as a result of an agreement between Western Exploration Company Limited, Rayrock Mines Limited, and Faraday Uranium Mines Limited. The Standard-Mammoth group of claims, including all the ore reserves developed by Loma Minerals, have been acquired by Johnsby Mines Limited.

\* By J. D. McDonald.

An exploration drive is planned to investigate the Standard-Mammoth lode system, starting about 500 feet above the inner workings of the Standard No. 5 level and passing about 850 feet below an ore zone on the Hecla claim. The ultimate objective is a connection with the Mammoth No. 12 level, which is about 200 feet higher than the new drive. The entire project involves several thousand feet of underground work. The adit for the Hecla drive, as it is called, is above the Standard No. 5 level at an elevation of 4,170 feet, on the Surprise Crown-granted claim. Access to the adit is by 1 mile of new road which leaves the old Standard camp at No. 5 level.

The mine plant and surface installations were started in October and completed early in December. Power was brought to the plant by a 2,300-volt transmission-line from the old Standard line. A 7- by 8-foot drift was started in December and is being driven north 65 degrees east toward the Standard-Mammoth lode. Drift footage at the end of 1962 was 260 feet. A crew of fifteen men was employed for two months; six were employed underground.

**Bosun  
(New Santiago  
Mines Limited)** (49° 117° N.E.) Company office, 511, 850 West Hastings Street, Vancouver 1. R. Crowe-Swords, president. Capital: 3,000,000 shares, 50 cents par value. The Bosun mine is on the east shore of Slocan Lake, 1½ miles south of New Denver on the Nelson-Nakusp highway. W. H. MacLeod, of Silverton, did some development work off the winze which was sunk previously. A small amount of stoping was done on the vein. A total of 42 tons of ore was shipped to the Western Exploration mill.

**Hewitt (Kopan Developments Limited).**—(49° 117° N.E.) Company office, 906, 11 Adelaide Street West, Toronto. W. W. Dennis, president. Lessees F. Pho and J. Hichert continued mining below the No. 10 level. A short shaft was sunk and the ore was hauled to the Western Exploration mill. The total ore treated was 625 tons.

**Enterprise** (49° 117° N.E.) F. Pho and J. Kelly, of Silverton, leased this mine and operated it for five months. The mine is on Enterprise Creek, 8 miles by road from the Slocan City-New Denver highway. Operations ceased in November. The ore was hauled to the Western Exploration mill. The total ore treated was 345 tons.

#### SPRINGER CREEK\*

##### Silver

**Anna (Silver King  
Mines Limited)** (49° 117° N.E.) This group of five claims is owned by Silver King Mines Limited; mine office, Slocan City. B. Marasek, president and manager. The property is on the northern side of Springer Creek, adjoining the Ottawa mine on the east. It is accessible by 5 miles of good road from Slocan City.

B. Marasek and one man worked on the property for eight months. The ventilation raise from No. 4 level to No. 3 level was completed, a total distance of 120 feet. Diamond drilling consisted of nine holes with a total footage of 940 feet. A 40-foot crosscut was driven to explore the shear. Two tons of ore was shipped to the Trail smelter.

\* By J. D. McDonald.

to the local master-jointing in the rock. The fissure may be several hundred feet long, with a width varying from that of a knife-blade to 5 or 6 feet. Both wet and dry ores occur in the granite; examples of the former are the *Fisher-Maiden*, *Mountain Con*, and *Flint* mines, and of the latter the *Molly Hughes*, *McAllister*, *Sweetgrass*, etc. In the rocks of the Slocan series the fissure system is best developed and contains the largest veins and ore-bodies. The veins vary in length from a few hundred to about 4,000 feet, and in width from a few inches to 50 feet. They almost invariably cut across the strike or dip of the formation, bedded veins being quite rare. In such a wide area the strike varies greatly, and the dips range from 30 to 80 degrees. The veins either end by swinging in on the bedding-plane of the slates and quartzites, or feather out in the broad bands of softer slates. Faulting is difficult to detect on account of the similarity of the rocks; it is only where sills of porphyry occur that the small displacements may be seen.

"Where the vein is wide the filling is largely crushed and broken country-rock. Siderite, quartz, and calcite are the most common of the gangue minerals, and the deposits are characterized by having one of the above either as the predominant or as the almost exclusive gangue mineral.

"The ore-shoots are usually composite in character, and consist of irregular bands, lenses, and masses of clean galena or zinc-blende, and intimate mixtures of the two.

"The shoots vary from a few feet to 400 feet or more in length, and from a few inches to 40 feet in width. As a rule, the pay-streaks of high-grade ore favour the hanging-wall, and vary from a fraction of an inch to over 5 feet in width.

"The ore-bodies favour the softer slates and sandstones which are more carbonaceous, rather than the quartzites and porphyries, but there are some exceptions in which the reverse is true.

"The ores are classified under wet and dry; the former having calcite or siderite as gangue with the galena, while the latter have quartz. Galena and blende, with tetrahedrite (freibergite, grey-copper), are the chief metallic minerals. Ruby and native silver and argentite are found in a few deposits. Chalcopyrite and pyrite are almost invariably present, the former in small amount and the latter in increasing quantity as the lead content decreases.

"At present the values of the ores mined range from about 7 per cent. lead and 20 oz. silver to the ton—which is low-grade concentrating ore—to the high-grade ore which ranges from 50 to 75 per cent. lead and from 80 to 175 oz. silver per ton. The dry ores run high in silver, with low lead content. Gold occurs in many of the ores, with assay values from \$1 to \$7 per ton."

In the 1911 Report of the Minister of Mines will be found a report by W. Fleet Robertson, Provincial Mineralogist, on the Slocan district, in which there are extended descriptions of the *Standard*, *Van-Roi*, and *Hewitt-Lorna Doone* mines. The writer will therefore try to avoid undue repetition, but simply note new work and developments.

This company owns a group of claims on the north side of Four-mile creek about two miles from the town of Silverton. The claims include the **Standard Silver-Lead Mining Co.** *Emily Edith*, *Standard*, and *Alpha*, and the principal mining-work is on the *Standard*. The *Standard* was the nucleus of the present company and was first acquired by Geo. Aylard from the original owners; later Mr. Aylard interested Finch & Campbell, of Spokane, and the company was formed, and the *Emily Edith* and other claims were secured by purchase. The *Alpha* is being operated at present by the company under some sort of an option with the owners, the estate of N. F. McNaught.

In 1911 the water-concentrating mill was erected on the shore of Slocan lake, at the north end of the town of Silverton, and connected to the mine by an aerial bucket tramway. A flow-sheet of this mill is given in the 1911 Report, and only slight modifications of the mill design have been made since that time. The capacity of the mill is about 150 tons a day. The products of the mill are lead concentrates carrying good silver values which is shipped to the Trail smelter, and zinc concentrates containing some silver which are sold to smelters in the United States. No figures as to extraction are available, but it is known that both lead and zinc losses in tailings are considerable. It is probable that the average all-round extraction on silver, lead, and zinc values is not more than 70 per cent. Such losses are usual in any mill using jigs and tables operating on lead-zinc ores. Also when any of the ore contains grey-copper and ruby-silver (as is often the case), these minerals are almost entirely lost in the tailings, thereby causing a heavy loss in silver values. The reason that a lead-zinc concentrator generally has

high tailings losses is owing to the habit of this class of ore to slime readily, and such slimes of metallic minerals cannot be saved in ordinary concentrators. Of late years a great deal of work has been done in adapting flotation processes to the treatment of these slimes, and great success has been attained in many places, notably at Broken Hill, Australia, where flotation had its inception, and later in many sections of the United States. The pioneers in the use of oil-flotation to treat silver-lead zinc ores in British Columbia were the Silverton Mines, Limited, and later the Standard Company. The process is working successfully at the mill of the former company in combination with a preliminary water-concentration, and a very satisfactory recovery of the values in the ores is being obtained. The process at the Standard Company's mill is in the final stages of experimentation and a plant to treat the tailings is about to be installed. One of the chief difficulties in adapting flotation to the treatment of tailings containing lead and zinc sulphides is the selective separation of these minerals by oil-flotation. It is comparatively easy to float the lead and zinc sulphides together and separate them from the associated gangue rock, but it is much harder to float either sulphide by itself. One way of dealing with it is to make a combined lead-zinc concentrate and then separate these by later treatment on a shaking table. Or, again, by a proper selection of oils and modifications of the process a partial separation can be made by oil-flotation. A description of the process in use at the Silverton Mines, Limited, is given in the notes on that company's mill.

The *Standard* mine is developed by eight tunnels, all of which are adits driven in on the vein. The vein is a large one, up to 100 feet in width, and the vein-filling consists for the most part of crushed slate, together with some quartz, calcite, and siderite. The main ore-shoot in the mine is developed between No. 3 and No. 6 levels. This ore-shoot was undoubtedly the largest shoot of high-grade galena ore ever uncovered in British Columbia. On the No. 5 level it was 400 feet long and showed up to 20 feet in width of clean galena, besides an equal thickness of concentrating-ore. All ore above No. 4 has been stoped out, and most of that above No. 6. At the present time No. 8 tunnel is being driven in, and exploration is being carried out between Nos. 6 and 7 to find the downward continuation of the main ore-shoot. The vertical distances between the tunnels are: No. 3 to 4, 100 feet; No. 4 to 5, 125 feet; No. 5 to 6, 180 feet; No. 6 to 7, 280 feet; No. 7 to 8, 400 feet. No. 7 is in over a mile and should have struck the main ore-shoot, but in such a large vein it quite possibly could have been missed. By working down from No. 6 in intermediate levels the ore-body will either be followed or it will be definitely known that it has ceased. No. 8 is in about 1,500 feet and has shown small amounts of ore. There is a long section of the vein that this tunnel will prospect before entering ground where a possible extension of the upper ore-shoot would be found, and it is quite possible that other shoots may be discovered. The general practice is to run crosscuts to foot and hanging walls every 100 feet. In this way any ore-shoot 90 feet or greater in length would be discovered, and shorter ones would stand a fair chance of being located. Work is being prosecuted steadily on this level, which has its portal on *Emily Edith* ground.

The main level entry of the mine is the No. 6 level, and from ore-bins at its mouth the tramway starts. Some crude ore is taken out of No. 5 and brought down to these ore-bins by a baby gravity-tram, but all mill-feed goes through to No. 6. There are also bins at the portal of No. 7 and the main tramway can be loaded there if desired. All the levels down to No. 7 are connected by raises, but there is no connection between Nos. 7 and 8. The system of mining is to stope the ore upwards in 5-foot sections, timber by means of square-setting, and fill in the timbers with waste rock.

When war broke out in August, 1914, the *Standard* had to stop mining and milling ore, as the Trail smelter refused to take any shipments at that time. Development-work was kept up, though, and in June, 1915, mining and milling was resumed. The mill is run in three 8-hour shifts and the mine in two shifts.

In 1915 the production, which is for the half-year operated, was as follows: Tonnage milled, 35,176 tons; lead concentrates, 7,910 tons, containing 747,313 oz. silver and 8,480,945 lb. lead; zinc concentrates, 4,406 tons, containing 101,320 oz. silver and 3,778,857 lb. zinc.

In the last four years this mine has paid the following dividends: 1912, \$425,000; 1913, \$650,000; 1914, \$475,000, operating seven months; 1915, \$250,000, operating seven months.

Like all Slocan mines, a great deal of dead development has to be done to find the ore-shoots, and, at certain times, the total tonnage of ore in sight in the mine is small.

1911

each pass on to a five-compartment jig. The middlings of all the jigs are sent to the bucket elevator and returned to the rolls and trommels. The products of the jigs and tables pass to a three-compartment bucket elevator and are hoisted and deposited in bins.

The power for the mill is provided by water-wheels, a 5-foot Pelton driving the rough crushing plant and another the remainder of the plant.

The object of the plant was to make a separation of galena, zinc-blende, and iron-pyrites, making a zinc-blende product that would be sufficiently high grade to be marketable.

The *Standard* mine has, within the last year, shown one of the most Alpha, Standard, successful developments with depth of any property in the Slocan, and now and Emily Edith. has more ore developed—practically ore in sight—than at any time in its history. The *Standard* vein cuts through three properties, the *Alpha*, *Standard*, and *Emily Edith*, each of which has already made a record as a large shipper of silver-lead ore. These properties are situated in the Slocan Mining Division, on the slope of the mountain on the east side of Slocan lake, and on the north side of Four-mile creek, which flows into the lake at the town of Silverton.

The vein-fissure cuts through the Slocan slates in a general east-and-west direction, and has been developed by various adit tunnels from the upper workings of the *Alpha*, the highest of the three properties, at an elevation of 2,834 feet above Slocan lake, down to the lowest workings of the *Emily Edith*, at an elevation of about 720 feet above the lake.

The general slope of the hillside along the line of the fissure is from 20 to 30 degrees, and, as the ore-shoots dip into the hill, the adit tunnels driven become quite long when any depth is attempted.

The fissure in the upper workings of the *Alpha* is somewhat irregular and broken, but as it goes down the hill it becomes more clearly defined. In this fissure there are shoots of ore between which the fissure is almost barren.

On the *Alpha* the ore-shoot was discovered practically on the surface, dipping into the hill, and before the property was shut down in 1894, owing to litigation, some 1,200 tons of high-grade silver-lead ore were shipped, chiefly from a large body of galena and lead-carbonates found near the surface.

This property has lain idle since 1894; it was held for some years by the late N. F. McNaught, and is now owned by his estate.

The development consists of five adit tunnels driven in on the vein; the upper tunnels contained good ore, but Nos. 4 and 5, the two lowest tunnels, did not reach the ore-shoot, although the vein there is clearly defined.

It would seem that these two tunnels had not been driven far enough in to expect to strike the ore-shoot seen in the upper levels, and that allowance had not been made for the dip of the ore-shoot into the hill and the low slope of the hillside.

A scheme was in progress last fall not only to extend these lower levels, but also to prospect the ground at a greater depth by using one of the *Standard* tunnels, permission to do so having been granted by that company.

*Standard Mine.*—The *Standard* mine is owned by George H. Aylard, of New Denver, and John A. Finch, of Spokane, Wash., and is situated as has been described. The property consists of three Crown-granted claims, the *Shunieaw*, *Standard*, and *Surprise*, and the same partners have also acquired the adjoining property of the *Emily Edith* company.



The *Standard* mine has been opened up by a series of adit tunnels, the highest at an elevation of 1,987 feet above the lake, or 300 feet lower than the lowest tunnel of the *Alpha*, while No. 6 tunnel is at an elevation of 1,414 feet above the lake, thus developing between these levels a vertical depth of 573 feet, while it is considerably more on the slope of the vein.

No. 1 tunnel appears to have been above the ore-shoot, and was driven in some 85 feet without striking anything very encouraging.

No. 2 tunnel, some 77 feet vertical lower down, was driven in about 250 feet, and passed through a shoot of ore about 150 feet long, which extended upwards to the No. 1 tunnel.

No. 3 tunnel is 81 feet lower than No. 2, and has been driven in 415 feet, passing through the same ore-body as seen in No. 2.

No. 4 tunnel, 100 feet lower, has been driven 900 feet, and has also passed through the same ore-body, which here extended along the level 300 feet.

No. 5 tunnel is 125 feet lower than No. 4, and after having been driven 1,300 feet struck the ore-body, which continued for about 300 feet, having a maximum width of over 40 feet, of which 20 feet was clean galena and 20 feet ore, which would concentrate, approximately, three into one.

No. 6 tunnel had, in September last, been driven in about 1,800 feet, the face showing strong mineralization, with zinc-blende and a little galena, but not enough to constitute ore.

About 200 feet back from the face, a small fissure, carrying a little galena, had been followed off to the left by a drift; this drift in following the ore had assumed the shape of a letter S, and contained a very nice stringer of ore, galena, and blende—quite sufficient, in September, to be workable.

Later advices from the mine indicate that this drift, as it was extended, opened up a very considerable body of galena-ore, and that the drift had become parallel to the main tunnel, but some feet to the left.

Whether this particular ore-body is the downward continuation of the ore-body developed on No. 5 is not yet determined; it appears to be rather too far out, and then, again, it may be the top of an ore-shoot from below which did not extend up to the No. 5 level; work being done will, however, soon solve the question.

The showing of ore on No. 5 level is one of the largest exposures of high-grade galena ever seen in British Columbia, and is practically intact up to No. 4 level, constituting a block of "ore in sight" above No. 5 level, which on a rough calculation figures out to a net value in the neighbourhood of \$1,000,000.

The ore-shoot is at its strongest on the No. 5, and so, undoubtedly, continues for some distance below; whether the ore found in the No. 6, some 200 feet lower, is the same ore-body has not been proved, but it probably is, in which case over \$2,000,000 more of ore will be available.

The ore shipped in former years gave smelter returns which averaged about 60 per cent. of lead and 80 oz. of silver to the ton, and there is no doubt this continuation of the ore-body will run about the same.

*Concentrator.*—The owners of the property were, last fall, completing the erection of a concentrating-mill, which has since been finished and is now running. This mill is situated on the townsite of Silverton, adjacent to the lake-shore, and is connected with the No. 6 tunnel of the mine by a self-acting aerial tramway, 7,900 feet long.

At both the upper and lower terminals this tramway is provided with separate bins for clean and concentrating ores, so that each can be sent down separately, permitting of the clean ore being shipped from the mill without further treatment, while the concentrating ore will go through the mill process.

The advisability of this procedure is evident, as the higher values in silver are usually contained in grey copper, "freibergite," or some high sulphide which, from its nature, crushes to a fine powder, causing great losses in slimes, so that a large proportion of the values would be lost in water concentration. By shipping the cleaner ores direct this loss is obviated, although at the expense of a somewhat increased freight and treatment charge.

The water for power and washing purposes is taken out of Four-mile creek (sometimes called Silverton creek), about two miles up from the lake; the intake is formed by a short tunnel driven through a projecting shoulder of rock in a canyon forming a natural dam, which cannot be swept away by the freshets to which the creek is liable every spring.

From the tunnel intake the water is conveyed by ditch and flume for about half a mile, passing on the way, by tunnels, through two gravel and clay sliding banks, in which the water is confined in tight flumes.

At a point just below the wagon-road up to the *Emily Edith* mine, the water from the ditch enters a 20-inch iron pipe, and is conveyed down to the creek-level, where, beside the wagon-road, an air-compressor plant has been installed. This plant consists of a 10-drill air-compressor of the Canadian Rand type, driven by a 5-foot Pelton wheel, working under a head of 160 feet, the whole being housed in a well-constructed, permanent building.

The waste water from the compressor plant Pelton is caught up by a second ditch-line, this time on the north bank of the creek, and is conveyed by flume along the hillside to a point directly above the concentrator plant, down to which the water is conveyed by a 16- to 12-inch iron penstock, about 1,200 feet in length.

At the compressor plant a by-pass is arranged so that, if for any reason the compressor Pelton is not in operation, the water can be passed, by opening a valve, from the compressor-penstock directly into the concentrator-flume.

*Emily Edith.*—The *Emily Edith* mine is an extension, down the hill, of the *Standard*, and, although formerly owned and operated by another company, has of recent years been acquired by the *Standard* company. The *Emily Edith* has not been worked since about 1904, and, as the shale country-rock weathers easily, the old workings to-day reveal nothing and cannot be examined.

The mine was originally opened up by some seven or eight adit tunnels, mostly driven in on the vein from the outcrop, although some were primarily crosscuts to the vein. The highest of these tunnels is at an elevation of 1,128 feet above the lake, approximately 286 feet vertical lower than the present lowest (No. 6) tunnel on the *Standard*. The lowest tunnel on the *Emily Edith* is at an elevation of 720 feet above the lake; therefore the vein has been explored in this property for a vertical height of 408 feet.

As far as can be gathered from the old mine-plans, the tunnels have been driven in, respectively, starting with the highest, 140 feet, 250 feet, 300 feet, 370 feet, 410 feet (partly crosscut), 350 feet, and 220 feet. It would, therefore, seem as if such development as had been done was exceedingly superficial when it is considered that the two lower tunnels in the adjoining *Standard* had to be driven 1,200 feet and 1,800 feet before reaching the ore-shoot which has made its success, and that there remains a considerable section of the vein absolutely virgin and unprospected.

The mine formerly produced a considerable tonnage of galena-ore running well into silver, but associated with a high percentage of zinc-blende.

It is expected that the *Standard* company, the present owners, will push the development of the *Emily Edith* as soon as the *Standard* No. 6 tunnel is producing.

The property is thoroughly equipped with good office, laboratory, bunk and cook houses, from which a wagon-road leads down to the main wagon-road up Four-mile creek.

The accompanying flow-sheet of the *Standard* concentrator, as originally started, has been made from a sketch kindly furnished by the management after the mill was completed.

The Van-Roi Mining Company, a subsidiary company of the Le Roi Van-Roi Mining No. 2, of Rossland, is the successor of the Vancouver Mining Company in the operation of the old *Vancouver* group of mines. The general manager of the company is Ernest Levy, of Rossland, who is also the manager of the *Le Roi* No. 2 of that place. The local manager is Douglas Lay, of Silverton, with T. J. Lloyd as mine superintendent and G. A. Gordon in charge of the concentrating plant.

The property held by the company includes several Crown-granted mineral claims, the *Humboldt*, *Vancouver*, *Zilor*, *Mountain-Boomer*, etc., situated on the south side of Four-mile creek, on a shoulder of the hill between Granite creek on the east and Vancouver creek on the west, some four miles from Silverton, and at an altitude of between 3,900 and 4,500 feet.

The country-rock here, classed as the Slocan slates, consists of a lime-slate formation, and is here cut by at least two well-defined veins, roughly parallel and about 75 to 100 feet apart, having a strike of about N. 70° E. and a dip to the north of about 70 degrees.

These veins, known respectively as the Main, or North, vein, and the Beryl, or South, vein, are quartz-filled fissures, crossing the slates, varying from 4 feet to 10 feet in width, and often containing much brecciated slate. In these veins there are more or less clearly defined ore-shoots or lenses, while between these the vein-matter is not sufficiently mineralized to be of value.

The ore consists primarily of galena and zinc-blende, with high-grade silver minerals and sometimes metallic silver and ruby-silver, which occur in such a manner that they may often be sorted out by hand from the concentrating ore that forms the great bulk of the tonnage.

The approximate assay of the concentrating ore as sent to the mill is 4 per cent. of lead, 9.1 per cent. of zinc, and about 11.2 oz. of silver to the ton, while the ore from the eastern portion of the mine, the direction the development is trending, will run up to 15 oz. of silver to the ton.

The present output of the mine is, approximately, 35,000 tons of ore a year, in the production of which 105 men appear on the mine pay-roll, including surface men, and sixteen are employed in and about the mill.

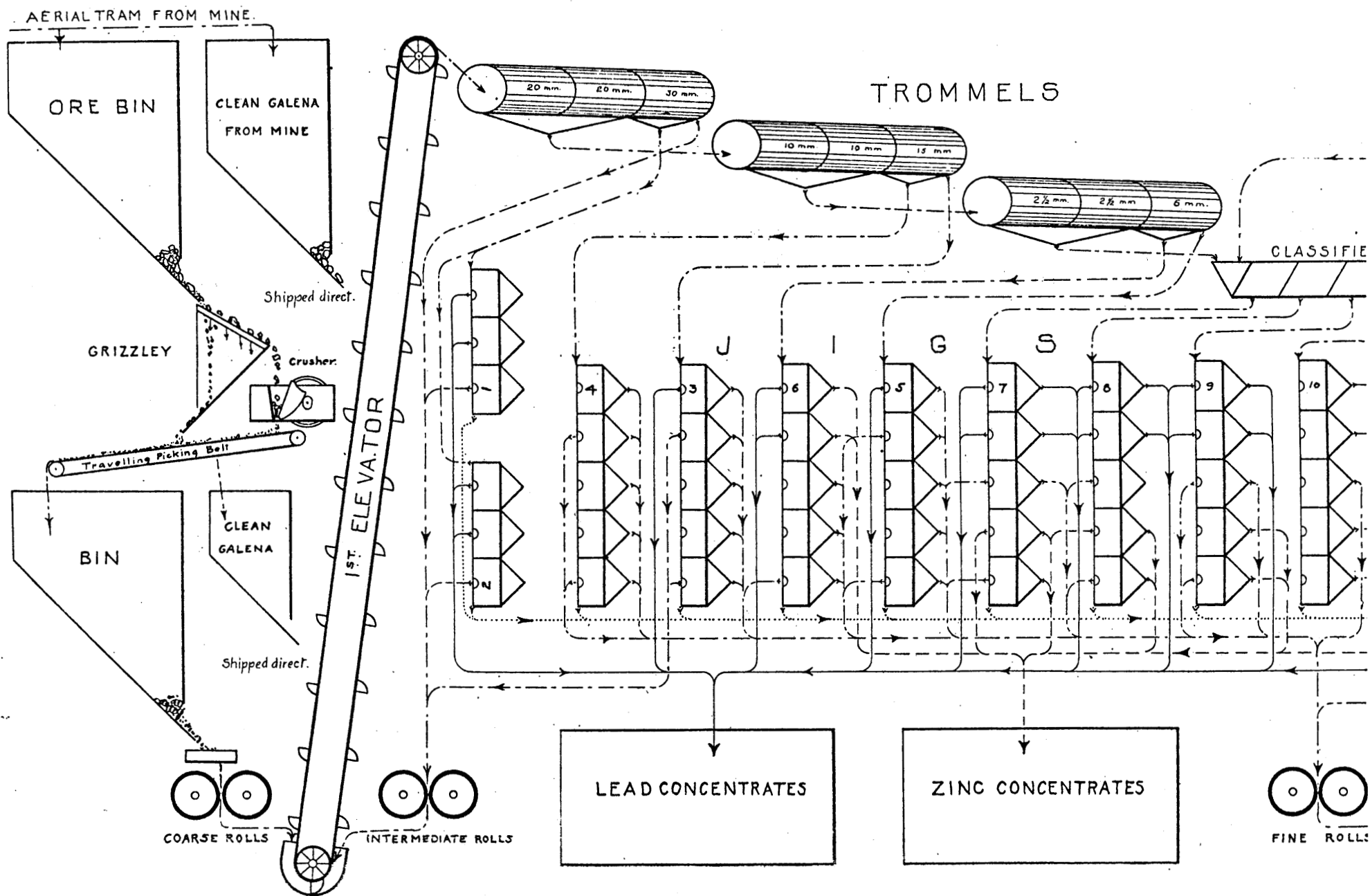
The development of the property has been by adit tunnels run in on the vein; tunnels Nos. 1, 2, 3, and 4 have been driven in from the west side of the hill from the Vancouver Creek slope, while No. 5 tunnel, now the main working tunnel, has been driven in from the east side of the hill from Granite creek.

The property was originally opened up by the *Vancouver* company by an adit tunnel from Vancouver creek, of which No. 2 cut a very considerable ore-shoot, or lens of ore, passing through which this tunnel was continued for some distance without finding another ore-shoot.

No. 3 tunnel was driven in along the vein until it had passed completely under the ore-body seen in No. 2 level, showing that the ore-lens did not extend downward to No. 3, nor did it quite reach up to No. 1. No. 3 tunnel was pushed some distance farther by the old

Four-mile  
creek  
gr.

adit  
tunnel



MELS

# FLOW SHEET

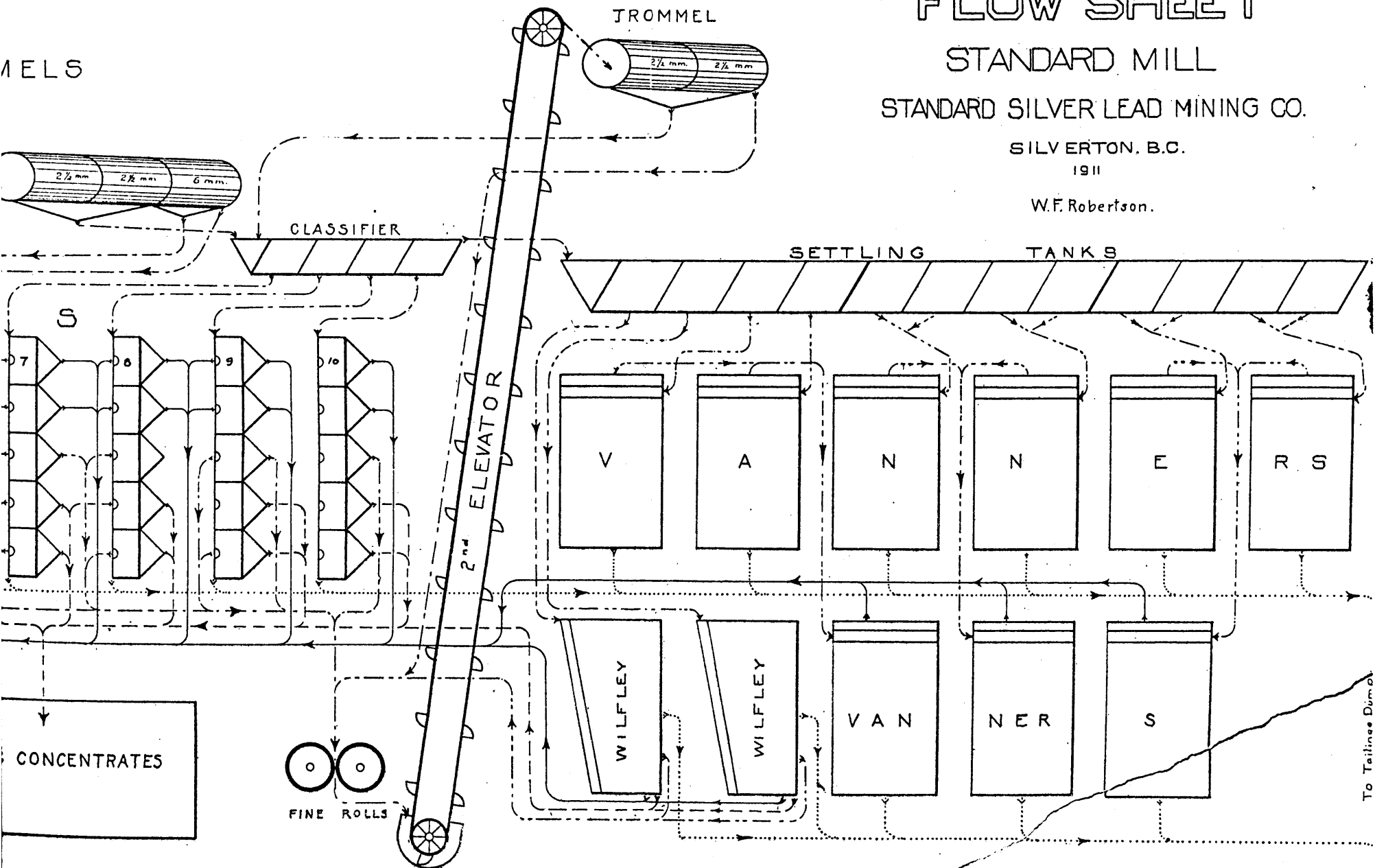
## STANDARD MILL

STANDARD SILVER LEAD MINING CO.

SILVERTON, B.C.

1911

W.F. Robertson.



To Tailings Dump

being stored at present on the dump, the present price of \$10 a ton for 45 % zinc and 20 ozs. of silver, offering no inducement to sell. The ore is taken out at No. 2 tunnel, where it is trammed 100 feet to a bin, from whence it is run in a short tram 400 feet to a second bin, which in turn discharges into a third bin; it is then loaded into the buckets of the main aerial tramway, which is  $1\frac{1}{4}$  miles long, with a fall of 3,000 feet.

The concentrating mill is designed to treat 100 tons of ore a day, but when visited it was only putting through about 40 tons a day. The plant is arranged for the separation of the zinc blende, but no close separation is attempted, as the zinc concentrates carry about 20 to 20 oz. of silver, so that it is better economy to allow as much zinc as possible to go into the lead concentrates without reaching the "penalty limit" of 10 % zinc. The concentrates are hauled by waggon to Silverton, where they are shipped.

The *Emily Edith*, another of the well-known groups of claims in this district, formerly shipped considerable ore, but for the past two or three years has been shut down, and was found to be in the charge of a caretaker only, who was temporarily absent in Silverton when the property was visited, and, as all the tunnel entrances were locked up, nothing was seen of the underground workings.

The country rock is a hard brown shale, and is cut by a strong north and south fissure vein, carrying argentiferous galena and zinc blende. The mine is developed by a series of adit tunnels run in on the lead (to judge from the size of the dumps, for a considerable distance), and of these No. 4 is evidently the main or working tunnel. About 10 tons of galena ore, about 60 % lead, was still in the ore-sheds, and there were various piles of zinc blende ore, estimated at about 500 tons of 30 % zinc.

The mine is equipped with good buildings, ore-sheds, stables, office and a bunk-house well worthy of being copied by other mines in the Province, in which a well-planned attempt was made to give the men reasonable comfort and chances for cleanliness. The bunk-house is a frame building, two and a half stories high, with basement, lathed and plastered inside and clap-boarded outside, and was not an expensive building to construct. In the basement is a heating furnace for the whole building. The first floor contains changing-room, wash-room, sitting-room and writing-room for the men; with a separate entrance, office, draughting-room, and rooms for foreman and clerks. The top story is one large, well lighted and ventilated room, provided with a single row of double bunks, well built of planed lumber. This is the "ram pasture," where men are provided with a bunk and mattress without extra fee beyond the usual charge for board. The second floor is divided up into small rooms, each with a window and door, some fitted up with two beds, and others, larger, with four beds, each bed being provided with a woven-spring mattress, etc. Beds in these rooms could be had at a small additional charge, said to be 75c. a month for a bed in a four-bed room, and \$1 a month in a two-bed room. These charges, though small, pay splendid interest on the additional cost of construction, and the fact that they are always in demand proves that the men did not grudge the additional charge, which ensured them some privacy and a chance to keep clear of the dirty and undesirable element which, however small in proportion, is often to be found in a mine bunk-house. This bunk-house was planned and built by the then manager, Mr. E. Rammelmeyer, and the company, of which C. E. Hope, of Vancouver, is the agent, has the plans.

It is recently reported that this property has been taken over under lease and bond by M. S. Davys, of Nelson.

The *Comstock* was formerly extensively worked by a company, but is now under lease to Messrs. Hunter & Davys, who are operating the property with a force of 1 foreman, 4 miners, 2 ore sorters, and a cook, who also

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Jenny Lind, Ottawa Group and Fisher Maiden, all of which were visited, except the first two, and south of the Four-Mile Creek are the Thompson Group, Vancouver Group, and the Hewitt claim.

Four-Mile Creek, for ten miles of its course, forms a dividing line between the Slocan slates and the granite, although small areas of each cross the river in places.

#### THE MOUNTAIN CHIEF.

This property lies at the western extremity of this ridge and is owned by Mr. Geo. W. Hughes, who was one of the earliest shippers from this district *via* Nakusp, having purchased the claim in 1892 and then shipped a large amount of ore in 1893-4 and 5, of galena averaging 130 ounces of silver and 70% lead. After this the lead was lost, and much work has been done prospecting for its continuation. This fall several car-loads of zincy galena ore have been shipped, and work is being pushed ahead.

#### THE ALPHA.

The *Alpha*, Crown-granted, 51.67 acres, and other claims are locally known as the Grady group, and are owned by Jas. McNaught, Alex. McKenzie, and Jas. McKenzie. Manager, F. McNaught, Silverton. A good road  $2\frac{1}{2}$  miles long from Silverton, leads to the foot of a 3-rail gravity tramway, about 1,200 feet long, up to tunnel No. 1. No work had been done for some time, as there was some litigation in progress, in fact, none since the fall of 1894, but over 1,000 tons of ore had been sold that averaged 115 ounces in silver per ton and 70% lead.

This vein runs true N.E. and S.W., and dips S.E.  $30^{\circ}$  to  $40^{\circ}$ , through the black limestones, shales, and slates, but no ore was in sight. The ground is much disturbed and faults were in evidence. There are five tunnels, of which No. 1 was in about 300 feet to the face, with three upraises, cross-cuts, and an incline, and another tunnel starting near the mouth of this one ran 50 feet N.  $70^{\circ}$  E., while immediately below was a third, connected by stopes with the upper ones. No. 4, 80 feet down the hill, is a cross-cut for 100 feet through the much contorted country rock, and then a drift 110 feet along a smooth fault wall lying next to which is much black gouge, but no ore. Tunnel No. 5, below No. 4, appears to be following another lead altogether, from the position and strike, or north and south, dip E.  $45^{\circ}$ - $50^{\circ}$ , and for 110 feet along a smooth wall with several inches of decomposed matter or iron oxides; but there were no signs of any ore having been taken from this working.

OTHER CLAIMS.—North-west about one mile is the *California*, owned by J. MacDonald, J. Marino, B. C. VanHouten *et al*, to which mine a road had been built from New Denver, as a car-load of galena ore was ready on the dump for shipment.

#### THE REED AND ROBERTSON GROUP.

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High up on this range, 6 miles by road and trail from Silverton, is a very strong vein that runs up the south slope, crosses the ridge and then passes down the north slope as far, it is believed, as the Carnation claim, and along its strike eight or ten claims have been staked.

*Reed and Tenderfoot*.—These two claims, surveyed for Crown Grants, extend up the slope and across the ridge, and had been secured by Mr. C. W. Callahan, M.E., for his clients, who was prospecting the vein by surface cuts. The vein runs about north and south (mag.) and dips from  $45^{\circ}$  E. to nearly horizontal. At the southern boundary of the Reed a tunnel had been driven in 110 feet, disclosing considerable milling galena ore, and on the surface the ledge was very wide with also a good deal of mill ore occurring in wide bands of very coarsely crystallized calcite, 10 to 12 feet wide, while next to the calcite bands are several inches of solid galena. Higher up the slope the calcite bands continue, forming a prominent land mark from their whiteness, and in several cuts narrow bands of solid very large cubed galena lie next to these bands that at a point 300 feet above the tunnel come together in a solid mass of lime 10 to 14 feet wide, with several feet of concentrating ore, and few inches of solid lead ore. At the small cuts, about 30 tons of splendid ore were piled up, but more work is required to demonstrate the value and conditions of this very striking lead. There is no timber on these claims to amount to anything, and to get this ore in quantity down to Four-Mile Creek, a long aerial rope tramway, on a very steep pitch, will have to be built down a ridge safe from snow-slides.

*The Jenny Lind*, lying south of the Reed, has about 800 feet of the vein crossing one corner, and is owned by Paul and Chas. Anderson, Silverton. The vein presents very much the same characteristics of a large amount of calcite and brecciated slate and lime with

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