

BRITISH COLUMBIA DEPARTMENT OF MINES

HON. W. A. MCKENZIE, Minister.

ROBT. DUNN, Deputy Minister.

J. D. GALLOWAY, Provincial Mineralogist.

J. DICKSON, Chief Inspector of Mines.

BULLETIN No. 1, 1929

SUMMARY OF MINING OPERATIONS

FOR SIX MONTHS ENDED JUNE 30TH, 1929

IN THE

PROVINCE OF BRITISH COLUMBIA

COMPILED BY

JOHN D. GALLOWAY, Provincial Mineralogist



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AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

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Bear River Valley at Stewart, Portland Canal.

Shows Portland Canal Short Line Railway in 1910, now in disrepair, which is included in Canadian North-eastern Railway Charter, recently acquired by the Consolidated Mining and Smelting Company of Canada, Limited, to build from Stewart to Finlay River.

*To the Hon. W. A. McKenzie,
Minister of Mines, Victoria, B.C.*

SIR,—I beg to submit herewith a brief review and summary of mining operations in the Province for the six months ended June 30th, 1929.

The object of this bulletin is to summarize briefly the progress of the industry and to estimate approximately the value of the mineral production for the period under review.

Included are reports on each of the Mineral Survey Districts of the Province by the Resident Engineers and a summary regarding coal-mining by the Chief Inspector.

I have the honour to be,

Sir,

Your obedient servant,

JOHN D. GALLOWAY,

Provincial Mineralogist.

*Bureau of Mines,
Victoria, B.C., July 29th, 1929.*

SUMMARY OF MINING OPERATIONS

FOR SIX MONTHS ENDED JUNE 30th, 1929.

GENERAL SUMMARY.

BY JOHN D. GALLOWAY, PROVINCIAL MINERALOGIST.

Returns for the first six months of the year indicate that a new high record will be established for the mineral production of the Province in 1929. An output for the whole year valued at over \$70,000,000 is indicated. With prospecting, development, and construction of new mining plants and equipment proceeding at a greater pace than ever before, a continually expanding production record seems assured for some years to come.

A review of the mineral industry of British Columbia for the first half of 1929 shows that the material progress shown in recent years has been well maintained. The aggregate production of minerals was at about the same rate as in 1928, but owing to higher prices for copper, lead, and zinc, the value of the output shows a substantial increase. There is every reason to believe that production will be at a slightly higher rate in the second half of the year than in the first, so that a record year is anticipated.

Prospecting, exploration, and development have been carried on to an ever-increasing extent and the results of this work are in general satisfactory.

The value of the mineral-output for the half-year is estimated at \$35,256,063. This production rate is expected to be easily maintained or increased in the second half of the year, which will result in a mineral production of \$70,000,000 or more for 1929, exceeding the previous record of \$67,188,842, established in 1926.

The output in 1928 was valued at \$65,372,583, or at the rate of \$32,686,291 for six months. The production for the first six months of 1929 shows, therefore, an increase of 7.8 per cent. The tonnage of ore treated was approximately 3,300,000 tons, showing an increased rate as compared with 1928, the previous record year. The speeding-up of output at the *Britannia* and *Hidden Creek* mines mainly accounts for this increase. The average gross value of the ore treated was about \$8.15 a ton.

The following table shows the estimated mineral production of the Province for the period under review:—

ESTIMATED MINERAL PRODUCTION FOR SIX MONTHS ENDED JUNE 30TH, 1929.

Description.	Quantity.	Valuation.
Gold, oz. (placer and lode).....	90,000	\$1,860,462
Silver, oz.	5,250,000	2,903,098
Copper, lb.	51,000,000	9,404,145
Lead, lb.	145,000,000	7,490,990
Zinc, lb.	91,000,000	5,245,513
Coal, tons (2,240 lb.)	1,172,645	5,863,225
Structural materials .....	.....	1,700,000
Miscellaneous metals and minerals.....	.....	788,630
		<hr/>
		\$35,256,063

The production of gold, estimated at 90,000 oz., shows a decrease, which is accounted for by a somewhat lessened output from the *Premier* and decreases from Trail Creek and Nelson Mining Divisions.

The estimated silver-output of 5,250,000 oz. is practically one-half the 1928 production, and it is expected that due to increased mining and milling of silver-lead-zinc ores the second half of the year will show a higher figure.

The estimate of copper production of 51,000,000 lb. shows a slightly higher rate of production than during 1928. The increased output was made by the *Hidden Creek* and *Copper Mountain* mines of the Granby Company, as the *Britannia* rate of production was practically the same as

during 1928. Larger tonnages were treated by these three mines, but it is apparent that slightly lower-grade ore is being treated; this policy can be practised owing to the prevailing 18-cent copper market.

Lead production during the period shows a lessened rate of production as compared with 1928, but it is probable that during the second half of the year a larger output will be made; so that it is possible that the final figures for 1929 will show an increase over 1928. The lead-output of the Province comes mainly from the *Sullivan* mine, but developments throughout the Province are steadily producing further important reserves of lead ore.

The production of 91,000,000 lb. of zinc for the half-year is at about the same average rate of production as in 1928. The Trail plant is now equipped to produce zinc at a substantially higher rate than indicated by the six months' figures. The second quarter output at Trail was substantially higher than the first quarter of the year. The output in the second half of the year will probably be determined by the question of marketing the zinc, but an output for the year of at least 200,000,000 lb. is expected.

Coal-output for the six-month period shows a decrease, the rate of production being less than during the year 1928 and lower than the corresponding period of 1928. For details of coal production see the Chief Inspector's report at the end of this bulletin.

The estimated value of the output of structural materials is \$1,700,000, or approximately half the 1928 production. The latter half of the year should show an increase as building operations are active throughout the Province. A final figure approximating \$4,000,000 is anticipated.

The estimated production of miscellaneous minerals and metals during the period shows a substantial increase, the figure of \$788,630 being 87 per cent. of the total output recorded in 1928. An output of 251 tons of cadmium at Trail contributed largely to this increase.

METAL PRICES.

The outstanding feature of metal prices in the first half of 1929 was the rise in the price of copper to 24 cents a pound. This, however, was largely a nominal quotation and it is doubtful if much copper was sold at this price. The average price of copper for the six months ended June 30th was 18.439 cents a pound, which shows an increase of 25.8 per cent. over the average of 14.649 cents for 1928.

Lead and zinc prices rose during the early part of the year and then declined slightly, with the averages showing somewhat higher than for 1928.

The following table shows the average metal prices for 1928 and for the first six months of 1929:—

Metal.	1928.	Six Months ended June 30th, 1929.	Increase.	Decrease.
	Cents.	Cents.	Per Cent.	Per Cent.
Silver (New York), per oz.....	58.233	55.297	.....	5.0
Copper (New York), per lb.....	14.649	18.439	25.8	.....
Lead (London), per lb.....	4.571	5.166	13.0	.....
Zinc (London), per lb.....	5.463	5.764	5.5	.....

IMPORTANT EVENTS.

During the period under review several events have transpired in mining and in matters relating to mining which should be of major importance in connection with the future of the mineral industry of the Province and which will undoubtedly add to the general prosperity of British Columbia. These are briefly commented on and summarized as follows:—

The continual expansion of the activities of the Consolidated Mining and Smelting Company of Canada continues to occupy the most important place in British Columbia mining. Definite announcement has now been made by S. G. Blaylock, general manager, that the company will proceed at once with the construction of the first unit of a fertilizer plant at Trail, British Columbia. This plant will cost from \$7,000,000 to \$8,000,000 and will produce ammonium sulphate, ammonium phosphate and superphosphate, and possibly other fertilizers. This company has potentially cheap sulphuric acid from waste roaster-gases, cheap electric power (when

developments planned are completed), and a large supply of raw phosphate rock in East Kootenay.

A supply of potash would be of great value to the company in connection with the plan of developing a fully rounded-out fertilizer industry. The company has therefore broadcasted literature descriptive of potash-deposits and samples of various types of minerals and rocks containing potash in the hope that prospectors will search for this mineral. Potash determinations will be made free of charge by the company for any one sending in samples.

The treatment of zinc-slugs by electric smelting is now thoroughly worked out and a battery of furnaces will be required to treat the daily production and gradually treat the reserve of some 500,000 tons of zinc-slag, said to contain about 20 per cent. zinc.

Much additional electric power is required at Trail to supply the fertilizer plant and to take care of other expansion planned. In order to supply more power, the company, through its subsidiary, the West Kootenay Power and Light Company, is proceeding with two power projects. A plant will be constructed on Adams river, which is expected to produce 30,000 horse-power, which will be delivered into the power system at some point in the Okanagan district. Investigation of the Pend d'Oreille river is still proceeding with a view to constructing a plant capable of producing about 70,000 horse-power. Some consideration is also being given to the project of damming the Kootenay river with the objective of increasing the available power on the Kootenay river.

It is interesting to note that another metal is now being turned out in marketable form at Trail. This is bismuth, a production of 7 tons being reported during the first half of the year. This is obtained as a by-product of refining operations.

The acquisition by the Consolidated Company of the Canadian North-eastern Railway charter to build a railway from Stewart to a point on the Finlay river is a new departure for this company, but in this connection it should be remembered that the Consolidated Company is controlled by the Canadian Pacific Railway. No announcement has been made as to when railway-construction will be commenced, but it is believed that the 15 miles of railway built in 1910 from Stewart up the Bear river will shortly be renewed and reconditioned. The Consolidated is now interested in many mineral properties in the Stewart area and east of that along the proposed line of this railway. The building of this railway would open up a country believed to be potentially rich in varied mineral resources.

No further announcement has been made by the Consolidated Company regarding plans for a copper plant on the Coast, but the company has applied for a water-power on the Lois river, which application is still pending. The company has been very active in optioning copper properties on the Coast. Three properties in Alaska have been taken up and it is reported that the company has closed a deal for the Kinman property near Nimpkish lake, on Vancouver island. This was a new discovery in 1928 and it gives promise of being an important copper-mine. Details are given in this bulletin in the report of George A. Clothier, Resident Engineer of No. 6 District.

The entry of Noah Timmins, of Ontario mining fame, into British Columbia mining is of decided interest. He has recently taken an option on control of the Owen Lake Mining Company. A substantial cash payment was made and operations to develop the property will be rapidly pushed ahead.

A series of veins have been opened up on this property, some of which are of workable widths, carrying a complex mixture of sulphides. Values in gold, silver, lead, zinc, and copper are found and much of the ore is expected to be of milling grade, although quite good values are reported in places. Development of the property is no more than well started, but the indications are said to be promising for the opening-up of substantial tonnages of milling-ore.

The discovery of stannite (tin pyrites) at the *Snowflake* is of much mineralogic interest. It is the first authenticated discovery of tin ore in place in British Columbia. The commercial importance of the occurrence is being investigated as rapidly as possible by the steady development of the tin-bearing vein. This discovery opens up interesting possibilities of the finding of stannite and possibly cassiterite (tin oxide, the principal tin ore of the world) in the mineralized area in which the *Snowflake* is situated. A comprehensive report on the tin occurrence at the *Snowflake* by B. T. O'Grady, Resident Engineer of No. 5 District, is included in this bulletin.

The Britannia Mining and Smelting Company continues to increase its mining and milling operations. The daily tonnage now being treated is 6,000 tons a day, which is believed to be

the highest rate of mining ever carried on in the Province. Copper-output is not, however, being correspondingly increased, but is being maintained at about the 1928 rate of production, when 41,046,003 lb. was produced. With a price of 18 cents for copper, lower-grade ore can be handled at a profit, and this policy is apparently being followed.

Although no details have been received, it is understood that development of the *Ferguson*, on the Ingenika river, is turning out satisfactorily and another important silver-lead-zinc mine is likely to result.

Most encouraging reports have been received regarding the development of the British Columbia Silver Company's mine, and the discovery of some unexpected ore in the *Premier* revives the hopes that this famous mine will have a longer future than indicated by the statement of ore reserves in the annual report of the company for 1928.

The Granby Company's *Bonanza* mine was brought into production early in 1929 and is now producing about 11,000 tons of ore a month. An intensive search is being made by this company for further ore reserves in the mineralized area adjacent to the *Hidden Creek* mine at Anyox. The results of deep development on the *Copper Mountain* mine of the Granby Company continue to be very satisfactory, both in grade and quantity of ore disclosed.

The report included in this bulletin by the Resident Engineer of No. 6 District on the Kinman property would indicate that this is one of the outstanding mineral discoveries in the Province in recent years. The development of this property may hasten the time when a copper plant will be erected on the Coast.

Production from the Slocan, Ainsworth, and Nelson Divisions shows somewhat of a decrease during the first half of the year. This is accounted for by several reasons, none of which are connected with lack of ore reserves at the mines which showed a lessened output. The future outlook for these Divisions is that the tonnage of ore mined and milled will gradually increase, as plans now under way are brought to fulfilment.

The construction of a new 350-ton flotation plant at the *Monarch* near Field will bring back into production an old mine. The mill-construction was commenced after adequate development had proven extensive ore reserves of good-grade lead-zinc ore. It is expected that the mill will be completed late in the year.

The *Union* at Franklin camp, Grand Forks Division, is being equipped with a 100-ton concentrator. This mine has been steadily developed for two years by the Hecla Mining Company and a sufficient ore reserve developed to warrant equipment with a mill.

Reports coming in would indicate that prospectors are quite active in many parts of the Province, and that apparently a larger number are in the field than in 1928. The policy of the Consolidated Company in putting a number of prospecting-parties in the field shows that the largest mining company in the Province considers that there are still many opportunities for new mineral discoveries to be made in British Columbia.

It is probable that during the field season several hydroplanes will be used in Northern British Columbia in connection with prospecting operations. These will be mainly used for transporting men and supplies to areas which are somewhat inaccessible by ordinary methods of travel.

Exploration and reconnaissance of mineral properties by electrical prospecting methods are proceeding in several parts of the Province. This method is proving useful as a preliminary to diamond-drilling or excavational development to delimit the probable mineralized zones and eliminate unlikely areas. Four electrical prospecting companies now have representatives in the Province and are prepared to undertake this class of work.

It is probable that 1929 will set a new high record in dividends paid, as in the second quarter of the year both the Granby and Britannia Companies increased the regular quarterly disbursement. A total slightly in excess of \$12,000,000 is anticipated.

From the foregoing brief review it will be readily seen that the mineral industry of the Province is in a highly prosperous condition and has a bright future ahead of it.

PUBLIC PARTICIPATION IN MINING.

Much interest is now being taken by the public in British Columbia mining, as is clearly shown by the marked activity in mining stocks and the comparative ease with which new mining promotions are financed. It is inevitable that when the mining industry is in such a sound and prosperous condition and the public keenly alive to the speculative possibilities in mining, the

promotion of some worthless properties will be attempted and that the public will be misled by some of the statements made in order to sell mining stock. Through the efforts of the Department of Mines under the provisions to protect investors in the "Mineral Survey and Development Act," it is believed that, generally speaking, company prospectuses are reasonably accurate, and where they are misleading they are quickly withdrawn upon receiving private notice under the Act. There is, however, at the present time, much misinformation being broadcasted by means of "popular articles" in certain papers, which may be highly misleading to the investing public. Much of this literature can be characterized as being inspired by over-enthusiasm and consists of harmless exaggeration, but some of it may seriously mislead the unwary.

Legitimate promotions generally have a report made to start with by a reputable mining engineer and the public should ask for such a report before considering the purchase of stock in a new venture. It should also be remembered that the reports of the Department of Mines contain much valuable information about the mineral properties of the Province and these are available free of charge.

It is apparently still possible to sell stock by means of the display of high-grade mineral specimens, but it should always be remembered that the quantity of ore is quite as important a consideration as the quality; hence the desirability of careful investigation by the investing public.

It has frequently been stated that the main mining operations of the Province are conducted in a highly efficient manner, and that the technical direction equals that of any other mining area in the world, but it is also apparent that many of the smaller mining companies of the Province lack competent technical direction in the carrying-out of development-work. This is often due to the management being left in the hands of the promoter who, in certain instances, has neither technical nor practical knowledge of mining. One of the greatest needs for mining at the present time in the Province is a much larger supply of young mining graduates with two or three years' practical experience. In certain instances the present unsatisfactory managements could with advantage be replaced by employing these young engineers, but the supply is limited and they are difficult to secure. The successful mining companies of the Province all employ this type in various capacities and the small local companies would be well advised to follow the example.

It is quite noticeable that many influential names are now frequently included in boards of directors of new mining companies, apparently in order that the company may have a good standing with the public. These directors should therefore recognize their responsibility by seeing that accurate statements are presented to the public in literature issued by the company, and also that the development of the mineral properties is supervised by capable mining engineers. In certain instances shareholders' money is being sadly wasted in expensive equipment and in elaborate development plans, for which no reasonable justification can be found. Lack of knowledge and over-enthusiasm are responsible for these misguided efforts. The expenditure of money inadvisedly, generally means that promising possibilities are not tested out and in some cases the company's funds are gone before the property has had a fair trial. It cannot be too strongly emphasized that the most important function of the board of directors of a company is to see that the active management of the mineral property under development is in capable hands.

There is now an abundance of capital available for British Columbia mining which comes from many sources. This, of course, does not mean that there is a buyer for every prospect, but any property with reasonable possibilities can be optioned to some one who will develop it. Opinions naturally differ as to the speculative chances of making a productive mine out of many prospects, but it is quite certain that more properties are now being tested than ever before in the history of mining in the Province.

The Consolidated Mining and Smelting Company is probably in the lead in acquiring, optioning, and developing properties, and is also quite active in putting parties in the field to prospect certain mineral areas. Other large mining companies in the Province also have exploration departments seeking new properties, and a large number of small companies are developing one or more properties. The capital for these small companies is supplied in part locally and partly from many sources outside British Columbia.

DEPARTMENT OF MINES.

A number of changes have occurred in the staff of the Department of Mines. In April H. T. James resigned as Resident Engineer of No. 1 District and J. T. Mandy has been appointed to the position. In June A. G. Langley resigned as Resident Engineer of No. 5 District. The position was filled by the promotion of B. T. O'Grady, Assistant Resident Engineer, to be Resident Engineer. A. M. Richmond was appointed Assistant Resident Engineer, succeeding B. T. O'Grady. C. W. Moore has been temporarily engaged as Assistant Resident Engineer of No. 2 District. Mr. Moore is an experienced placer operator and he will make a special study of the placer areas of the Cariboo and Quesnel Mining Divisions.

An arrangement has been made with H. Carmichael to make certain technical reports to the Department on mineral properties in Queen Charlotte and Atlin Mining Divisions.

The permanent technical staff of the Department of Mines (exclusive of the Inspection of Mines staff) now consists of the following officials:—

Official.	Headquarters.
J. D. Galloway, Provincial Mineralogist	Victoria.
D. E. Whittaker, Provincial Analyst and Assayer.....	Victoria.
J. B. Adams, Assistant Provincial Assayer.....	Victoria.
J. T. Mandy, Resident Engineer, No. 1 District.....	Prince Rupert.
D. Lay, Resident Engineer, No. 2 District.....	Hazleton.
H. G. Nichols, Resident Engineer, No. 3 District.....	Kamloops.
P. B. Freeland, Resident Engineer, No. 4 District.....	Grand Forks.
B. T. O'Grady, Resident Engineer, No. 5 District.....	Nelson.
A. M. Richmond, Assistant Resident Engineer, No. 5 District.....	Nelson.
G. A. Clothier, Resident Engineer, No. 6 District, Vancouver, Workmen's Compensation Building.	

The headquarters of two of the Mineral Survey Districts have been changed so as to permit of the more efficient handling of the work by the Resident Engineers in these districts.

Owing to the expansion of mining activity in the Province the work of the whole Department of Mines has increased considerably during the last two years. This is particularly true of the Resident Engineers, whose services are being availed of to an ever-increasing extent. Reporting on new properties, road and trail requirements, and advising prospectors are all factors which have steadily increased the work of the Resident Engineers. In order to cope with the increased services necessary for the public, further appointments of Assistant Engineers may be necessary.

The Assay Office of the Bureau of Mines also shows the results of increased prospecting, exploration, and mining development being carried on in the Province. The present small staff is very fully occupied with the work that is coming in from all parts of the Province. All samples for assays and mineral specimens for determination should be sent to the Provincial Mineralogist, Victoria, British Columbia. Inquiries of a technical nature regarding the mineral industry of the Province should also be addressed to the Provincial Mineralogist.

ROAD AND TRAIL WORK.

A special fund of \$100,000 was provided at the last session of the Legislature in the "Loan Act" for the purpose of building trunk trails to enable prospectors to get into promising mineral areas. In a number of instances surveys of these trails are now proceeding and construction will be under way during the field season.

The regular assistance to mining roads and trails by means of grants from the "Mines Development Act" has proceeded more vigorously than usual to supply the many demands for improved transportation. The building of motor-roads and wagon-roads by the Public Works Department in certain places is of considerable assistance to mining. Particularly is this true in Northern British Columbia, where in certain districts the bulk of the Public Works Department road-work is on mining-roads. A steadily increasing programme of building roads and trails will, however, be required in future years to adequately open up the mineral-bearing areas of the Province.

MINING DISTRICTS OF BRITISH COLUMBIA.

NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1).

SUMMARY REPORT FOR SIX MONTHS ENDED JUNE 30TH, 1929.

BY JOSEPH T. MANDY, RESIDENT MINING ENGINEER.

The North-western Mineral Survey District comprises the following seven Mining Divisions: Bella Coola, Queen Charlotte, Skeena, Nass, Portland Canal, Stikine-Liard, and Atlin.

The important economic geological features of this 125,000 square miles of territory are a stretch of about 750 miles in length, embracing the eastern contact margin of the Coast Range granodiorite batholith, numerous inclusions and "roof-pendants" within the batholith, and appreciable remnant areas of the western contact-zone. Only very restricted portions of these geologically favourable areas have been prospected in detail.

During the period under review the marked mining activity that was evident in 1928 has continued with growing and healthy impetus. Governing factors in the situation are the better and rapidly improving transportation facilities and the increasing active interest of strong and stable mining corporations.

The purchase by the Consolidated Mining and Smelting Company of Canada, Limited, of the Canadian North-eastern Railway, and the prospect of the utilization of this railway up the Bear River valley and extension into the interior, is indicative of the faith of this company in the potentialities of this district and has greatly stimulated general activity.

For the first time in the history of the district the aeroplane has come into the service of mining development. By this means men, supplies, and equipment have been transported from Stewart to the Consolidated Mining and Smelting Company's holdings at Bowser lake, 50 miles inland. The more extensive use of this efficient means of transportation would greatly stimulate exploration and accelerate development.

Prospecting has been greatly encouraged by assistance rendered by the Department of Mines in the building of trails and the formulating of plans to open promising new mineral-zones to prospectors by the construction of trunk trails to hitherto inaccessible areas. The decision to construct a trunk mining-trail from the Meziadin Lake extension of the Bear River trail to a junction with the Dominion Telegraph trail at 23-Mile point is a noteworthy advance. This trail will penetrate the promising mineral regions lying beyond the explored area of the Portland Canal Division. The sum of \$25,000 has been provisionally allocated for the purpose and the survey of the trail is in progress.

The acquisition of power rights in Portland Canal area by the Power Corporation of Canada promises the early development of power for use of developing properties. Work has been started on the harnessing of American creek at the head of Bear River valley and surveys are in progress farther in the interior.

Hitherto many properties worthy of intensive and technically well-guided exploration have met with disaster through lack of sufficient funds to bring them into production, and also through failure of the companies concerned to employ the advice and guidance of accredited mining engineers. The investing public has suffered largely on this account. Too much stress cannot be placed on the advice to investors to inquire carefully into these matters before committing their funds.

The operations of old-established mining companies, with their experienced staffs, in the promising prospects of the district augurs well for the future stability of the industry. A steady addition to the list of producing mines can be looked for from this source.

In Portland Canal District the Consolidated Mining and Smelting Company of Canada is actively exploring and developing several properties. The Premier Gold Mining Company is pushing development on three properties and still maintaining output from the *Premier*. The Granby Consolidated Mining, Smelting, and Power Company has brought the *Bonanza* into a steady production of about 400 tons a day. An active policy of exploration has been inaug-

urated by this company, which may lead to discoveries of extensions of the *Hidden Creek* ore-bodies and development of new properties in the area. The Britannia Mining and Smelting Company is pushing exploration of the *Toric* at Alice arm and has added to its interest in that area. Strong Eastern Canadian mining interests are searching the district for worthy prospects. In view of the laxity of interest from this source in former years the movement is a decidedly healthy and welcome sign. Mining Corporation of Canada has a party of prospectors in the Stikine country and engineers representing this company are in the field examining prospects. Engineers representing other Eastern interests have also been through the country.

As a guide and stimulus to the mineral exploration in the district, the work of the Dominion Geological Survey is to be highly commended. A Dominion Geological Survey party, headed by George Hanson, with four assistants, is completing the mapping and detailed study of the Alice Arm area. The final report and map of this work is awaited with much interest. In the same area R. Bartlett is completing a topographical survey. Dr. F. A. Kerr and staff of four assistants is concluding the geological and topographical survey, commenced in 1926, of the lower drainage region of Stikine and Iskut rivers. This is along the eastern margin of the Coast Range batholith and is a promising prospecting-ground for lead, zinc, and silver minerals. V. L. Eardley-Wilmot, of the Dominion Department of Mines, is engaged in a study of the silver ores of the Portland Canal and Alice Arm areas.

More prospectors are scattered through the district than in any previous season and several important discoveries have already been made.

QUEEN CHARLOTTE MINING DIVISION.

Nothing new of importance has developed in this Division so far this season. Some prospecting for lode-mineral has resulted in discoveries of copper ore near Rennell sound, Graham island.

MORESBY ISLAND.

The *Swede* group, Klinkwoi bay, was reported as optioned to American interests early in the season. This is stated by the owners to be erroneous. Engineers representing the Consolidated Mining and Smelting Company of Canada have, however, been on the ground. This property has a very large showing of disseminated chalcopyrite and bornite in an amygdaloidal diabase, assaying from 0.5 to 1.5 per cent copper. The bornite phase of the ore contains small values in the platinum and palladium group of metals.

The property should be geologically explored for contact-zones of the intrusive with the older sediments, and also for structural conditions conducive to zonal circulation of mineral solutions. As the cupriferous amygdaloidal diabase is seen also on the west coast of Moresby island in the neighbourhood of Moore channel, there is probably a very extensive zone worthy of more extensive exploration than it has received.

GRAHAM ISLAND.

The black-sand deposits on the beach of Graham island are arousing interest once more. Several former attempts to recover the gold from these deposits on a commercial scale have been unsuccessful. It is supposed that the extremely fine distribution of the gold makes economic recovery difficult. It may also be found, however, that much of the gold occurs as minute nucleus kernels in grains of magnetite. This is a characteristic of some magnetite sands. In that case very fine grinding would be necessary to liberate it. The present operations are by a syndicate of Prince Rupert and Vancouver people. A successful outcome of the venture would be a worthy achievement. Results are awaited with interest.

Oil on Graham Island.—The possibility for an oilfield on Graham island is also again receiving its periodical revival. These oil hopes are based on the occurrence of ozokerite (a residual petroleum product), which has been known on Graham island for several years, and the reports of small oil seepages and gas escapements.

Measured in terms of probability for the occurrence of a commercial oilfield in the area, these signs are not altogether favourable. Rather are they the evidence of formerly existing oil accumulations that have gradually been dissipated, although it is possible that some oil-pools may be left in the formation. In its relationship to oil Graham island is an area of high metamorphism (alteration). The extremely high fixed carbon ratio of its coal "basins," the widespread occurrences of Tertiary intrusive dykes associated in all prob-

ability with an underlying batholith of Cretaceous-Tertiary age, the occurrence of fault-fissures as natural avenues for prolonged oil escapement, the continued unstable seismic condition of the island, are all evident indices of unfavourable conditions for the stability of subterranean oil accumulations.

SKEENA MINING DIVISION.

The Coast section of the Skeena Mining Division, on account of its easy accessibility and the advantage of ready-made transportation facilities, is receiving some attention from prospectors.

Many sections of the Coast and outlying islands, in which there are contact-zones and pendant inclusions in the Coast Range batholith, are worthy of more intensive prospecting than they have hitherto received. Doubtless, the contiguity to "home" and the fascination of distant fields has mitigated against the attraction of these areas. Most of the known mineral-showings in this Coast area have been more or less merely stumbled upon by shore-line observation. It is quite possible that more systematic prospecting "inside" the shore-line would repay the slightly more laborious work entailed.

Several groups of claims have been staked on copper-showings in the Hartley Bay and Kitimat sections. On islands contiguous to Grenville channel some prospecting has been done, and claims staked on copper-lead-zinc-silver showings in intercalated limestones of the Prince Rupert series.

Los Angeles Vancouver Mines (Drum Lummon).—This company has taken over the old *Drum Lummon* property on Douglas channel. The property has been thoroughly described in former Annual Reports. The company is driving a crosscut tunnel to cut the vein at a point that will give an additional 160 feet of backs. W. C. Rennells is superintendent in charge of the operations at the property.

Trixie Group (Patterson Claims).—Work on this property is being actively prosecuted by J. B. Woodsworth, of Vancouver, and associates. Plans are under way for the construction of a road from the beach to the mine.

Gibson Girl Group.—This property, owned by Frank Cole and George Keys, of Prince Rupert, comprises four claims situated on Gibson island, at the northerly entrance to Grenville channel. The showings consist of chalcopyrite, zinc-blende, and galena in reticulated structure in the fracture, and bedding-planes of limestone-zones intercalated in the mica-schists of the Prince Rupert series. The property was optioned to the Granby Company early in the season and a crew of men employed in open-cutting and stripping. The results did not hold up to the expectations of this company and the option was dropped. As the structural character of the deposit can be quite misleading, it is possible that further work may yet establish some depth continuity to the quite impressive surface showings.

NASS RIVER MINING DIVISION.

The Nass River Mining Division promises in the near future to strengthen its position as the most important producing Division of the district. Exploratory work by the Granby Consolidated Mining, Smelting, and Power Company at Anyox and in neighbouring areas is promising of extended operations by this company. Healthy development is under way in the Alice Arm section. Renewed interest is being taken in the promising prospects of the area by examining engineers representing strong operating companies. These activities have greatly stimulated the work of prospectors and claim-owners. The future of the Alice Arm district is brighter than it has been for the last ten years.

OBSERVATORY INLET SECTION.

Granby Consolidated Mining, Smelting, and Power Co.—This company has steadily maintained production. The *Bonanza* ore-body, about 3 miles southerly from Anyox, has been brought into production. The aerial tramway from this operation to the plant has been completed and about 400 tons of ore a day is being delivered. The ore-body is now being developed on the south side of Bonanza creek. The incline shaft is being driven 700 feet on this side of the creek.

Several minor alterations to the concentrator have stepped up the capacity of the plant, which is now treating a tonnage well in excess of that for which it was originally designed. Tests of smelting a percentage of the concentrates in the converters are stated to have been successful and the system is contemplated as regular practice.

The *Hanna* claims adjoining the *Hidden Creek* mine have been bonded by the Granby Company and the property is being diamond-drilled. A systematic study of the structural character of the *Hidden Creek* ore-bodies is being undertaken by H. T. James, former Resident Engineer for this district. It is hoped to discover heretofore unsuspected extensions of these ore-bodies. Over 1,200 men are now on the pay-roll at Anyox and the plant is being operated at full capacity.

Silver Crest Mines, Ltd.—This company is developing the *Saddle* group at the head of Hastings arm. The prolonged winter season prevented completion of the 8,300-foot aerial tramway from the tunnel to the beach. It is reported that the company contemplates further financing for development of the *Saddle* group and its holdings in the Salmon River area.

Esperanza Mines, Ltd.—For a detailed description of this property the reader is referred to the Annual Report for 1928. During the last quarter No. 9 tunnel has been driven 160 feet; 152 feet of this has been driven in eighty-two days at a cost of less than \$14 a foot. As the work is all by hand this is a very creditable performance. Two men are employed, with Norman Fraser in charge.

With a view to increasing the possibilities for tonnage, the company has procured options on the adjoining *Alice, Ingram and Pratt, Acadia*, and other groups, comprising sixteen claims. Negotiations are pending with a strong company for the purpose of taking over the property on an operating basis. The future aim of the company is the installation of a compressor and drills, with a view to the development of sufficient tonnage to warrant the erection of a mill. This is a sound policy. With careful and conservative handling, there are good prospects for a profitable small tonnage milling proposition.

Alice Group.—This property, owned by Neill Forbes *et al.*, of Alice Arm, consists of four claims adjoining *Esperanza* on Esperanza mountain. The quartz vein, interbedded in argillite, varying in width from 2 inches to 3 feet, striking N. 70° W. (mag.) and dipping from 50° to 80° S., has been opened by a 68-foot crosscut and a 40-foot drift. Mineralization consists of galena, zinc-blende, grey copper, arsenopyrite, and in places argentite and ruby silver. Along the north-west tracing for about 2,000 feet the vein varies from 1 to 3 inches in width and is sparsely mineralized. Better conditions should be met with on the south-easterly extension of the vein towards the *Esperanza* line, where admixed and interbedded tuffs and intrusive dykes do not appear to be such a feature of the argillites as they are towards the north-west.

Anna Mack.—This property, owned by Bill Cummings, Alice Arm, adjoins the *Alice* on the north-west. An open-cut has exposed the continuation of the *Alice* vein, showing about 6 inches in width of sheared and brecciated quartz, very sparsely mineralized.

Acadia Group.—This property, owned by Neill Forbes, Alice Arm, consists of two claims on the easterly slope of Esperanza mountain to Kitsault River valley. The showing consists of a 5-foot quartz vein in argillite, striking N. 60° W. and dipping 50° N. Mineralization is massive pyrrhotite, with which some chalcopyrite is intermixed, splashes of massive zinc-blende, and along the hanging-wall 6 inches of banded zinc-blende, pyrite, and some galena. Some work should be done on the southerly side of the creek to determine the extent and values of the ore-shoot exposed in the cut.

Alice Arm La Rose Mining Co., Ltd.—This property is located at about 2,000 feet altitude on the north-east slope of Haystack mountain. A detailed description of the property and workings is contained in the 1928 Annual Report.

The vein occurs in the argillites that cover the slope of Haystack mountain to about altitude 1,925 feet, where they appear to abut on the underlying volcanics which form the upper slopes of Haystack mountain. The bedding of the argillites strikes approximately N. 50° W. (mag.) and dips easterly towards Kitsault valley at about 45°. This structural condition seems to have a very important bearing on the economic attitude of the *La Rose* vein.

Disappointing results have been met with on the No. 1 tunnel level at altitude 1,900 feet in the argillites, and the prospects for improvement in the downward extension of the vein in this formation are not encouraging. It is evident, however, that where the high-grade ore was struck in the raise, about 20 feet up from the tunnel level and from there to surface, it is either in, or very close to, a tuffaceous rock, heavily impregnated with pyrite and an undetermined black mineral. Again, in the upper tunnel near the mouth of the shaft at altitude 2,060 feet, the vein is contiguous to this tuffaceous rock and shows fair mineralization until it enters the argillites proper, when it immediately becomes shattered, sheared, and barren. Future work

should be centred on determining the extension of the vein in this tuffaceous rock. This might best be accomplished initially by an extension of the intermediate drift northward.

Homeguard.—This property, situated on the east side of Kitsault river, about 15 miles from Alice Arm, is under option to the Dalhousie Mining Company. The claims have recently been prospected by the Radiore Electrical Prospecting Company. The results of this survey are not known.

The Toric Mines Co., Ltd.—This property is situated on the east side of Kitsault river and about a mile beyond the Camp 8 terminus of the Dolly Varden Railway. Development-work is being carried out by the Britannia Mining and Smelting Company, Limited, which bonded the property early in the season. A crew of sixteen men is at present employed, with B. B. Brock, the engineer in charge. The Britannia Company has staked twenty-eight claims in the neighbourhood. The road is being continued from the suspension bridge over the Kitsault river at Camp 8 to the *Toric* and eventually to the *Tiger* property.

The drift is being continued along the foot-wall of the ore-body and an active programme of diamond-drilling is in progress. This work will determine the attitude and conformity of the 60-foot-wide ore-body opened up underground to the smaller surface outcrops and the enclosing formation.

Dolly Varden Properties, Ltd.—Several engineers have examined the *Dolly Varden* workings, but nothing as yet has materialized with regard to the reopening of this well-known old property.

Utility Mines No. 1, Ltd.—This company is energetically developing the *Tiger*, situated 1 mile north of the *Toric*.

The *Tiger* vein is a well-defined vertical vein, varying from about 5 to 15 feet in width. It outcrops in a series of five faulted blocks over a distance of about 400 feet. Some good-grade ore, with visible native and ruby silver in places, occurs in the various cuts and underground workings. No. 1 tunnel, at elevation 2,050 feet, has opened up four of the faulted blocks exposed in the various open-cuts between elevations 2,100 and 2,225 feet. No. 2 tunnel, at elevation 1,900 feet, is at present being driven to get under No. 5 cut (elevation 2,175 feet), where there is a good showing of ore carrying galena, grey copper, and pyrite, with some ruby and native silver over a width of 8½ feet. No. 3 tunnel, at elevation 1,750 feet, is being extended to reach the various surface showings at this depth.

The property is a very promising prospect. Commendable work is being done in mapping out and correlating the somewhat complicated fault conditions that affect the vein. A crew of seven men is employed, with Ed. Pickett in charge.

Red Point.—These claims are situated on the west side of the Kitsault river, north of Evidsen creek, in what is known as the Kitsault copper-belt. Granby engineers have carried out an examination and survey of this group and the adjoining *Vanguard* claims.

North-east Fork of Kitsault River.

This section of the Alice Arm area is receiving more attention from prospectors than formerly. Some promising discoveries have been made.

A likely looking series of siliceous igneous rocks, in places of diabasic type, outcrop about 7 miles up the North-east fork on the higher altitudes of the west side of Washout creek. These rocks can be followed in a north-westerly direction to the ridge that slopes down to the Kitsault river. Here one or two contacts with the argillite indicate that this series is intrusive into the argillite formation. The locality is worth prospecting.

Fox Group.—This property, owned by James Flynn *et al.*, of Alice Arm, consists of seven claims on the southerly slope of Red Bluff mountain. The main showing is a quartz-barytes vein of undetermined width and attitude in andesite porphyrite. Mineralization consists of zinc-blende in irregular grains, accompanied by pyrite and some galena. The vein has been traced for about 600 feet by three open-cuts in a westerly direction from an elevation of 1,600 to 1,735 feet. A short crosscut below the lower open-cut will shed some light on the width, attitude, and extent of mineralization. The showing warrants this work being done.

Observer Group.—This property consists of eight claims, owned by Neill Forbes and Jim Flynn, of Alice Arm, adjoining the *Fox* group on the west side of Washout creek.

There are several promising showings on this group, on which little work has as yet been done. The formation is andesite porphyrite, and in places resembles a fine-grained quartz diabase. Not sufficient work has been done to allow of definite determination of the attitude

and extent of the occurrences, which certainly warrant being opened up. The showings are of three types: (1) Disseminated chalcopyrite in a siliceous replacement zone; (2) brecciated quartz-barytes, with similar mineralization to the *Fox* vein; (3) zinc-blende, galena, grey copper, and pyrite, in quartz-barytes gangue.

Red Bluff Group.—This property, situated on the south slope of Red Bluff mountain to Red Bluff creek, is a group of Crown-granted claims that has been held for some years by J. W. McPhee, of Butedale. A syndicate has been formed to carry out some development. A trail is being constructed to the proposed camp-site at the base of the bluff.

The occurrence is an extensive zone of pyritized porphyrite, cut by numerous andesite dykes. Chalcopyrite is sparsely distributed in isolated bunches along joint and fracture planes in the porphyrite.

ILLIANCE RIVER SECTION.

Kitsault Eagle Silver Mines, Ltd.—This company is developing the *Sunrise* group on McGrath mountain. The 1,000-foot crosscut to strike the surface showings at a depth of 500 feet is being vigorously pushed and is expected to reach its objective shortly.

PORTLAND CANAL MINING DIVISION.

Activity in this Division is rapidly increasing. Areas and properties heretofore considered beyond the bounds of the immediate means of accessibility are receiving the attention of operators and prospectors. An atmosphere of faith in the region warranting adequate future transportation facilities is prevalent and well founded. Older areas that have been neglected for some time are being revived and several properties in these localities are receiving attention. Promising discoveries have been made by prospectors in new areas and further exploration has resulted in new discoveries on several old properties. The *Premier* has long held the position of the only steadily producing property in this Division. From the energetic development-work of this company and the Consolidated Mining and Smelting Company on their several holdings in the area, it can be expected that other properties will be brought to the stage of steady production in the near future.

SALMON RIVER SECTION.

Premier Gold Mining Co., Ltd.—I am indebted to D. L. Pitt, manager, for the following information: "Operations at the *Premier* mine have been carried on through the first six months of the year normally. Production for direct shipment to the smelters has amounted to 62,621 tons, while ore sent to the mill has amounted to 83,365 tons. Underground development has been carried on a little more vigorously than usual and several promising ore-bodies have been developed. These are in process of opening up and producing now and are adding quite a bit to the reserve tonnage. No radical changes have been made in the mill during the first six months of the year, but improved metallurgical results have been attained by the careful operating of the plant. The entire operation is quite satisfactory."

Northern Light Mining Co., Ltd.—This property adjoins the *Premier* and *Woodbine*. A thorough geological survey and surface-trenching has been carried out for the purpose of mapping mineralized zones occurring on the property. Underground exploration based on this work is proceeding. A compressor and oil-engine has been installed and is in operation and rapid progress is expected. The operations are under the personal supervision of G. R. Bancroft, consulting engineer. This company was recently merged with the Premier Border Gold Mining Company.

Woodbine Gold Mining Co., Ltd.—This company carried on exploration up to the end of June, when operations were closed down for the purpose of determining the most economical and efficient future policy. An earnest effort was being made by the management to find a commercial body of ore. At the time of inspection work was being prosecuted in an incline advanced about 50 feet west from 209 drift. Good values were reported along the last 25 feet of this incline.

The following samples taken in this incline from localities selected by the company officials as being most likely to carry good values do not verify these expectations:—

(a.) Across 7 feet of incline face: Gold, trace; silver, 0.4 oz. to the ton; copper, *nil*; lead, 0.3 per cent.; zinc, 0.9 per cent.



Finlay River, North of Fort Grahame, looking North-east.



Telegraph Creek Settlement on Stikine River, looking Down-stream (West).

(b.) Down 4.9 feet south wall of incline, 41.7 feet west of 209 drift (locality selected and sample moiled by Woodbine superintendent under my supervision): Gold, trace; silver, 3.7 oz. to the ton; copper, *nil*; lead, trace; zinc, 0.7 per cent.

(c.) Down 6.6 feet south wall at start of incline, 7.5 feet west of 209 drift (locality selected and sample moiled by Woodbine superintendent under my supervision): Gold, trace; silver, 2.2 oz. to the ton; copper, *nil*; lead, trace; zinc, 0.9 per cent.

Pulps were prepared from these samples on the ground and delivered to the company assayer for check, and gave the following returns:—

(a.) Gold, *nil*; silver, *nil*.

(b.) Gold, trace; silver, 3.48 oz. to the ton.

(c.) Gold, trace; silver, 2.18 oz. to the ton.

No. 1 stope for the main drift was also reported to have been productive of good values. A small corner, 6 feet from the face of this stope, mineralized with fine-grained galena and some zinc-blende, was selected for sampling, and gave the following:—

(d.) No. 1 stope, across 2 feet of west corner, 6 feet from face (locality selected and sample moiled by Woodbine superintendent under my personal supervision): Gold, 0.12 oz. to the ton; silver, 11.9 oz. to the ton; copper, 1.1 per cent.; lead, 2.7 per cent.; zinc, 5.4 per cent. The *Woodbine* assay on pulp prepared on the ground from this sample gave: Gold, 0.06 oz. to the ton; silver, 11.24 oz. to the ton.

On account of these discouraging returns the locality in which the *Woodbine* sample and assay plans showed the best and most consistent values was then selected for sampling, and gave the following returns:—

(e.) West side, 216 raise, 7 feet from face, down 3.8 feet (sample moiled from face of lower section of *Woodbine* channel No. 206): Gold, 0.01 oz. to the ton; silver, 4.3 oz. to the ton; copper, *nil*; lead, trace; zinc, 1 per cent.

(f.) The west side, 216 raise, 7 feet from face, down 2.2 feet (sample moiled 6 inches south of upper section of *Woodbine* channel No. 206): Gold, trace; silver, 0.3 oz. to the ton; copper, *nil*; lead, trace; zinc, 0.6 per cent.

(g.) West side, 216 raise, 10 feet north of (e); chip templet of 5 by 5 feet face between and including *Woodbine* channels 204 and 205: Gold, 0.04 oz. to the ton; silver, 3.1 oz. to the ton; copper, *nil*; lead, trace; zinc, 0.5 per cent.

(h.) West side, 216 raise, 23.2 feet back from face, down 3 feet (moiled from face of *Woodbine* channel 203): Gold, 0.05 oz. to the ton; silver, 5.9 oz. to the ton; copper, *nil*; lead, *nil*; zinc, 1.7 per cent.

Pulps were also prepared from (e), (f), and (g) and delivered to the *Woodbine* assayer, and gave the following:—

(e.) Gold, trace; silver, 3.6 oz. to the ton.

(f.) Gold, trace; silver, 0.2 oz. to the ton.

(g.) Gold, 0.04 oz. to the ton; silver, 2.58 oz. to the ton.

The results of these samples are self-explanatory and very discouraging. As the localities for sampling were especially selected as being those portions of the workings reputed and indicated to contain the highest values, and as every opportunity was given the staff at the mine to check the sampling and assaying, it must unfortunately be concluded that appreciable quantities of commercial grade ore do not exist in the present workings of the property. Sample (d) is indicative of ore approaching a milling grade and it is possible that similar or even higher grade small lenticular bunches may occur at intervals.

The present underground workings have systematically explored the *Woodbine* mineralized zone on that horizon with unfortunately discouraging results. In future, operations should be devoted to an economically restricted diamond-drill exploration of a deeper horizon in the westerly portion of the workings, where slightly improved structural conditions are met with. Any encouraging indications from this work could then be followed up by mining operations. A maximum expenditure of \$15,000 should complete this work; the work should, however, be planned and guided by an accredited consulting mining engineer.

Premier Extension.—This property adjoins the *Woodbine* on the north. Preparations to resume work are under way and a small crew is on the ground.

B.C. Silver Mines, Ltd.—Work on this property, adjoining the *Premier* on the north, has been progressing steadily. A promising ore-shoot on the sixth level is reported to have been opened up and development on this is proceeding.

Big Missouri.—Diamond-drilling in the effort to find commercial bodies of ore has been continued by the Consolidated Mining and Smelting Company, Limited, which controls this property.

Whilst the porphyry-zone penetrated by the underground workings is well mineralized, the values are generally low and not commercial. Only isolated good-grade values over narrow widths had been found in these workings and in the drill-cores up to the time of my visit (June 22nd). No consistent zone of commercial grade ore had been developed up to that time. The property is still a long way from nearing the productive stage and its future as a possible profitable mining operation, which is not yet assured, will only be determined by further extensive development.

Unicorn.—This group adjoins the *Big Missouri* on the north. Exploration is proceeding under J. Hovland.

Silver Tip Mining and Development Co.—These claims adjoin the *Unicorn* on the north and east. Underground work will be continued in the Winkler tunnel. It is intended to crosscut to reach the tuff-zones, in which promising silver values had been found on surface.

BEAR RIVER VALLEY.

Silverado Consolidated Mines, Ltd.—This company's holdings are situated on the east side of the head of Portland canal, at an elevation of about 3,500 feet. The Premier Gold Mining Company, Limited, owns control of the nineteen Crown-granted claims and is actively pushing exploration and development.

I am indebted to D. L. Pitt, manager of the Premier Gold Mining Company, for the following information: "At *Silverado* operations have been carried on continuously during the first six months of the year, driving the lower crosscut tunnel to pick up the veins on their downward continuation. The veins at this depth did not contain sufficient commercial ore to warrant stoping operations. A raise 200 feet has therefore been put up to cut the veins at a higher elevation. A sub-level is being established at that elevation. One vein has been picked up and drifting is now being done along the strike of it to determine the occurrence of the ore-shoots on this horizon."

Bayview Mining Co., Ltd.—This company's claims are situated on the west side of the Bear River valley, easterly slope of Mount Dolly, at an elevation of about 3,000 feet and about 3 miles from Stewart. No work has as yet been done on these claims this year. The best opportunity for success on the holdings of this company lies in the eastern area of the *Lucille No. 1* claim, which is in the Bear River formation and some little distance from the granite-contact. This part of the property is worth further prospecting.

United Empire Gold and Silver Mining Co., Ltd.—On these claims, adjoining the *Bayview* on the north and east, some stripping and cleaning-out of the old cuts has exposed the No. 1 vein for a distance of several hundred feet. In one cut at elevation 3,475 feet the vein shows 23 inches well mineralized with galena and ruby silver. A sample taken across 18 inches of the showing in this cut assayed: Gold, 0.12 oz. to the ton; silver, 207.7 oz. to the ton; lead, 9.3 per cent.; zinc, 5.7 per cent.

The drift on this vein at elevation 3,350 feet is advanced 145 feet, but will have to be extended to get under the possible downward extension of this high-grade lens. A sample taken across the 5-foot face of this tunnel assayed: Gold, 0.02 oz. to the ton; silver, 27.2 oz. to the ton; lead, trace; zinc, 1.6 per cent.

There is much ground on the property still to be prospected. The large pyritized porphyry dykes cutting through the claims in a north-westerly direction should be prospected for the possibility of a mill-grade ore. At elevation 2,975 feet, about 600 feet south-east of the camp, a large cupriferous pyrrhotite outcropping should also be prospected.

Dunwell Mines, Ltd.—Work has not yet been resumed on this property. The assay plant has been reopened, however, and is proving of great assistance to prospectors and others requiring quick returns on samples.

Black Hill Mining Co., Ltd.—Control of this company has been taken over by the Northern Metals Holding Syndicate. The twelve claims are located north of the head of the South fork of

Glacier creek, between altitudes 3,850 and 4,650 feet. Several veins, 8 to 12 inches wide, carrying high values in silver, lead, and zinc, in lenticular development, occur in a complex argillite-andesite formation. Recent work is reported to have uncovered additional showings. Camp has been established, a pack-horse trail is being constructed, and development is being energetically pushed with a view to shipping high-grade ore this season.

Ben Bolt Mining Co.—This is one of the oldest holdings in the Portland Canal Mining Division, the claims being Crown-granted in 1912. The group is situated near the head of the South fork of Glacier creek, about 4 miles from the Bear River road.

The occurrence is a wide brecciated quartz vein in argillite carrying zinc-blende, galena, pyrite, in what is known as the "Portland Canal fissure-zone." The vein is heavily graphitic. Extensive underground exploration from tunnels at different levels was at one time carried out by the Pacific Coast Exploration Company. Three of the claims have reverted to the Ben Bolt Mining Company, 43 Victoria Street, Toronto, and the *Chicago Fraction* to Samuel Morrison, 1150 Main Street, Vancouver. The work has resulted in only partial exploration of the ore-shoots. The prospect has been idle for a number of years, but warrants further exploration for the possible development of mill-grade ore.

Bitter Creek Mines, Ltd.—The holdings of this company are being operated by the Northern Metals Holding Syndicate. The claims are situated at an elevation of 3,400 to 4,000 feet in Harkley gulch, near the head of Bitter creek, about 7 miles east of the Bear River wagon-road. Camp has been established and exploration is proceeding. The mineralized silicified zone in the greenstone will be further developed with a view to indicating a milling tonnage.

Two tunnels at elevations of 3,425 and 3,500 feet have opened up this zone with promising mineralization of galena and zinc-blende, some pyrite and arsenopyrite, over good widths. A sample across 3.7 feet in the face of the 35-foot upper tunnel at elevation 3,500 feet assayed: Gold, 0.12 oz. to the ton; silver, 7.5 oz. to the ton; copper, 0.2 per cent.; lead, 4.7 per cent.; zinc, 9.8 per cent.

In the lower tunnel, at altitude 3,425 feet, there is a 62-foot width of mineralization with 20 feet similar to the face of the upper tunnel. This is a promising showing and should be seriously developed from the angle of mill-grade ore.

A grab sample from a heavily pyritized zone showing some arsenopyrite, outcropping 60 feet east of the upper tunnel, assayed: Gold, 0.44 oz. to the ton; silver, 1.5 oz. to the ton; copper, trace; lead, trace; zinc, 0.8 per cent. This zone has not been opened up on the surface; it appears to be of appreciable width and the assay is a decidedly encouraging indication. The zone should be cut in the lower tunnel and the pyritized area of that working should be systematically sampled.

Several pyritized felsite, quartz-porphry, and syenite dykes cutting the greenstones should be carefully prospected for gold values. Much constructive prospecting can still be carried out on the property and should lead to further discoveries.

A. & T.—These claims, situated at about 2,500 feet elevation on the west side of Bear river and about 11 miles from Stewart, have been bonded by the Consolidated Mining and Smelting Company of Canada. The trail is being continued past the camp to a selected diamond-drilling site. Plans for a diamond-drilling campaign are being laid.

Independence Gold Mining Co., Ltd.—Development-work has continued on this property and the results are reported to be satisfactory.

Mountain Boy Mining Co., Ltd.—This company was incorporated in 1929 with registered office at 112 St. James Street, Montreal. The company controls eight claims and three fractions situated on the west side of American creek, about 15 miles from Stewart. Exploration is being aggressively pushed. Camp has been built, compressor installed, and work is proceeding underground. A sample consignment of about 5 tons of selected ore was sent to the smelter this spring. This is reported to have returned better than 1,100 oz. silver to the ton. Several new veins carrying high silver values are reported to have been discovered on the adjoining *Silver Mask* holdings of the Mountain Boy Company.

Rufus Argenta Mines, Ltd.—This company controls a block of claims on the north side of Bear River valley, about 20 miles from Stewart. The property is being developed by the J. F. Duthie interests of Seattle. The tunnel planned to cut the Erickson vein is being advanced and is expected to reach its objective shortly.

George Gold Copper Mining Co., Ltd.—The Consolidated Mining and Smelting Company of Canada, Limited, is reported to have made the final payment on this property, by which it would control 93 per cent. of the stock. Over 6,000 feet of diamond-drilling is stated to have given encouraging results. Plans for extensive underground exploration are being prepared.

George Enterprise Mining Co., Ltd.—Work on this property was started early in the spring and has been aggressively pushed. A compressor has been installed and exploration is expected to proceed rapidly. Operations are under the direction of W. V. Smitheringale.

Atlas Gold and Copper Mining Co., Ltd.—This company was incorporated in 1928 to acquire from the trustees the property of the Bear River Mining Company. The holdings consist of five claims situated near the head of Bear River valley, west of the George Copper Company's property and about 15 miles from Stewart. No development has been carried out on these claims for some time. It is understood that some diamond-drilling will be done this season. A trail is being constructed to the claims.

MARMOT RIVER SECTION.

Porter-Idaho Mining Co., Ltd.—The Premier Gold Mining Company, Limited, has actively continued its operations on the properties of this company. I am indebted to D. L. Pitt, manager of the Premier Gold Mining Company, for the following information: "Considerable drifting and raising has been done in the *Porter-Idaho* ground on various horizons. Drifts have also been carried into the *Porter-Idaho* ground from *Prosperity* No. 3 tunnel with fairly successful results.

"Owing to unsatisfactory operation conditions in the early spring, active work in some of the levels was suspended until the tramway is completed and proper supplies and equipment can be made available.

"The lower 3 miles of the tramway being constructed from the beach to the mine has been completed and is now operating in the hauling of freight and supplies. Lower terminal facilities are complete. Work on the upper 2 miles of the tramway has been carried on vigorously as weather and snow conditions permitted, and it is hoped to complete this leg and have it in operation by the latter part of August. Shipments can then be commenced. The construction of this tramway has proven a very difficult task owing to the rugged and inaccessible nature of the country over which the tram passes. Progress is satisfactory, however."

Prosperity.—This group, adjoining *Porter-Idaho* on the north, has also been continuously developed by the Premier Gold Mining Company, to whom I am indebted for the following information: "Full working crews have carried on during the entire six months of the year, drifting along ore-zones and other veins and raising between No. 3 and No. 2 levels. Considerable ore has been sacked and is awaiting shipment over the *Porter-Idaho* tramway when it is completed.

Melvin Group.—This group consists of one claim and four fractions, adjoining *Porter-Idaho* on the east. The group is being developed by the Marmot Metals Mining Company, Limited, which acquired control from the Melvin Syndicate. Camp has been established and drifting is in progress on one of the veins discovered last year. It is intended to start a crosscut tunnel at a lower altitude in the hope of cutting extensions of the *Porter-Idaho* veins.

STIKINE-LIARD MINING DIVISIONS.

This area has not yet been examined this year. It is known, however, that prospecting is very active and several well-equipped outfits have gone into the region. This should result in some interesting discoveries before the freeze-up. The claims owned by Neill MacNab and Angus McDonald on Devil's Elbow mountain are being opened up by the owners and a trail is being built. In the Clearwater River area several lode claims are also being opened up. The placer-gold operations on Clearwater river, Dease, Thibert, McDame, and Gold Pan creeks are reported to be active and an increased gold production is expected from these sections this year.

ATLIN MINING DIVISION.

The future for steadily increasing placer-gold production from this area is very encouraging. As a lode-mineral producing area this region promises to become one of outstanding importance.

The operation of the *Tulsequah Chief* group, on Tulsequah river, a tributary of Taku river, has been taken over by the United Eastern Mining Company, Limited, a strong mining corporation with offices in Los Angeles. Equipment and power units are being installed and 1,000 feet of drifting and 5,000 feet of diamond-drilling is planned for the season.

Additional recent discoveries on Taku river have been causing quite a bit of excitement and a great amount of development-work is being carried on. Thirty-five prospectors' licences have been issued from the Atlin office and many more from the Prince Rupert office. Thirty claims have been recorded this spring and summer at Atlin.

C. L. Monroe, Gold Commissioner at Prince Rupert, formerly at Atlin, has kindly supplied me with the following information: "An unusually early spring permitted hydraulic mining to start earlier than usual. The various operations were under way by the middle of May.

"On Pine creek the Discovery Mining and Power Company and on Boulder creek the Consolidated Mining and Smelting Company have made good progress. So far as I have heard, neither has yet encountered any 'pay,' but it is confidently expected that both will do so before the end of the season.

"On Otter creek Compagnie Francaise des Mines D'or du Canada has made splendid progress on its new system of development. Since Mr. Moran, the manager, has returned from Paris, a crew of thirty-five men has been steadily employed. The new pipe-line installation has given plenty of pressure and piping was started at the lower end of the creek on July 16th.

"On McKee creek George Adams is reported to have struck good 'pay.' Mr. Adams has worked long and faithfully in the confident belief that he would yet find the lost pay-streak on McKee.

"Matson & Colburn on Ruby creek are hydraulicking over the ground previously worked by the Placer Gold Mining Company. So far they have been engaged entirely in plant installation and no results may be expected for a few months.

"Individual mining is going on in the usual manner on other creeks. E. Turnquist, drifting on Ruby creek, and Morse, McKechnie & Bratt on Spruce creek, are reported to be still working in good 'pay.'

"Recent reports from Squaw creek would indicate that there will not be any great activity in that section during the summer. Most of the ground is still held by Indians, who were the original locators, but who do not take very kindly to mining. Several claims were acquired last fall by white men who were watching the situation, but it is not probable that much work will be done on those claims.

"The Rainy Hollow section has been inactive.

"With reference to mineral properties, the most interesting developments appear to be taking place with the *Tulsequah Chief* group. A plan of extensive development-work was started this spring.

"During the past week we have issued from this office over 120 free miners' certificates to residents of Juneau, who appear to be considerably excited over the mineral possibilities of that section of the Taku river.

"Work on the Atlin Silver Lead Company's property has been held up owing to the death of J. M. Ruffner. Before Mr. Ruffner's death (April 29th, 1929) he had reorganized the company and an option was given the Atlas Exploration Company, of Ottawa. An engineer representing this company made an examination of the property in the latter part of June.

"At the *Engineer* a crew of about twenty-five men has been working since April, prospecting on the lower levels. C. L. Hershman, who has charge of the work, is expected to arrive on the ground shortly and plans for future operations may be made known after his inspection."

NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2).

SUMMARY REPORT FOR SIX MONTHS ENDED JUNE 30TH, 1929.

BY DOUGLAS LAY, RESIDENT MINING ENGINEER.

GENERAL SUMMARY.

The widespread activity of last year has been well maintained during the present year. Apart from the operations of the companies already established, keen interest has been evinced by the larger mining companies of the Province in promising prospects; and the prospector on his part has not been slow in responding to the demand and has redoubled his efforts to discover new properties.

At the close of the period under review occurred the most important event—the acquisition of the controlling interest in the Owen Lake Mining and Development Company, Limited, for a consideration of \$1,100,000, with a cash payment of \$150,000, by Noah A. Timmins, president of Hollinger Consolidated Mines. This aroused the keenest interest not only in this district, but also throughout British Columbia.

The acquisition of the Canadian North-eastern Railway by the Consolidated Mining and Smelting Company of Canada, Limited, and its possible bearing on the mineral resources of the northern portion of the Omineca Mining Division, aroused much interest throughout the district. This event has already led to the renewal of prospecting and reconnaissance in the region affected.

Important features of general development are:—

- (1.) Recent strikes of fresh ore at the property of the Owen Lake Mining and Development Company, Limited.
- (2.) Development by Duthie Mines, Limited, at the *Henderson* in depth has yielded satisfactory results.
- (3.) Commencement of milling operations at the *Silver Cup* on May 4th by Silver Cup (Hazelton) Mining Company, Limited (formerly named Duke Mining Company, Limited).
- (4.) Resumption of milling operations at the *Henderson* by Duthie Mines, Limited, on June 1st.

(5.) A promising strike of new ore at the Babine Bonanza Mining and Milling Company's property. This last-mentioned has not yet been inspected, but it is reported on good authority.

The Consolidated Mining and Smelting Company of Canada, Limited, carried on an extensive programme of development at the various properties under option.

Many new discoveries have been reported, which are being examined as rapidly as time and opportunity permit. So far trips of inspection have been made to Takla lake, the headwaters of the Telkwa river, and the region between Morice lake and the South fork of the Zymoetz river.

On July 1st C. W. Moore was temporarily appointed Assistant Resident Engineer. He will make a special study of the placer-mining sections of the district.

The mineral resources of the Pacific Great Eastern Railway lands are being investigated by Dean R. W. Brock and Professor M. Y. Williams, of the University of British Columbia, in connection with the survey of resources now being undertaken for the Government by C. R. Crysedale, chief engineer, and staff.

The geology of the Owen Lake area is being studied by George Hanson and A. H. Lang, of the Geological Survey.

Summing up the results obtained to date this year, it may be stated that while disappointment has been experienced in one or two directions, this is outweighed by the success obtained in general, and steady expansion of the mining industry in this district is to be expected.

NEW DISCOVERIES.

Several new discoveries have been reported, which will be examined as opportunity offers. Among these may be mentioned:—

(1.) *Grandview* group on Milk creek, at the headwaters of the Telkwa river, by T. Riley and associates; in part, apparently a relocation of the *Surprise* group (refer to 1920 Annual Report). Several well-mineralized quartz veins, varying in width up to 5 feet, occur at a high elevation. Minerals present are galena, arsenopyrite, chalcopyrite, and copper carbonates. Silver values per unit of base metal are encouraging.

(2.) Frank H. Taylor reports the discovery by prospectors working for him of a promising copper mineralization a few miles north-west of Owen lake. He has staked a large number of claims in this region. This discovery has not yet been inspected.

ROADS AND TRAILS.

Adequate assistance has been rendered by the Department of Mines in connection with mining roads and trails. Among the more important upon which work has been started may be mentioned the following:—

(1.) The road northwards from Fort St. James to Manson Creek, the purpose of which is to give transportation to the northern portion of the Omineca Mining Division and ultimately the Peace River Mining Division.

(2.) The pack-trail from Kimsquit, on the Dean channel, via the Sakumtha pass to Eutsuk lake.

(3.) A road from Houston to Owen lake via the Morice River road to afford transportation to the Owen Lake Mining and Development Company, Limited. This will also be ultimately one of the links in the route from Kimsquit via the Sakumtha pass to Canadian National Railway points.

To date it has only been possible for the Resident Engineer to cover a portion of the Omineca Mining Division; consequently this preliminary report deals only essentially with the latter.

The Resident Engineer desires to express his thanks to prospectors and mining operators generally for courtesies extended. In particular the operating companies have given the fullest access to their records, which is greatly appreciated.

OMINECA MINING DIVISION.

SKEENA SECTION.

Usk.

Valhalla and Kleanza.—These groups are under operation by Columario Gold Mines, Limited. The principal work has been development of No. 4 vein by means of two adit-drifts about 93 feet apart vertically, with crosscutting to No. 3 vein and No. 5 vein. Each level on No. 4 vein has been advanced in the neighbourhood of 500 feet. In the case of each level, at a point about 300 feet from the portal, an intrusion of aplite was met with, which appeared to interrupt the continuity of the vein. Further investigation of the outcrop of the vein by open-cuts beyond the region of the aplite intrusion has been carried out, which indicates the likelihood of the vein being recovered by crosscutting in the foot-wall beyond the aplite. This crosscutting is now being carried out.

This development has disclosed on the upper level one fairly well-mineralized quartz-lens of a length of approximately 200 feet and of an average width of about 3 feet. This lens occurs between the portal and the aplite intrusion. On both sides of the latter another quartz-lens occurs about 80 feet in length and of an average width of approximately 2½ feet. In the lower tunnel quartz is more or less continuous for a length of about 200 feet, and width varies from a few inches up to 5 feet. Short raises on this level have been run up at three points. These appear to indicate a more steeply dipping body of quartz than is present in the level above. The quartz on this level does not appear to be so well mineralized as that on the level above. It is understood that these exposures of quartz have not yet been systematically sampled, but that the intention is to carry out such sampling in the near future.

On the upper level crosscuts have been run to No. 5 vein (which at this point is narrow—15 inches in width as a maximum, but well mineralized) and also to No. 3 vein, which probably has not been positively identified as yet on this level.

This company appears to be making a painstaking effort to economically develop its property, the possibilities of which can only be determined by further development.

Kleanza Creek.

Lucky Jim.—This property is under option to the Consolidated Mining and Smelting Company of Canada, Limited, and under development by that company.

Chimdemash Creek.

Toulon.—This group is under small-scale operation by Major McConnell, work being carried out under the supervision of John Willman.

Shenandoah.—R. W. Seelye and associates are carrying on development at this property with a force of ten men. A water-power plant is being installed on the North fork of Chimdemash creek.

Hardscrabble Creek.

Diorite.—This property, within a very short distance of the railway-track, exhibits an interesting copper mineralization and merits examination.

Legate Creek.

Properties on this creek under option to the Consolidated Mining and Smelting Company of Canada, Limited, are the *M. & M.*, *M. & K.*, and *Zona May*.

Seven Sisters Mountain.

The Consolidated Mining and Smelting Company of Canada, Limited, is carrying on work at the *Seven Sisters* group.

On the *Hughie* group work has been carried on this spring by the owners and some additional ore disclosed.

Kitwanga.

On the *Two Laddie* group, the owner, D. Lamont, has been working steadily and has discovered another vein on the property.

HAZELTON SECTION.

The important event in this section was the starting of milling operations on May 4th at the *Silver Cup* by the Silver Cup (Hazelton) Mining Company, Limited (formerly Duke Mining Company).

Rocher Déboulé Mountain.

Rocher Deboule.—Obtaining an option on this property, Aurimont Mines, Limited, continued operations started at the close of last year. An effort was made to ship at a profit hand-sorted ore. After shipping a few cars of ore operations were suspended. W. S. Harris was in charge of this work.

Comeau.—Work was done at this property by the owners, D. Comeau and G. Beirnes. This property possesses promising features and is commended to the attention of examining engineers.

Four-mile Mountain.

Mohawk.—Small-scale development has been persistently carried on by the Mohawk Mining Company, Limited, comprising drifting in the vein which was discovered last year at the granodiorite-tuff contact. This vein has been followed north-easterly for about 250 feet. A certain amount of mineral, it is stated, has been more or less continuous. The drift is now getting close to the Kinman shaft—a promising region.

Comet.—Some work was done on this property by Bulkley Mines, Limited.

Nine-mile Mountain.

Silver Cup.—Various difficulties were encountered by Silver Cup (Hazelton) Mining Company, Limited (formerly Duke Mining Company), in getting its milling power plant into operation, in consequence of which it was not found possible to start milling before May 4th. It subsequently developed that the ore was not an easy one to treat by flotation and the best flow-sheet has yet to be worked out. But little development has been carried out during the year beyond continuing the raise from No. 4 level to No. 3 level, started at the end of 1928. Stopping is now being carried out above No. 3 level and from No. 2 level to the surface. The shrinkage system is adopted. The immediate resumption of development on both levels 4 and 3 would seem advisable. Both these faces exhibit promise.

SMITHERS SECTION.

Hudson Bay Mountain.

Henderson.—In accordance with the programme announced at the close of 1928, Duthie Mines, Limited, completed its power plant, installed a sorting-belt and other improvements at the mill, completed a new bunk-house and boarding-house and other surface buildings, and has carried out extensive development.

Milling operations were resumed on June 1st and the plant has since been operated to capacity, mill-feed being composed of ore resulting from development, together with a limited tonnage from such shrinkage stopping as is being carried out to permit of a gradual reserve of broken ore.

The milling results obtained at this plant have reached a high degree of excellence. For example, lead and silver savings range from 95 to 98 per cent. and the zinc saving is about 85

per cent. Lead concentrates range from 50 to 60 per cent. lead and from 400 to 700 oz. silver to the ton. Zinc concentrates range from 50 to 60 per cent. zinc and somewhat under 1 oz. silver per unit of zinc. Such results reflect great credit upon all concerned.

Mine-development has involved sinking a 3-compartment vertical shaft from the mill tunnel level to the 600-foot level (a vertical distance of 100 feet), with crosscuts from this level to the *Henderson*, *Fault Plane*, and *Little Stranger* veins. On the mill tunnel level a cross-cut has been run to *Ashman* vein and drives continued on both the *Henderson* and *Fault Plane* veins.

In brief, the results obtained, while not spectacular, are encouraging. New commercial ore-shoots have been opened up on the *Henderson* and *Fault Plane* veins on the 600-foot level and on the *Ashman* and *Fault Plane* veins on the 500-foot level, and the silver grade of mineral seems to be maintained in depth. Surface and internal geology has been studied in detail by members of the staff, and it is the intention in the near future to crosscut south-east from the mill tunnel level to the *Dome* and *Raven* vein systems. These latter are virgin possibilities from which much is hoped.

It is quite evident that every phase of this company's operations receives searching and expert scrutiny and the property receives the benefit of highly skilled administration.

Babine Mountains.

Cronin Mine.—A small force of men has been employed by the Babine Bonanza Mining and Milling Company, Limited, under the direction of C. A. Chapman. Recently an important strike of ore has been reported, which has not yet been investigated.

HOUSTON SECTION.

Owen Lake.

Owen Lake Mining and Development Co., Ltd.—Much has been accomplished during the year and important strikes of ore have been made. Purchase of the controlling interest from Frank H. Taylor by Noah H. Timmins, of the Hollinger Consolidated Mines, at the end of the period under review has already been mentioned.

At this property preliminary investigation consisted in sinking the shaft on the *Diamond Belle* to a depth of 85 feet and drifting from the bottom east and west for a total distance of 120 feet. These workings are now full of water, but results met with are stated to have been quite satisfactory.

The main objective is the penetration of the *Diamond Belle* and *Silver Queen* vein system in depth, by running a 6- by 8-foot crosscut tunnel at a point about 100 feet above the level of Owen lake, which gives a vertical depth of about 300 feet below the main workings on the *Silver Queen* (these latter are themselves about 250 feet below the vein-outerop) and a depth of about 575 feet below the collar of the *Diamond Belle* shaft. This crosscut progresses at the rate of about 10 feet a day, and at the date of inspection on June 23rd had reached a point 1,200 feet from the portal and had penetrated seven veins, of which three were of obvious commercial significance. It might be added that at the time of compiling this report word has been received by the management that two more veins have been passed through, of which one shows fine ore.

These veins are crossed by the tunnel obliquely and some have been followed eastwards from the crosscut for about 80 feet. These veins are numbered in the order in which they were encountered. At the time of inspection the veins of obvious commercial importance were Nos. 1, 3, and 7, which occur at respective distances of 132, 267, and 970 feet from the portal of the tunnel. The most recent information as mentioned above is that there is still another. It should be understood that it is of course possible that some of the other veins upon investigation may prove to be of commercial importance. The strike and dip of these veins vary; some are steep and others comparatively flat. The strike may in the main be regular, but locally it appears to be, as in the case of the vein on the *Silver Queen* already known, somewhat irregular and zigzag. The country-rock is porphyritic andesite intruded in places by gabbro or a gabbroid rock. The veins are shear-zones. As in the case of other veins on this property, there occurs a large amount of manganese minerals, mainly rhodonite and rhodochrosite apparently.

Veins Nos. 1, 3, and 7 vary in width from 4 to about 11 feet. The character of the mineralization is that of lenses of compact chalcopyrite, with quite subordinate amounts of zinc-blende and galena. It is curious that the silver-carrier is the chalcopyrite, and not apparently

the zinc-blende or galena. A sample of chalcopyrite taken from No. 1 vein assayed as follows: Gold, 0.5 oz. to the ton; silver, 140 oz. to the ton; copper, 21 per cent. On the other hand, a sample of mainly zinc-blende with a little galena taken from the same place assayed: Gold, 0.04 oz. to the ton; silver, 2.6 oz. to the ton; lead, 1 per cent.; zinc, 21 per cent.

Such ore lends itself to hand-sorting (although of course strictly of a type that requires milling) and at the time of inspection ore-sorting was in progress with a view to making a preliminary shipment.

It should be understood that veins encountered in this tunnel are virgin possibilities that were not contemplated at the time of starting operations and are distinct from and in addition to these exposures which warranted the development of this property.

Having regard to the significance of manganese in the vein-outcrops and its possible influence upon the precious-metal grade of the mineral in depth, it will be a matter of great interest to find what is disclosed in this connection, when the tunnel penetrates the vein systems on which work has already been done at higher points. There seems every reason to anticipate that this property has a bright future.

In the installation of efficient plant and conduct of operations generally, there is reflected able technical direction, and the management is entitled to much credit for what has been accomplished at this property in a comparatively short time and in the face of transportation difficulties.

Assistance has been given this company by the Department of Mines to enable it to construct a road to its property from Houston via the Morice River route. Survey of this route is already in progress.

TOPLEY SECTION.

Richfield.—Much work has been done at this property by the Topley-Richfield Mining Company, Limited. The main shaft has been sunk on a pitch of about 54° for 120 feet below level No. 1 (100 feet vertical distance), and much drifting and crosscutting has been carried out on this level. In addition, to date approximately 1,600 feet of diamond-drilling has been accomplished.

As to the results gained: North of the shaft continuous mineral was met with for a length of upwards of 200 feet, as measured along the turns of the drift. The pitch of this varied from 30° to 55° and the average width is about 3 feet. A large number of samples were taken by the company of this ore, and from the company's assay records gold values seem to range from about 0.1 to 1.1 oz. to the ton and silver values from about 1 to 60 oz. to the ton.

At the northern end of the drift from the shaft on No. 2 level a raise was run up to level No. 1. For the first 40 feet this raise, it is stated, was in continuous ore from 3 to 4 feet in width. Samples of the muck resulting from this raise ran as high as 0.22 oz. gold to the ton and 67.1 oz. silver to the ton. At 40 feet above the level the raise, it is stated, left the ore in the foot-wall and its existence has been proved by crosscutting.

South of the shaft the main level encountered a length of 30 feet of continuous mineral ranging in width from 1 to 4 feet and averaging, it is stated, about 1.5 feet in width. Assay values of this mineral are not as good as those obtained north of the shaft.

From the north drift a crosscut has been run to the contact-vein, which follows with persistence the andesite-topleyite contact, but which failed to show commercial ore on level No. 1; this vein has been followed on the foot-wall for 130 feet and test-holes drilled in the vein where the latter is not exposed. Precious-metal values remain low, but a little chalcopyrite has recently appeared in this vein.

From this contact-vein a raise has been run up 70 feet at a steep angle to intercept the ore disclosed by diamond-drill hole 7 U. This has just been struck in the raise. It is 3 feet in width, assaying: Gold, 0.26 oz. to the ton; silver, 13 oz. to the ton.

It is stated that from No. 1 W. crosscut, level No. 2 (the crosscut run west from the bottom of the shaft), diamond-drill holes 10 U and 11 U have disclosed the existence of widths of 1 foot and 2½ feet of ore respectively at 100 feet below level No. 2. This ore carries good values.

Reviewing briefly the salient features of this property, the position is that level No. 1 disclosed a state of things *radically* different from those anticipated by study of the meagre exposures on the surface and the original prospect crosscut tunnel. A highly complicated geologic structure with much faulting was also disclosed by level No. 1. Matters are somewhat clearer on level No. 2, where the shoot of mineral encountered north of the shaft appears to

afford a definite objective, to which it is evident further exploration should be directed. It is possible, of course, that there will be a further improvement below level No. 2, but the structure disclosed this level is still complicated, and further development is necessary before an opinion can be expressed as to the potentialities of this property.

From a study of properties possessing points of resemblance to this one, it seems likely that mineralization is due to a deep-seated granitic intrusion and that there is therefore justification for conducting development below level No. 2 in anticipation of an improvement.

This company installed during the year a Gardner Denver electric-power pump of a capacity of 100 gallons a minute, against a head of 500 feet.

Babine Lake.

Richmond.—The Consolidated Mining and Smelting Company of Canada, Limited, is carrying out diamond-drilling at this property, situated on McDonald island, Babine lake.

Venture.—This group, formerly known as the "Boling property," is being developed by the Silver Island Mining Company, Limited, under the direction of H. J. Macdonald.

BURNS LAKE SECTION.

Mona.—Small-scale operations have been carried on at this property. Two sparsely mineralized fractures between 5 and 6 feet in width are being followed up by adit-drifts. These two fractures are about 100 feet apart horizontally and are known as No. 1 and No. 2 veins, No. 2 vein being the more westerly. So far no mineral of commercial importance has been disclosed.

CARIBOO MINING DIVISION.

Hixon Creek.

Cariboo Lode Mines, Ltd.—This is a newly incorporated company, which it is understood has an option on the property of the Quesnelle Quartz Mining Company on Hixon creek and also owns neighbouring mineral claims. The Quesnelle Quartz Mining Company carried on operations, it is understood, in the early seventies, but its workings are at present under water. It is understood to be the intention of Cariboo Lode Mines, Limited, to pump out these old workings to ascertain what is in sight.

Lightning Creek.

Lightning Creek Gold Gravels and Drainage Co., Ltd.—This company, which is now changing its name to the "Lightning Creek Gold Mines, Limited," has authorized an increase of capitalization, so that now there are 800,000 shares of \$5 par value and 10,000 cumulative preference shares of \$100 par value, or a total of \$5,000,000 authorized capital. The Cardinal Securities Corporation is offering for public sale the issue of \$1,000,000 of preference stock, with a bonus of two shares of common stock with each share of preference stock.

In connection with the offer of public sale of stock in this company, the Cardinal Securities Corporation issued certain advertisements in the *Star* and *Province* newspapers in Vancouver. Furthermore, the corporation made the use of a circular descriptive of the property of the Lightning Creek Gold Gravels and Drainage Company, Limited, issued some years ago by the Mines Operating Company.

Certain statements in the circular and advertisements referred to, being, in the opinion of the Resident Engineer, not in accordance with the facts, notice thereof was given to the Honourable the Minister, in accordance with section 15 of the "Mineral Survey and Development Act." The statements in question were to the effect that there is a proven gold content of \$13,000,000 gross and \$12,000,000 net in a 1½-mile section of this company's property, with a proved continuity of the channel, with an average of \$8,000,000 per mile, or \$12,000,000 to the section, and that the fourteen sections which this company owns therefore "conservatively indicate \$168,000,000 in gold values on this property."

The total production of Lightning creek and its tributaries is given by W. A. Johnston in Memoir 149, "Placer and Vein Gold Deposits of Barkerville, Cariboo District, British Columbia," published by the Geological Survey, as between \$5,000,000 and \$6,000,000 (refer to page 172 of Memoir). Practically all of this came from about 2 miles of the creek in the vicinity of Stanley and Van Winkle. The richest portion of the creek, therefore, with its tributaries, produced, according to reliable computation, not more than between \$2,500,000 and \$3,000,000 a mile.

The testing operations of this company have been carried out at Wingdam, some 13 miles below Stanley, on Lightning creek, where the former productive area was situated. There is no justification for inferring that because upper Lightning creek was rich, therefore the bed-rock gravels some miles down-stream will be equally rich. The richness of the gravels is determined by several factors, which may be quite different at two widely separated points on the same creek. Furthermore, it is quite possible that the pre-glacial drainage of Lightning creek below Stanley was by way of Beaver pass, which quite upsets attempts to align possible values in the vicinity of Wingdam with those near Stanley.

From the available evidence, there is no justification for assuming that the 21 miles of Lightning creek controlled by this company is as rich as the portion mined out many years ago. Definite evidence shows that the gold content on Lightning creek is irregularly distributed, and accurate and thorough testing by drilling is required before any reliable estimate of gold content can be made.

A consideration of the available data on the drilling results of the Lightning Creek Gold Gravels and Drainage Company indicates a possible gold content of \$260 a running foot of valley. Assuming that there does exist in that portion of Lightning creek under review a pre-glacial gold channel, largely uneroded by ice-movement, such a value is within the bounds of credibility. At the same time, its existence has yet to be demonstrated by an intensive drilling campaign, and further, having regard to the nature of the deeply buried bed-rock gravels, the economic extraction of the gold contents is likely to prove a severe tax on intelligent engineering ability. All those interested are advised to read the report on this company and property contained in the 1923 Annual Report of the Minister of Mines, as it accurately summarizes the possibilities of this property.

CENTRAL MINERAL SURVEY DISTRICT (No. 3).

SUMMARY REPORT FOR SIX MONTHS ENDED JUNE 30TH, 1929.

By H. G. NICHOLS, RESIDENT MINING ENGINEER.

INTRODUCTORY.

As a result of work that has been in progress in the Central District during the six months ended June 30th, 1929, there is promise of considerable advance to be noted in the annual record of development of the mines in this district. Although active work was delayed by the lateness of the spring, a large number of scouting-parties are in the field and some new discoveries have been made already.

The policy of opening up mineral areas by the construction of trunk trails for pack-horses which has been adopted by the Department of Mines is calculated to be of material assistance to the mining development of the district, and satisfactory initiative is being shown by private interests in the improvement of facilities for transportation to areas that are being prospected by them.

Apart from production of gold from the Bridge River area, features of particular interest are in connection with the development of known reserves of low-grade copper ore and work that is being carried out upon properties in widely separated sections of the district, from which a material increase in the production of silver-lead concentrates may be expected.

The above remarks are in no way intended to cover the whole field of activity within the district, portions of which alone have been visited during the current year, but are submitted as an introduction to the following comments upon some special features.

YALE MINING DIVISION.

HOPE SECTION.

For the purpose of this report this section covers the mineral-zone commonly known as the Coquihalla Gold Belt and the extension towards the south-east, through and beyond the 23-Mile camp on the Skagit River. A further examination of this area was made, in company with the Provincial Mineralogist, between the dates of June 29th and July 9th of this year.

In regard to the Coquihalla Gold Belt proper, mineralization, as described by C. E. Cairnes, of the Geological Survey of Canada, is identified with a zone of intrusion by diorite into greenstone, paralleling a slate-greenstone contact. Within this zone, where much alteration of the original rocks occurs, irregularly shaped bodies of serpentine are developed and dislocation and shearing in the greenstone and fracturing of the slates have afforded channels for mineralization, which is found in the character of gold-quartz veins penetrating the slates, along shears in the serpentine and greenstone, and as replacements in shatter or fracture zones. Shearing and crushing along the unconformable contact between the slates and greenstone have afforded conditions favourable to mineral deposition, and the principal occurrences of free gold have been found along the sheared margins of bodies of serpentine thus placed. Under particular conditions to be referred to later, shears within the mass of the serpentine are also found to carry gold content.

The discovery of gold ore of exceptionally high grade, under the special conditions referred to above, has been held in certain quarters to encourage the view that the development of tonnage would be a simple matter; but as may be gathered from the foregoing remarks, and as has been pointed out in a previous report, these deposits are prima facie evidence of sporadic occurrence, and may only be considered as affording strong encouragement to further prospecting with a view to securing information upon which to base a programme of intelligent development.

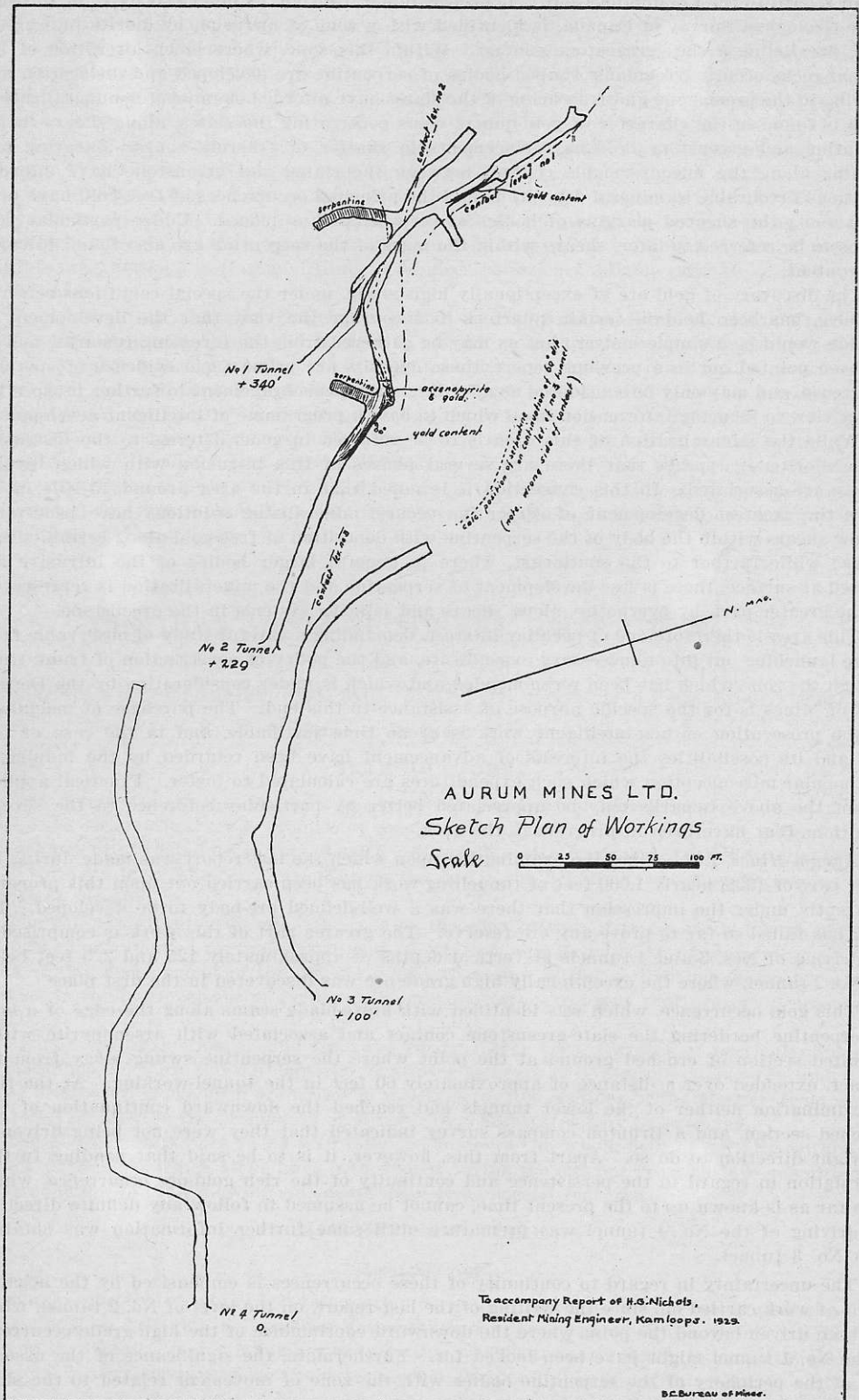
While the mineralization of this area is to be referred in general terms to the intrusion of the diorite, it appears that there are several phases of this intrusion with which diverse aspects are associated. In this connection it is noted that in the area around 15-Mile creek, where the greatest development of serpentine occurs, mineralizing solutions have penetrated narrow shears within the body of the serpentine with deposition of free gold along certain shear-planes; while farther to the south-east, where in general larger bodies of the intrusive are exposed at surface, there is less development of serpentine and the mineralization is represented, for the greater part, by pyrrhotite, along shears and jointing systems in the greenstone.

This area is therefore one of peculiar interest, demanding a careful study of observable facts before launching out into unnecessary expenditure, and the policy of construction of trunk trails through the zone which has been recommended and which is under consideration by the Department of Mines is for the specific purpose of assistance to this end. The purchase of machinery for the prosecution of non-intelligent work is at no time justifiable, and in the case of this area and its possibilities the interests of advancement have been retarded by the indulgence of a popular misconception which such expenditures are calculated to foster. Practical application of the above remarks may be appreciated better by particular reference to the several operations that have been in progress in the area.

Aurum Mines, Ltd.—Since the examination upon which the last report was made during the latter part of 1928, nearly 1,000 feet of tunnelling-work has been carried out upon this property, apparently under the impression that there was a well-defined ore-body to be developed. The work has failed so far to prove any ore reserve. The greater part of this work is comprised in the driving of Nos. 3 and 4 tunnels at vertical depths of approximately 125 and 225 feet below the No. 2 tunnel, where the exceptionally high-grade ore was discovered in the first place.

This gold occurrence, which was identified with knife-blade seams along the edge of a body of serpentine bordering the slate-greenstone contact and associated with arsenopyrite within a limited section of crushed ground at the point where the serpentine swung away from the contact, extended over a distance of approximately 60 feet in the tunnel-working. At the time of examination neither of the lower tunnels had reached the downward continuation of this enriched section, and a Brunton compass survey indicated that they were not being driven in the right direction to do so. Apart from this, however, it is to be said that pending further information in regard to the persistence and continuity of the rich gold-ore occurrence, which, in so far as is known up to the present time, cannot be assumed to follow any definite direction, the driving of the No. 4 tunnel was premature until some further information was obtained from No. 3 tunnel.

The uncertainty in regard to continuity of these occurrences is emphasized by the negative result of work carried on, since the writing of the last report, on the level of No. 2 tunnel, which has been driven beyond the point where the downward continuance of the high-grade occurrence in the No. 1 tunnel might have been looked for. Furthermore, the significance of the association of the periphery of the serpentine bodies with the zone of movement related to the slate-



greenstone contact is emphasized by the results of crosscutting carried out within the body of the serpentine on the level of No. 2 tunnel. Sampling along these crosscuts failed to afford evidence of any values. It is to be reiterated strongly that while the spectacular character of the ore which has been uncovered on this property affords much encouragement to further prospecting, there is at the present time no basis for any scheme of development with a view to blocking out tonnage.

A rough survey of the workings was made from which the attached sketch-map has been prepared, for which no particular accuracy can be claimed, but in which two points of considerable importance are indicated, namely: (1) The irregular character of the contact, which in no way coincides with the dip of the shear-planes in the serpentine; and (2) the fortuitous association of the serpentine bodies with the slate-greenstone contact. It is imperative, if intelligent work is to be carried on, that as a guide in the first instance a detailed survey should be made.

It would appear to be desirable that driving on the No. 3 level should be continued until the area in which the downward continuation of the high-grade section might possibly be found is satisfactorily explored, when, if ore of similar grade is encountered, connection between the two levels might be undertaken with a possibility of blocking out tonnage. Should such work fail in this object, it would be better to start again from the point where the high-grade material was encountered on the No. 2 level, and ascertain where it does go to, by raising and sinking on it. Should this prospecting show a similar lack of continuity in the vertical direction to that which the present workings indicate horizontally, it would appear to be wise to mine out the high grade ore, thereby prospecting by the old and safe rule of "following the ore."

It is understood that about 750,000 shares out of the authorized capital of 1,000,000 had been issued, and that of this amount it has been arranged, following a reconstitution of the Board of Directors, that 100,000 shares of the promotion stock is to be returned to the treasury and an amount of approximately \$13,000, that was apparently expended by the old board without proper authority on the property now held by Dawson Mines, Limited, will probably be returned to the company. The company is said to have nearly \$75,000 cash in the treasury.

Hope Gold Mines, Ltd.—This company, representing interests identified with A. B. Trites, of Vancouver, is carrying out exploratory work upon a number of claims that have been located in the vicinity of the property of Aurum Mines, Limited. It has been represented that the object of this work is, in general, to prospect the western contact of the belt of serpentine, which has been assumed to continue uninterruptedly to the south-east as far as the railway-track, and the extensive development of serpentine around 15-Mile creek has lent colour to this assumption. It is, however, clear that the serpentine occurs as irregular bodies within the greenstone, and the work that has been carried out by this company, at a distance of approximately 2 miles west of the *Aurum* workings, has demonstrated this fact.

Two tunnels have been driven for a distance of something over 100 feet each, in which occurrences of free gold have been found in a shear within the serpentine. Crosscutting from the lower tunnel proved a considerable width for this body of serpentine, but no values have been encountered elsewhere than along the narrow shear-plane above mentioned. In the upper tunnel the serpentine is found to finger out in the greenstone, into which the same plane of shearing persists, but with no apparent values.

On the *Montana*, lying to the north-west of the *Aurum* workings, the same company has also been doing some surface-stripping, with a view to locating a serpentine contact. Up to the present time this work has been unproductive of results.

Pacific Mines, Ltd.—This company, controlled by interests identical with those associated with Hope Gold Mines, has been carrying out some interesting work on 15-Mile creek. A body of serpentine which is intersected by dykes and intrusions of a feldspar porphyry, which apparently represent differentiates of the main intrusion, along narrow shears, has been sectioned in an efficient manner by ground-sluicing.

Three seams identified with these intrusions, in which visible gold has been found, have been exposed within a distance of about 300 feet. From the upper seam, in contact with a diorite dyke, a sample across about 15 inches assayed: Gold, 0.22 oz. to the ton; silver, 0.02 oz. to the ton. From a second seam a sample was taken across a width of about 6 inches and assayed: Gold, 0.42 oz. to the ton; silver 0.05 oz. to the ton, and from a third seam taken across a width of about 18 inches a sample assayed: Gold, 0.02 oz. to the ton; silver, trace.

This evidence of mineralized shears within the body of a serpentine mass is of considerable interest and affords justification for the prosecution of further exploratory work, but is on no account to be taken as an argument in favour of finding gold wherever there is serpentine.

Dawson Gold Mines, Ltd.—This company, with headquarters in Vancouver, was formed to acquire the *Emancipation* and adjoining claims and to continue development-work that had been initiated under the auspices of Aurum Mines, Limited. The prime feature of attraction in connection with the *Emancipation* is the occurrence of gold-quartz veins associated with the slate-greenstone contact.

There are two veins, roughly paralleling one another, which have been called the *Dyke* and *Boulder* veins; the former, in the hanging-wall, averages less than 12 inches in width, the latter being about 8 feet wide. An ore-shoot was developed in the *Dyke* vein, following its intersection with a crossing vein, and from this shoot some high-grade ore has been extracted in the past.

Economic possibilities in connection with the property have been held to be, as indicated in a previous report, in relation to the existence of an ore-shoot at the intersection of the same crossing vein with the *Boulder* vein, the latter having been found, wherever it has been opened up from the existing workings, to be too low grade for profitable operation. The intersection above referred to would be below the level of the present workings, and it has been recommended that a drift should be run in on this vein from the surface to reach this point of intersection.

During the progress of operations, to which reference has been made, a tunnel was started from a point suitable for the object mentioned, but it was run as a crosscut towards the *Dyke* vein and was later continued into the hanging-wall to explore the bodies of serpentine that occur within the greenstone.

The main feature upon which the attraction of the property has been based in the past was thus neglected in favour of the prevailing fancy for the serpentine formation. More recently these tunnel-workings have been used for the purpose of commencing a raise to connect with a winze on the ore-shoot of the *Dyke* vein; if and when a connection is made, the opportunity will be afforded for the further exploration of this ore-shoot in depth, from which a limited tonnage of good-grade ore may be anticipated. There is also a further possibility of gold values being encountered around the point where the *Dyke* vein-fissure and the body of serpentine come together.

A sample taken across a 6-inch width of the *Dyke* vein, near the bottom of the winze, assayed: Gold, 0.65 oz. to the ton; silver, 0.06 oz. to the ton.

(1.) Summarizing the situation in regard to this property, it may be said that further driving on the level of the main tunnel, where the *Dyke* vein appears to fray out into insignificant stringers after leaving the intersection of the crossing vein, and where the chances of encountering enrichment of the *Boulder* vein at its intersection with the crossing vein become more remote with every foot advanced, is without attraction.

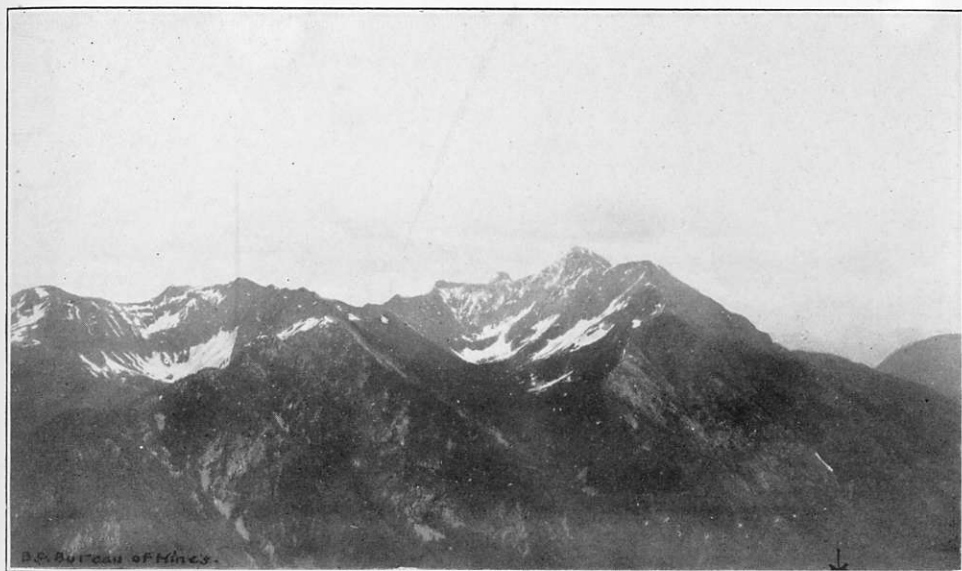
(2.) The work of exploration in depth of the ore-shoot on the *Dyke* vein is sound, and there are certain undetermined possibilities in connection with its juxtaposition with the body of serpentine; apart from these no considerable tonnage may be anticipated.

(3.) The major possibility in connection with profitable operation would appear to lie in connection with the occurrence of an ore-shoot in the *Boulder* vein below the level of the present workings.

(4.) Blind groping around in the serpentine bodies is not calculated to produce satisfactory results.

Columbia Metals, Ltd.—This company, with head office in Vancouver, has been formed to prospect ground situated on the west side of the Coquihalla river below Jessica, and attention has been devoted to a shear in the greenstone in which some scanty mineralization has been found. Funds have also been expended in groping around exposures of serpentine. It is understood that some specimens of fair-grade mineral have been taken from the workings in the greenstone, but such specimens are in no way representative of the economic value of the occurrence. A sample was taken across 5 feet 6 inches of the shear, where it was exposed in the main crosscut. The assay result was as follows: Gold, trace; silver, trace; copper, trace; zinc, none.

Dalhousie Mining Co., Ltd.—This company is doing prospecting-work in the same greenstone zone, on the steep hillside that flanks the right bank of Sowaqua creek, east of the Coquihalla river. The work that this company is doing is frankly of a prospecting nature and is to be commended, inasmuch as no unwarranted overhead expenditure is being incurred and it is being



Hope Mountains, West of Skagit River.



Lorne Mine Camp, 1929.

devoted to a search for something to which development might be applied. Up to the present time no discovery of economic importance has been made, but valuable information is being obtained in regard to structural and geological conditions and some minor occurrences of gold have been reported.

Hope Holdings, Ltd.—This company, which has been fostered by the MacLean Investment Company, of Vancouver, is identified with a number of subsidiary companies and holdings around 23-Mile camp on the Hope-Princeton trail. The chief activity has been devoted to work upon the *Silver Daisy*, near the confluence of the Sumallo and Skagit rivers. It is understood that an amount of approximately \$35,000 has been expended in the reconditioning of the road for motor transport, leading from Hope to the properties; in the purchase and installation of machinery; in the driving of tunnels for the purpose of developing the *Silver Daisy* vein; and certain work on the *Rainbow*.

The *Silver Daisy* vein, which is about 6 inches wide, occupies a fissure which follows a sinuous course through a succession of joint-planes in the greenstone. It has been followed more or less continuously for a distance of approximately 100 feet on one level, and from this working-place a car-load or more of shipping-ore was extracted. Twenty-one tons was shipped to Trail, which contained: Gold, 0.63 oz.; silver, 1,059 oz.; lead, 2,893 lb.; zinc, 3,574 lb.; net value, \$372.54.

A crosscut tunnel has been driven for a distance of about 250 feet from a point about 142 feet vertically below these workings and will require to be driven for a further 75 feet before reaching a point at which the downward continuation of this vein might be looked for.

It is understood that hopes have been entertained that at this lower horizon the vein might be found of greater width, but there is nothing in the nature of the occurrence upon which such a supposition might be based. There are also stated to be other veins from which production might be expected, but the work already carried out has demonstrated the fact that the stringers referred to are not to be considered of economic importance. The undertaking in general represents expenditure out of proportion to the possibilities of production from a vein of this size and character.

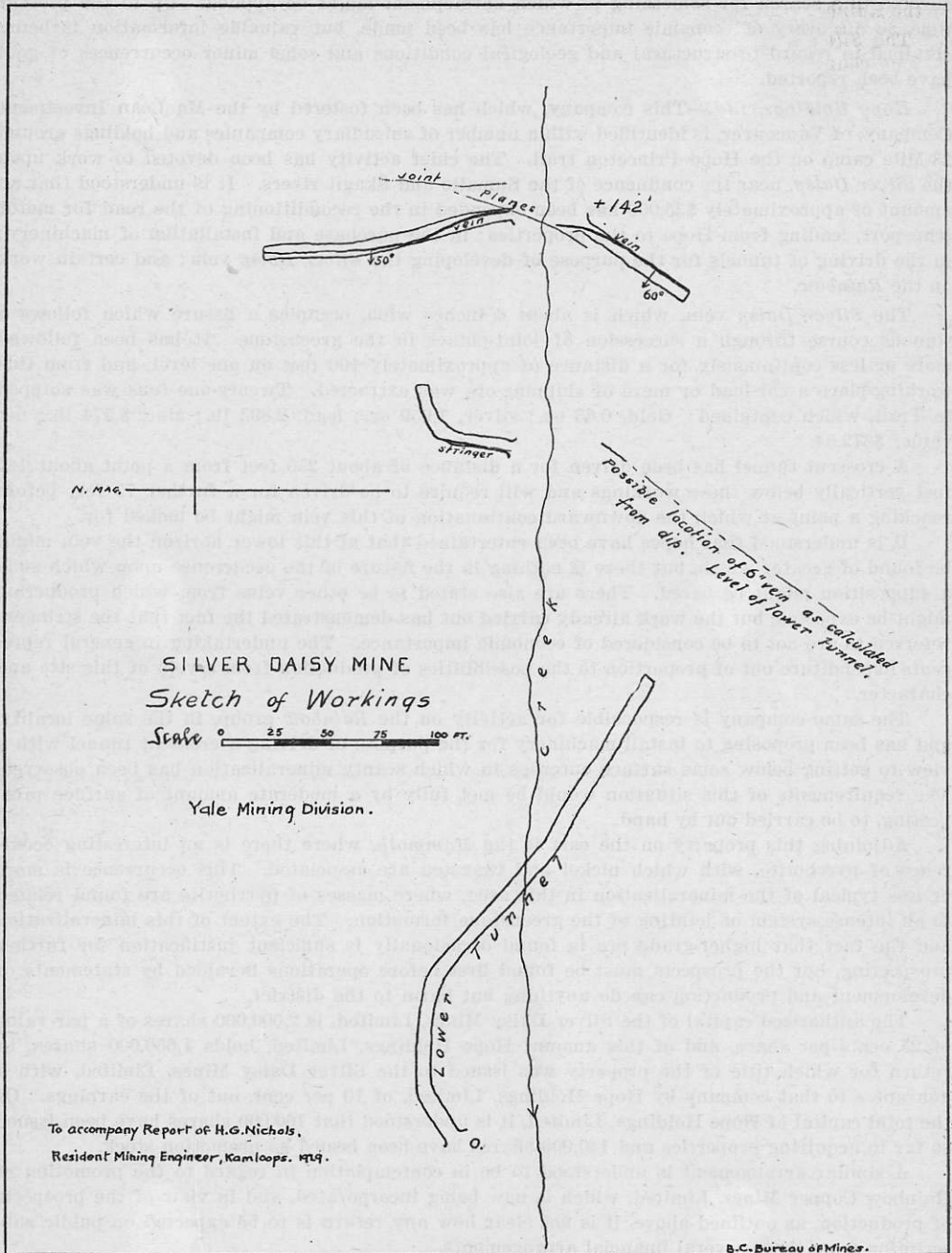
The same company is responsible for activity on the *Rainbow* group, in the same locality, and has been proposing to install machinery for the purpose of driving a crosscut tunnel with a view to getting below some surface outcrops in which scanty mineralization has been observed. The requirements of this situation would be met fully by a moderate amount of surface prospecting, to be carried out by hand.

Adjoining this property on the east is the *Mammoth*, where there is an interesting occurrence of pyrrhotite, with which nickel and tungsten are associated. This occurrence is more or less typical of the mineralization in this area, where masses of pyrrhotite are found related to an intense system of jointing of the greenstone formation. The extent of this mineralization and the fact that higher-grade ore is found occasionally is sufficient justification for further prospecting, but the prospects must be found first before operations heralded by statements of development and production can do anything but harm to the district.

The authorized capital of the Silver Daisy Mines, Limited, is 2,000,000 shares of a par value of 25 cents per share, and of this amount Hope Holdings, Limited, holds 1,650,000 shares, in return for which title of the property was issued to the Silver Daisy Mines, Limited, with a guarantee to that company by Hope Holdings, Limited, of 10 per cent. out of the earnings. Of the total capital of Hope Holdings, Limited, it is understood that 160,000 shares have been issued so far in acquiring properties and 140,000 shares have been issued as promotion stock.

A similar arrangement is understood to be in contemplation in regard to the promotion of Rainbow Copper Mines, Limited, which is now being incorporated, and in view of the prospects of production, as outlined above, it is not clear how any return is to be expected on public subscription from these several financial arrangements.

Gold Coin, Waterfall, and Grandview Group.—These claims are situated on a mountain, rising to an elevation of about 5,000 feet, lying to the north of Steamboat mountain, from which it is separated by the valley of 10-Mile creek, which flows into the Skagit river about 9 miles south of the *Silver Daisy* camp. Extensive bodies of pyrrhotite, similar to those at 23-Mile camp, occur in association with joint-planes in the greenstone, which is intersected by tongues and dykes of diorite, and in certain of these occurrences lead, zinc, and copper minerals are also found; it is reported that there are associated gold values. There are also some zones in which



arsenopyrite predominates. A considerable amount of prospecting has been carried on by C. Howlett and associates, of Hope. The greater part of this work has been devoted to the bodies of pyrrhotite, which are in greater evidence at the lower horizons of the hill. Some narrow bodies of limestone are encountered in the greenstone formation, and in general it may be said that further prospecting is justified, with particular application to the occurrences of galena at the higher elevations.

NICOLA MINING DIVISION.

MERRITT SECTION.

For the purpose of this report this section includes the country around the town of Merritt, in the Nicola Mining Division, within a radius of about 20 miles.

Morgan Copper Mines, Ltd.—This company, with headquarters in Vancouver, has been formed with the avowed purpose of exploiting mineral occurrences in the Aspen Grove camp. The general character of these deposits has been described in previous reports. A further examination was made for the purpose of checking statements included in the advertisements of this company, by which an interpretation of certain known occurrences was conveyed that was at variance with that which had been recognized as a result of previous investigations. It was found that the mineralized seams, which occur in fracture-zones of a basaltic formation, to which particular reference had been made in the said statements, did not present evidence of continuity or of average values upon which economic operations might be predicted.

A sample was taken across a width of 11 feet of one of these seams, that had been referred to as a "20-foot vein having an average value of \$22.83." This sample assayed: Gold, trace; silver, trace; copper, 0.05 per cent.

Planet Mines and Reduction Co. of Nicola, B.C., Ltd.—The 100-ton flotation plant of this company, operating at Stump lake, has been producing silver-lead concentrate from ore extracted from the *Enterprise* vein previously developed by workings from the old *Star* shaft. A crosscut tunnel has now been driven and has intersected this vein at a point at which it reached a width of about 5 feet, with satisfactory mineral content. Drifting and raising has been carried out towards the south in order to make connection with the shaft-workings, and a drift has also been run to the north, in which the vein was found to pinch to a mere stringer in the course of a few feet. This pinching and swelling is a characteristic of the veins in the greenstone in this area, and it would appear that a heavy burden of development would be entailed in the attempt to keep the mill running on production from this one source alone. Ore on the dump from previous workings, from which a return was expected to justify the early installation of the mill, was treated, and failed to fulfil expectations regarding it.

Operations have been initiated for the purpose of extracting some ore, to assist in keeping the mill running, from another vein outcropping on the far side of the hill, from which some samples showing encouraging values have been obtained. It is believed that profitable operation by this company will depend upon the results of development of the vein system that occurs farther up the hill, and which was developed by shaft-workings to a depth of about 400 feet, many years ago. To achieve this object the crosscut tunnel which has already intersected the *Star* vein, and which is excellently sited for the purpose of ulterior development, would require to be driven for a further distance of approximately 700 feet, and by the utilization of such available sources of ore-supply it is considered that there is a fair chance of profitable return.

Turlight Group.—This group is situated about 4 miles north-east of Nicola, on the hillside flanking Mill creek on the east. A shaft has been sunk by J. Graham and associates, of Merritt, upon an attractive vein about 5 feet wide, in which there is a heavy content of bornite with a quartz gangue. The ore occurrence appears to occupy a shear in a marginal differentiation of a granite stock, intrusive into the greenstone, but no outcrops are to be found along the line of strike in either direction, although the vein in the shaft is well defined with good walls. A sample of the ore taken from this shaft assayed: Gold, 2.02 oz. to the ton; silver, 5.3 oz. to the ton; copper, 11.3 per cent. Should drifting in both directions at a moderate depth prove continuity for this vein, further development will be fully justified.

KAMLOOPS MINING DIVISION.

KAMLOOPS SECTION.

Ajax and Monte Cristo Groups.—Diamond-drilling on this property by the Consolidated Mining and Smelting Company of Canada, Limited, has been in steady progress since the early spring, and while no definite statement in regard to results is available, it is understood that twelve holes have been bored already and that a further line of drill-holes to intersect the mineral-zone at greater depth is in progress.

The delimitation of areas of economic low-grade copper ore, at one point in this area close to Kamloops, would provide encouragement for further investigation of the several wide zones of shearing that occur in the granitic formation.

ASHCROFT MINING DIVISION.

HIGHLAND VALLEY.

Transvaal Group.—Prospecting-work has been resumed upon this group, which is situated in a field of low-grade copper mineralization, occupying ground which is partly in the Ashcroft and partly in the Kamloops Mining Division. It is hoped that results of this work and of a more detailed survey of the several mineral occurrences of this camp may be dealt with in an ensuing report.

VERNON MINING DIVISION.

VERNON SECTION.

White Elephant Group.—Operations having for their main object a milling test on the extensive localized body of quartz in which pockets of high-grade bismuth-telluride ore have been found to occur have been commenced by Pre-Cambrian Mines, Limited, and it is understood that further development from the bottom of the shaft, which has been sunk on this body of quartz to a depth of approximately 80 feet, will depend upon the results obtained. Surface indications do not afford a sufficient guide for the direction of this development-work.

Okanagan Copper Mining Co., Ltd.—This company, which is understood to be privately controlled, is engaged upon development of some attractive bodies of copper ore occurring in association with a complicated jointing system in volcanic formation on Siwash creek, Okanagan lake. It is understood that a low-level tunnel is to be driven for the purpose of intersecting a series of these ore-bodies, in which there is a notable content of chalcocite and which have been exposed in open-cuts and surface-tunnelling.

CLEARWATER SECTION.

Eastern interests are engaged in development of the mineral occurrences, to which reference has previously been made in the Annual Report for 1927, near the headwaters of the Azure river and of Hobson creek, a tributary of the Clearwater River system.

LILLOOET MINING DIVISION.

BRIDGE RIVER SECTION.

Opportunity has not yet been afforded for visiting this camp during the present season, but it is understood that development of the *Lorne* by the Lorne Gold Mines, Limited, is proceeding as planned, and that operation of the *Pioneer* by the Pioneer Gold Mines of B.C., Limited, continues upon a satisfactory basis.

SOUTHERN MINERAL SURVEY DISTRICT (No. 4).

SUMMARY REPORT FOR SIX MONTHS ENDED JUNE 30TH, 1929.

BY PHILIP B. FREELAND, RESIDENT MINING ENGINEER.

SIMILKAMEEN MINING DIVISION.

Princeton Mining and Development Co., Ltd. (Golden Copper Co., Ltd.).—The Princeton Mining and Development Company passed out of existence early in the year, owing to the fact that the company's free miner's certificate lapsed. Walter R. Gilbert, of Chilliwack, one of the stockholders, restaked three claims covering a part of the ground held by the old company, and a new company was formed, called the Golden Copper Company, Limited. At present these claims and two others, staked since, are held in the name of Walter R. Gilbert. The new company has an authorized capital of 100,000 shares, par value \$1 per share, with president, Walter R. Gilbert,

Chilliwack; vice-president, Francis Federici, Vancouver; secretary, A. C. Ray, 530 Seymour Street, Vancouver; treasurer, A. O. Topley, Chilliwack. The directors are W. R. Gilbert, F. Federici, John Summers, C. S. Halfnights, and C. N. Davidson. These claims cover part of Lot 404, which is owned by S. Sheppard, and, it is understood, the base-metal rights go with the lot and cannot be claimed by the company unless paid for. An arrangement has been made between W. R. Gilbert and Sheppard so that the latter receives payment for his rights.

Up to June 23rd two or three men had been working outside the limits of Lot 404, in No. 2 tunnel, and an upraise was driven about 45 feet from a point about 100 feet from the mouth of No. 2 tunnel. Similar conditions were found to exist in this raise; i.e., high-grade stringers of chalcopyrite, which were too widely separated to be mined profitably. It is understood that W. R. Gilbert is financing this work himself; he will receive 51,000 shares for three claims and will advance up to \$11,000 if necessary for development. Further work of a similar nature is being undertaken in hopes of finding minable ore-bodies. A car-load of ore found in the bin has been shipped.

Pacific Slope Mines, Ltd.—Under the management of P. H. Fraser, Vancouver, a considerable amount of development-work has been done on the *S. & M.* and *Marion* groups, situated on Whipsaw creek, about 21 miles south of Princeton. On May 1st, it is understood, a payment was due to Sam Spencer, of Princeton. According to the management, a time extension was asked for by the company, and refused, so that the Pacific Slope Mines, Limited, has no further interest in this group. Some discussion has arisen between the company and the owner regarding the original description of the locality of these groups and where the work has been done. Until the ground is surveyed this matter cannot be settled. The workings have not been examined this year.

Granby Consolidated Mining and Smelting Co.—With the finding of new ore-bodies at depth carrying a higher percentage of copper, and the higher price for the metal, conditions at Copper mountain and Allenby are much improved. A new Symons cone crusher has been installed at the mine, which is proving satisfactory, and the mill is handling about 2,500 tons a day. New dwelling-houses are being built at the mine.

PLACER-MINING.

Tulameen Gold and Platinum Recovery Co.—Nothing has been done this year on the holdings of this company on the Similkameen river.

John Guest Leases.—These leases are situated about 2 miles below Coalmont, on the Tulameen river. At the present time a P.H. model, 1¼-cubic-yard bucket shovel, with drag-line equipment on a 50-foot boom, is being installed. It is the intention to build a grizzly and 24-by 18-inch sluice-boxes on a follower to run on rails behind the shovel. The tailings will be taken across the river and dumped on flat ground to the west of the workings. Numerous pits and two shafts have been sunk in the area to be mined. One shaft, which struck the rim-rock, is 36 feet deep; the other, 26 feet deep, did not strike bed-rock. Pay-gravel found averaged 44 cents a cubic yard of free gold and platinum. These leases will be incorporated later into the John F. Guest Mining Corporation, with Nevada capital behind the scheme. Leases held include Nos. 337, 338, 492 to 500, and 502 to 419. No drilling has been done.

Granite Creek Dredging Co., Ltd.—A 1½-cubic-yard bucket, steam-driven dredge has been installed on this company's leases near the mouth of Granite creek and will be ready for operation about the end of July. It is the intention of the company to work the flat benches at the junction of the Tulameen river and Granite creek. Two years ago a 400-foot channel was cut by a steam-shovel. About 3 feet of pay-gravel was exposed towards the end and near the surface of this cut. Spokane capital is financing this venture. No drilling has been done.

Slate Creek Consolidated, Ltd.—Under the management of Norman McCormick, of Tulameen, this company, which is a consolidation of the Similkameen Placers, Limited, and the Slate Creek Platinum Company, continued work on the Slate Creek tunnel. The total distance, including about 40 feet which had to be abandoned on account of running ground, is about 950 feet. This tunnel is an extension of part of the old Law tunnel, which commences at the foot of the first waterfall, and is being driven up the channel of Slate creek. Bed-rock and pay-gravel have not been struck to date. Occasional pannings of partially assorted glacial gravel have shown colours in gold and platinum. Nothing is known about the depth of bed-rock in this channel and the distance still to be tunnelled is unknown. Nothing has been done to date this year on

the bluff leases. Three shifts are being worked and about $4\frac{1}{2}$ feet of tunnel a day is being driven. Material struck has been mostly glacial clay and gravel. No drilling has been done.

Big Ben Platinum and Gold Mining Co., Ltd.—Under the management of John Marks, these leases were operated for only a short time, owing to a shortage of water. A small amount of gold and platinum was recovered. This is an old high channel being worked on bed-rock and some good recoveries made.

British Columbia Platinum Mining Co., Ltd. (N.P.L.).—This company, formed in 1929, has an authorized capital of \$600,000, divided into 600,000 shares of \$1 par value. The president of the company is F. Shelly; the vice-president, George C. Bagley; directors, F. Shelly, Frank Newman, George Bagley, Frank Jackson, and S. J. Castleman; registered office, 624 Birks Building, Vancouver. Leases owned and under option on the Tulameen river are Nos. 153, 392, 228, 229, 545, 593, 594, 579, 588, 589, 590, 591, 592, 596-180, 181, 154, 155, and 258. Some of these leases are located near Hines creek, some near Champion Creek bridge, some on Champion creek, and the remainder near Kelly creek.

The company claims to be the sole owner of the "Newman process" for the recovery of precious metals from ores, gravels, and black sand. By this process it is believed that the problem of recovery from these sands has been solved and made applicable on a commercial basis. Statements made in the prospectus of this company—that "There is an enormous yardage, etc., bearing values which would be in excess of 28,000,000 cubic yards," and "The values known to be contained in these gravels vary according to locality, etc.," and "The free values vary from 50 cents per cubic yard to several dollars per yard"—are not justified, because there is insufficient development-work done. Numerous open-cuts, shafts, and trenches have been excavated over a period of years by former operators, and in one or two instances rim-rock and bed-rock have been reached, but no systematic exploration has been done either by shaft-sinking, tunnelling, or churn-drilling to ascertain cubic yardage, value per cubic yard, the whereabouts of possible workable channels, or depth to bed-rock. With these facts unknown, statements regarding the amount of pay-gravel and values contained are absurd. At the time of examination, July 19th, no development or construction work was being done on the properties.

It is a well-recognized fact that there are values in gold and platinum in the gravels and benches of the Tulameen river, and it is probable that these gravels can be profitably mined, but to install a plant to treat the sands and gravels before thoroughly testing the ground to ascertain the locality of workable channels is to court disaster. The bulk of the bench-gravels so far developed is partly assorted glacial material containing spotty values in gold and platinum. It seems evident that these glacial deposits have in places blocked the old channels of the Tulameen river, turned the course of the water, and covered the old stream gravel-beds. Whether or not the whole mass of glacial debris overburden and the river-gravel can be mined profitably is to be ascertained only by thorough testing. Spectacular recoveries in gold and platinum have been made from time to time by individuals, but these do not represent any large cubic yardage. On the Sootheran lease, now optioned by this company, several valuable discoveries have been made on a low bench adjoining the river, which had been covered with glacial debris. This is one instance of the possibilities to be found on bed-rock in the old channels.

SUMMIT CAMP, TULAMEEN.

This camp has not been visited this year, but it is understood that the Silver King Mining Company, under the management of William Dornberg, is working a few men on the old Cascade Consolidated Silver Mining Company's claims on Treasure mountain. Leases have been acquired from the Capital Mining and Milling Company, C. C. Julian, and the Cascade Consolidated Silver Mining Company by Wm. Dornberg and an assignment made to the present company. It is proposed to erect a small concentrating plant which will eliminate most of the gangue rock and ship this rough concentrate to the smelter.

Andy Jensen and associates are developing the *Queen Bess* group near the Coquihalla divide, with encouraging results.

Coalmont Gold Mines.—This company, under the management of J. J. Minne, 435-6 Rogers Building, Vancouver, has been developing a group of claims situated on Arastra creek, a tributary of Granite creek, and about 6 miles south of Granite Creek village. Two or three men have been employed during the winter and early summer on an arrangement of half-cash and half-stock for work done.

A tunnel about 65 feet long has been driven on the *Vera No. 1*, close to Granite creek, and a 4-foot quartz lead developed for that distance. Occasional segregations of pyrite were found, but the vein was for the most part entirely barren of values. Higher up the hill and to the east the old *Fitzgerald* workings (now *Dora*) were cleaned out and retimbered. A new upper tunnel (elevation 5,360 feet) was driven for 30 feet to tap the downward extension of a quartz vein, 3 feet wide and 60 feet distant, which had been stripped at an elevation of about 40 feet above. A general sample of this vein assayed a trace in gold and silver. Open-cuts and stripping uncovered the vein at intervals over a distance of about 1,500 feet on the slope. Barren quartz occurred in these cuts.

A middle tunnel, 180 feet long and about 500 feet lower elevation, was driven by former owners on a fault which cut the vein diagonally. Disintegrated quartz was found in the drag of the fault. Occasional segregations of pyrite and chalcopyrite were found in this vein. A picked sample of the mineralized quartz vein assayed a trace in gold and silver and 0.20 per cent. copper. Another tunnel about 400 feet lower and 80 feet long had been driven by the former owners. Sheared and displaced pieces of quartz occurred in this tunnel. Several samples were taken in different parts of these tunnels, but only traces of value were found. The vein varies from 2 inches to 4 feet in width and occurs as a fissure in the gabbro. A suggestion made that the crosscut should be driven from the middle tunnel has, according to the management, met with favourable results and some higher-grade ore found.

Numerous carefully selected samples taken by the management and miners assayed as high as \$77 a ton in gold and silver. There was no ore of this kind left at the mine at the time of examination. It is possible that the new ore found in the crosscut will develop into a minable ore-shoot, but much development must be done before there is any suggestion of road-building or mill-construction. General information published by this company, which cannot be substantiated by the Resident Engineer, is as follows:—

“General information of twelve mineral claims known as *Vera*, *Vulture*, *Victory*, *Brandon*, *Viking*, *Moonstone*, *Spokane*, *Crystal*, *Hope*, *Gold Thread*, *Robertson*, and *Bluemoon*, and situated 1 mile from the North fork on Granite creek, running north-west and south-east directions in the Similkameen Mining Division, Yale District, in the Province of British Columbia.

“*Values*.—The principal values of these claims are highly mineralized in gold, silver, with a percentage of platinum, assays running:—

Gold, \$15.80; silver, \$1.33; total, \$17.13.

Gold, \$53.60; silver, \$23.76; total, \$77.36.

Gold, \$5.20; silver, \$15.54; total, \$20.74.

Gold, \$24.39.

Gold, \$23.20; silver, \$8.66; total, \$31.86.

“*Developments*.—The property is under development with a crew of men at the present time driving tunnels and opening up veins throughout the property. The veins run straight through the entire property. The width of these veins is 4 feet and inclined to widen out to 16 feet, carrying high values in gold and silver. The veins consist of white free-milling quartz.

“*Transportation*.—Facilities for transportation are wonderful, being only 5½ miles from Coalmont, B.C., on the Kettle Valley Railway of the Canadian Pacific Railways.

“*Water and Timber*.—Plenty of water and timber for domestic purposes and for mining operations is available right on the property.

“Coalmont Gold Mines, Limited, 500,000 shares, par value \$1 each; capital, \$500,000.

“Office: 435-6 Rogers Building, Vancouver, B.C.”

The statement made that the vein widths vary from 4 to 16 feet is entirely wrong, and the high values in gold and silver could not be substantiated. Transportation facilities are extremely difficult and the cost of road-construction expensive.

COAL.

The general outlook for coal-mining near Princeton is distinctly favourable. The influx of new capital into this section promises an increased tonnage for the year. The seams are generally wide and contain a clean variety of lignite coal, which is in demand for domestic purposes at the Coast cities.

OSOYOOS MINING DIVISION.

Hedley Gold Mining Co.—This company has been operating since early in the spring and, with the exception of occasional reduced capacity on account of water-shortage, has continued steadily up to the present time.

Peggy.—This group, situated on the divide between Hedley creek (20-Mile) and the Similkameen river, and owned by Dan McKinnon and R. E. Baxter, of Hedley, has been prospected during the spring. A continuance of the mineral-zone has been discovered below what is known as the "Red Tunnel" on the Similkameen River slope. The occurrence of arsenopyrite carrying gold in the limestone, especially on the Hedley Creek slope, appears to warrant further development.

Oregon.—This group, reported upon in the 1928 Annual Report, is being explored by electrical prospecting. No data regarding results are to hand.

B.E. Mining Co.—This company, with headquarters at Leavenworth, Wash., has optioned a group of six claims situated about 4 miles due south of Twin lakes and owned by A. Piper and Gwatkin, of Oliver. Several open-cuts and a crosscut tunnel 110 feet long have been driven to develop a quartz vein about 14 inches wide, impregnated with pyrite and galena carrying gold. The width of the vein system varies in other workings from 2 inches to 5 feet and conforms generally to the strike of the schist. Small segregations of galena, carrying phenomenal values in gold, have been found, but these are too widely separated to be profitably mined. The general average mine-run may, however, be worked profitably. A small crusher, 20-horse-power Fairbanks-Morse engine, a 3 by 3 ball-mill, and a Wilfley table have been installed on the property.

Two samples taken from 13 inches of vein-matter in the face of the crosscut tunnel assayed 0.68 oz. in gold and 0.12 oz. in silver to the ton, and 0.50 oz. in gold and 0.10 oz. in silver to the ton. A general sample from an open-cut on the same vein, about 100 feet from the tunnel, assayed a trace in gold and silver. This sample did not contain any sulphides.

Big Horn Mines, Ltd.—Nothing was done on this property during the spring and early summer. It is understood that the plant upon this property, including the mill, has been sold to Vancouver interests.

GREENWOOD MINING DIVISION.

WALLACE MOUNTAIN.

The mines on Wallace mountain, Beaverdell, have received marked attention of late, owing chiefly to the discovery of high-grade silver-lead-zinc ore at depth on the *Wellington* and an interesting find on the *Beaver*, in the Wallace formation.

The regular and probably increased tonnage output from the *Bell*, which has been the mainstay on the mountain, has had the effect of promoting faith in the future possibilities of these properties.

Wellington Syndicate, Ltd.—The lowest crosscut tunnel, commenced in 1928, struck a high-grade vein of silver-lead-zinc ore early in the year. An upraise was put in on the ore to connect with the upper workings and was in ore for nearly its entire length. The width of the mineralized shear-zone varies from 1 to 4 feet, containing massive high-grade ore from 6 to 30 inches in width. A continuance of the crosscut found the lower segment of this ore below a fault. The management considers that this ore-zone is not the same as that mined above, owing to the absence of the small andesite dyke which has always been associated with the ore in the upper levels. At the present time the crosscut is being continued in hopes of finding the downward extension of the upper zone, and the chances appear to be good. All indebtedness has been paid off, according to the management, and from now on surplus cash will be used either for dividends or be put aside for contingencies such as the mine has recently experienced.

Highland Lass Syndicate.—This syndicate has been working seven or eight men steadily, under the management of A. Finch, and a small amount of ore has been shipped. Some difficulty has been experienced owing to the ore-zone being mined on the contact of the quartz diorite and the Wallace formation, where extremely broken ground was encountered. When the ore is found at a greater depth, away from the contact, increased shipments may be looked for. The shear-zone found is a continuation of one of the *Bell* shoots. A ground-tram and a hoist will probably be installed in the near future and the ore hoisted up to the road above.

Beaver Silver Mines, Ltd.—During recent months Ed. Nordman has been in charge of the work on this company's claim. Work has been continued in the drift from the bottom of the

shaft and a small tonnage of high-grade ore found and mined. Owing to the extremely broken nature of the ground the ore has been badly displaced and is difficult to mine.

On the north-east end of the claim an open-cut about 60 feet long and 12 feet deep in the deepest part has been driven across a most promising-looking mineral-zone in the Wallace formation. About 100 feet to the south-east the continuation of the mineral-zone has been uncovered, but no work has been done to prove its extent. The Wallace rocks here are fractured and warped and the mineralization occurs in bands, stringers, small lenses about 4 inches across, and isolated crystals in the more siliceous zones. A sample of rock from this open-cut, from which most of the galena was discarded, assayed: Gold, trace; silver, 2 oz. to the ton; lead, 2 per cent.; zinc, 3 per cent. Picked samples of galena ore assayed over \$100 a ton in silver and lead. More work will have to be done upon this discovery before its possibilities can be gauged.

Sally Mines, Ltd.—This mine is closed down at present, pending a readjustment of the company. The area covered by this company is an attractive one and there appears to be no reason why successful operations should not continue for many years to come.

Silver Star Mines, Ltd. (Revenge Group).—This company has been operating the *Revenge* since the spring and a car-load of ore has been shipped to the smelter. Development-work has been confined chiefly to the upper levels recently, and the shear-zones, mined by former operators, followed with favourable results. Work done on the lowest level did not uncover any ore to date. Until the ore has been mined down to a reasonable distance (about 70 feet) above this tunnel, further work will probably stand in abeyance. Wm. V. Somerville, 1164 Melville Street, Vancouver, is mine manager.

Mogul Mining Co., Ltd.—This company has been developing a group of claims on Horseshoe mountain, about 25 miles north of Westbridge, on the Kettle river. Practically all the work has been done on the *Mogul* and *Silver Dollar* claims and constitutes the cleaning-out and deepening of both shafts. Work was done during the winter and, according to the management, satisfactory results were obtained. In the early spring a road was constructed to the property and, according to advice, a crosscut tunnel will be run to tap the downward extension of the vein on the *Silver Dollar*. A compressed-air plant will probably be installed for this purpose. It has been impossible to examine this work because the shafts are filled with water. H. E. Hunnings & Co. has been sponsoring the development of these properties. The mineral-zone on the *Silver Dollar* occurs in the Wallace formation and the vein on the *Mogul*, on and near the contact of the Wallace formation with the quartz diorite and an alkali syenite dyke.

CAMP MCKINNEY.

Charles F. Law, of Vancouver, has unwatered part of the old shaft on the *Waterloo*, with the idea of interesting capital in development.

Hercules Consolidated Mining, Smelting, and Power Corporation, Ltd.—Under the directorship of R. Crowe-Swords, of Vancouver, several properties in the Greenwood and Grand Forks Mining Divisions have been optioned and some preliminary work done.

The holdings of the Pacific Tidewater Mines at Phoenix were taken over and a crosscut tunnel driven about 75 feet long from the gulch below the road on the *Stemwinder*. This tunnel was driven in the porphyry, except near the mouth and face, where highly altered volcanic rocks occurred containing some pyrite and chalcopyrite. This tunnel should be extended to ascertain the width and value of the mineral-zone which has been stripped about 25 feet in elevation above and between 75 and 100 feet to the north. A trench dug for about 100 feet along the strike of this zone is slightly mineralized with pyrite, chalcopyrite, and malachite in the fractures. In a northerly direction some open-cuts have been dug which may possibly be a continuation of the mineral-zone beyond the *Brooklyn* glory-hole.

In Deadman's gulch a log camp has been partly constructed and it has been the intention of the management to drive a long crosscut from the gulch to develop the lower horizons of the *Stemwinder*, *Brooklyn*, and other claims. No diamond-drilling has been done by this company on any of the claims to ascertain the location or depth of any ore-bodies that may occur in this area, so that a long crosscut tunnel will naturally be a blind venture at the present time and is to be condemned as such.

Work done on all the claims optioned by this company has been spasmodic and men have been employed only part of the time.

The option on the *Crescent* has expired on account of non-payment of money due.

On the *Anaconda* group, situated on the west side of Boundary creek, about 2 miles from Greenwood, the Hercules Company excavated an open-cut 120 feet long across a fractured mineral-zone containing narrow lenses of pyrite and chalcopyrite in a brecciated volcanic rock. The fractures are also filled with quartz and calcite and much oxide of iron and manganese has stained the rocks in this area.

The possibility of finding minable ore-bodies in the neighbourhood of Phoenix and Greenwood appear to be good and the area is worthy of careful geological study, to be followed by either an electrical survey or a diamond-drilling campaign. A great deal of this area is covered by lavas and soil which prohibit the finding of outcrops. The find on the *Stemwinder* is interesting and further exploration is warranted. General rock mineralization to the north-east also offers opportunities near Phoenix. Work done on the *Anaconda* also warrants further exploration. Samples of ore from the *Stemwinder* and *Brooklyn* sent to Trail for concentration tests proved to be satisfactory and no flotation difficulties may be expected.

GRAND FORKS MINING DIVISION.

Bonanza Fraction Group (English and French).—This group was bonded by the Hercules Consolidated Mining, Smelting, and Power Corporation and a few men employed for short periods on the development of the lower tunnel. A shallow winze was sunk in the main cross-cut, but this was full of water and could not be examined. The tunnel was driven about 25 feet to the south-east and similar mineralization discovered to that previously developed in the tunnel; i. e., segregations and stringers of galena, pyrite, and sphalerite. Picked samples of galena assayed well in silver and lead. Further development is justified on this property, which lies close to transportation and water.

Grand Forks Smelter.—During the winter months a considerable amount of testing was done for the Hercules Consolidated Mining, Smelting, and Power Corporation by Robert R. Hedley, and several hundred tons of converter-slag and flue-dust was found that carried a high enough percentage in gold and copper to be considered valuable. Nothing further has been done with this material, or the main mass of slag which carries only low values in gold and copper, where tested.

Hecla Mining Co. (Union Mine).—Continuous development of the *Union* at Franklin camp has been carried on by the Hecla Mining Company. The lowest tunnel has been extended and an upraise driven which connected with the No. 3 tunnel above. The foundations for a 125-ton flotation plant are being constructed and ore is being blocked out ready for production. A new bunk-house has been erected and other necessary buildings to accommodate the employees.

Rock Candy.—This mine is being operated by the Consolidated Mining and Smelting Company of Canada, Limited, and steady shipments of fluorspar are made to the concentrator.

Lightning Peak Camp.—This locality has not been visited up to the present, but a new strike is reported to have been made by Walter Johnstone, of Edgewood, that appears to add greatly to the attractiveness of the camp. A sample across 10 feet of vein-matter, sent by Johnstone, assayed: Silver, 30 oz. to the ton; copper, 4.2 per cent.; zinc, 12 per cent. This camp will be reported upon later in the year.

EASTERN MINERAL SURVEY DISTRICT (No. 5).

SUMMARY REPORT FOR SIX MONTHS ENDED JUNE 30TH, 1929.

BY B. T. O'GRADY, RESIDENT MINING ENGINEER, AND A. M. RICHMOND, ASSISTANT RESIDENT ENGINEER.

GENERAL REMARKS.

District No. 5 comprises the following twelve Mining Divisions: Revelstoke, Lardeau, Trout Lake, Slocan, Slocan City, Ainsworth, Nelson, Trail Creek, Arrow Lake, Golden, Windermere, and Fort Steele.

During the six-month period under review important developments have taken place, notably in connection with the ever-expanding operations of the Consolidated Mining and Smelting

Company, but also in connection with the activities of independent interests which will be specified hereunder in the body of the report.

An exceptionally busy season is being experienced, necessitating a large amount of field-work in connection with the investigation of applications for assistance towards improving transportation facilities to mining properties, checking-up of prospectuses of companies offering shares for sale to the public, co-operation with visiting engineers, advice to prospectors, and other duties in accordance with the provisions of the "Mineral Survey and Development Act."

During the last few years a large number of new activities were initiated and numerous companies were incorporated to develop prospects and operate mines already partially developed and from which some previous production had been made. This renewed activity was accompanied by a general feeling of optimism, with periods of intense speculation in mining stocks, which in some quarters was considerably stimulated by sensational reports of "strikes" and too confident predictions of early profits and dividends. In a number of cases, notably in the West Kootenay, these over-optimistic anticipations have not been substantiated, due to various factors which were not taken into consideration. While some disappointment may be felt because production of individual propositions has not come up to expectations, it is believed that this condition is only temporary, and that the mining industry in general is going through a wholesome period of reintrospection and that the ultimate result will be most beneficial.

The present summary of mining activities is necessarily brief, and as it has not yet been possible to fully cover the district there may be some activities omitted which have not yet come to notice. Where properties have not been visited by the writer, or the Assistant Resident Engineer, the best information obtainable is presented.

NEW DEVELOPMENTS.

Among the outstanding new developments may be mentioned: Extensions to the *Sullivan* concentrator bring its present capacity to 5,100 tons a day, and when the full construction programme at the concentrator is completed this fall the capacity will reach 6,000 tons a day. The authorized construction of a huge chemical-fertilizer plant at Trail was announced to the press recently by S. G. Blaylock, vice-president and general manager of the Consolidated Mining and Smelting Company. A great new industry will be created of vital importance and far-reaching interest. Extensions and additions to existing zinc plants at Trail, which include the construction of a zinc-oxide fuming plant to treat slag from the lead-furnaces; these improvements indicate a largely increased production of zinc in the near future. The construction of a 350-ton concentrating plant for the *Monarch* mine near Field. Continuation of important development-work at the *Reeves-McDonald* on the Pend d'Oreille river. These and other interesting new developments will again be referred to in the body of this report under their respective Mining Divisions.

GOLDEN MINING DIVISION.

Monarch.—The *Monarch* and *Kicking Horse* operations at Field constitute a development of outstanding importance. Reference to these mines may be seen in the Annual Report for 1928. Large bodies of silver-lead-zinc ore of good commercial grade have been developed, warranting equipment of the properties for large-scale production. The construction of the concentrator was commenced in May of this year and it is expected to go into production about the end of September. The combined properties are being operated by the Base Metals Mining Corporation, Limited, under the technical direction of F. Eichelberger. From 75 to 100 men are being employed at present, principally on mill-construction.

Giant.—Work has been resumed by A. B. Trites on this property, which is located near Spillimacheen, and it is reported that a contract has been let for driving 1,000 feet of tunnel. For further reference see Annual Reports for 1927 and 1928.

Whitwatersrand Syndicate, Ltd.—This syndicate has acquired the *Crown Point* group at the head of McMurdo creek. The season's work includes extensive trail repairs necessary for economic exploration of the property, which is reached by trail about 35 miles in length from the Columbia river at Parson's. The property has not yet been visited, but a trip will be arranged shortly.

Alpha.—The *Alpha*, at the head of Bobbie Burns creek, which has been idle for some years, is being investigated by English interests and geologists are now examining the property.

WINDERMERE MINING DIVISION.

Paradise.—This property is situated on Spring creek, off Toby creek. Very encouraging results are reported from recent development of the *Portal* ore-body on *Paradise* ground and substantial tonnages have been added to the ore reserves. Development-work is also being continued on *Shamrock* ground. The mill is being removed from the mine to the foot of the mountain at Jackpine flat and its re-erection at that point, which will necessitate the building of about 4 miles of aerial tramway, is under consideration.

Pretty Girl.—This prospect, situated on the summit of the ridge between Slade and Law creeks, is being operated by the North Kootenay Mines, Limited, with a small crew.

Windermere Mining Co., Ltd.—Some claims adjacent to the *Mineral King* property on the north side of Toby creek, just above Jumbo creek, have been acquired by this company, but at the time of writing no activity has materialized.

Kootenay Metals Corporation, Ltd.—Two men are reported to be driving tunnel on contract at the *Outcrop and Outlet* property on Delphine creek, on which a small amount of work was done during 1928.

Kootenay Giant Mining Co.—No activity is reported by this company in connection with its *Grotto* and adjacent claims on Horsethief creek.

Lead Queen.—At this property, on Frances creek near Brisco, development-work is proceeding under the technical direction of F. Eichelberger.

FORT STEELE MINING DIVISION.

At Kimberley important extensions are being made to the *Sullivan* concentrator, whereby its capacity will be brought up to 6,000 tons a day by the fall of this year. At the present time extensions already completed permit of the handling of 5,100 tons a day. With the present and fully completed extensions it will be possible to handle lower-grade ore from the *Sullivan* with at least the same metal-output as previously. Concurrently with extensions at the concentrator the mine is being prepared to handle the desired 6,000 tons a day. Many improvements, both underground and on the surface, have been made which add to the efficiency of this great operation.

The Moyie concentrator of the Consolidated Mining and Smelting Company is treating 500 tons daily, part of this tonnage being from the *St. Eugene* tailings that are pumped from Moyie lake and the rest being material from the old dumps of the upper workings of the *Sullivan*. These old dumps were left in the days before selective flotation was a commercial success and contain the zinc ore which was separated from the lead-zinc ore extracted from the upper levels of the mine.

Kootenay King.—Towards the end of last year this property, situated on Wildhorse creek, was acquired under option by the Britannia Mining and Smelting Company, Limited, from the Kootenay King Mining Company. The property was shut down during the winter months owing to its high elevation, about 7,500 feet, and the rugged nature of the country. Activity was resumed in the spring and subsequent work has consisted of a small amount of development-work, together with diamond-drilling. Two portable gas-driven compressors are in use. Development-work is expected to be aggressively continued during the balance of the season.

Kootenay Selkirk's Mining Co., Ltd.—A small amount of development-work is being done on the property of this company, which is situated about 2 miles north-westerly from the *Kootenay King* property and is reached by road and trail up Saugum creek.

Estelle.—Exploration of this property has been continued by the Consolidated Mining and Smelting Company, diamond-drilling being done.

St. Eugene Extension Mines, Ltd.—This recently incorporated company is developing the *Aurora*, on the western side of Moyie lake, from twelve to fifteen men being employed under the supervision of S. Price. Recent exploration consists of a winze being sunk from the No. 2 level, and the No. 3 tunnel, which has been extended, is giving encouraging results. These workings develop an east-west striking fissure-vein which is believed to be the westerly extension of the vein from which a large production was made at the *St. Eugene* across the lake.

Other minor activities which have been reported are: The *Homestake* on Perry creek, where a small amount of work has been done under the direction of J. F. Hutchcroft; the *Lead* group, being developed in a small way by the Blake Bros. A small amount of work has been done on

the Moyie River Mining and Development Company's property, situated on Moyie river, 12 miles above Lumberton.

PHOSPHATE.

Shipments of phosphate rock have been made by the Consolidated Mining and Smelting Company from its property near Fernie to Trail, where it is used in connection with extensive experiments in the manufacture of fertilizers being carried on in conjunction with the Government and Universities of the three Prairie Provinces and the Canadian Pacific Railway, which experiments have culminated in the decision of this company to erect the chemical-fertilizer plant mentioned in other parts of this report. Development-work is proceeding at the above property on Lizard creek and at the other phosphate property near Crowsnest belonging to the same company.

SLOCAN MINING DIVISION.

Mining in the Slocan Division has been actively continued and developments are taking place which are expected to place the industry on a sounder basis. The predicted large increase in tonnage has not been substantiated for various reasons. Mining and milling operations dependent upon water-power were severely handicapped during the winter months by the exceptionally low-water conditions, due to light snowfall and freezing-up. Failure of some milling operations to show profitable production can be attributed to a lack of systematic development to definitely assure ore reserves sufficient to provide for continuous milling operations. In these cases beneficial changes in technical direction are expected. As a result a detailed geological study of ore-deposits will be made, followed by systematic exploration and development, milling operations being discontinued until ore reserves are definitely known.

ZINCTON.

Lucky Jim.—This mine is situated at Zincton, on the Kaslo-Nakusp Railway. Milling operations have been suspended since the beginning of February. Systematic exploration and development is now proceeding under the direction of H. H. Yuill and his technical staff. The downward continuation of the ore is being explored by long holes with prospecting-drills. So far the dimensions of the ore-body being explored below the No. 5 level are over 150 feet long and up to 55 feet wide, consisting of a good grade of zinc ore. At the time of writing this ore-body has been proved to extend to a depth of 80 feet below the No. 5 level and indications are favourable for its downward continuation to greater depth.

SANDON CAMP.

Ruth-Hope.—This mine is situated at Sandon and is operated by the Ruth-Hope Mining Company. For the first few months of the year milling operations were discontinued owing to the exceptionally severe weather conditions and consequent shortage of water. The mill is now being steadily operated, the mill-feed is improving, and prospects are very favourable for more profitable production during the coming months. Results of work in the mine are very encouraging. A very interesting section of the vein is being opened up on the sixth level, where there is a showing about 6 feet wide of good milling-ore containing in places massive galena from 3 to 4 feet wide. In lateral extent the limits of this ore-body have not yet been defined. In the old *Ruth* workings a good block of ore is strongly indicated between the No. 4 level, where ore is exposed along the bottom of the drift, and the 4,150-foot level, 75 feet below the No. 4 tunnel, where ore is exposed for a length of about 200 feet. The westerly 50-foot section of the ore-body here will average about 6 feet in width of good-grade milling-ore, which is also apparent in the west face of the drift. On the No. 5 level, 150 feet below the 4,150-foot level, crosscutting is proceeding for the downward continuation of this ore-body.

Noble Five.—This mine, situated at Cody, is owned and operated by the Noble Five Mines, Limited. The *Deadman* ore-body on the 1,800-foot level is being explored by a series of raises at 50-foot intervals. The total length of this ore-body, as at present developed, is about 350 feet. The ore varies considerably in width, being impressively wide where first encountered at its western extremity, the mined area at this point being up to 20 feet wide. Going easterly the ore pinches and swells, with a good stoping width throughout the greater length of the ore-body. Ore is also being mined from two small stopes in the easterly drift on the 800-foot level on the *Noble Five* vein, including the new stope at the eastern end of the drift past the fault. The vein

in the latter working has been mined up to a width of 6 feet in places. The No. 7 level is being advanced to explore the upward continuation of this ore-shoot. The property has exceptionally interesting possibilities for developing additional ore-bodies where favourable geological conditions are known to exist, but at the present stage of development it is too early to allow of a very important tonnage being estimated. The mill has recently been operated on a basis of about 75 tons a day. The ore going into the mill is being drawn from the *Deadman* ore-body and from the stopes in the 800-foot level easterly drift on the *Noble Five* vein.

Silversmith.—Operations at this property, situated at Sandon, have for some time been confined to exploration of the downward continuation of the Slocan ore-shoot and no new developments of importance have been reported, only a very limited crew being employed at the present time. Considerable information regarding this property is contained in previous Annual Reports.

Leadsmith.—Development at this property, situated near Cody, is being continued with a small crew, but the results obtained are not known at the time of writing.

Slocan King.—This property, situated near Sandon, is being worked in a small way. The results of recent exploration work are not known.

Canadian-Brandon.—Recent activities at this property, situated on the summit of Silver ridge, have so far been confined to leasing operations, as far as known.

Colonial Slocan Mines, Ltd.—This company is developing the *Colonial* and *Freddy Lee* properties, situated on the western side of Cody creek, with a small crew in charge of L. McPhee.

Carnation.—Work has been resumed on this property, situated on the ridge forming the divide between Carpenter creek and Silverton creek, by the Carnation Silver-Lead Mines, Limited, under the direction of R. H. Stewart. A 3-drill compressor and 54-horse-power Diesel engine have been installed and twelve men are employed at surface-stripping and on the continuation of the No. 3 tunnel on the Sandon slope. Electrical prospecting is also being conducted by a party from the Radiore Company.

Mercury.—This property, situated on the northern side of Carpenter creek below the *Payne*, between Sandon and Three Forks, is being developed by a small crew doing surface work and drifting on the vein. Work is being financed by George Clarke and associates.

Majestic.—This property is situated north-westerly from Sandon, on the northern side of Carpenter creek. A small crew is reported to be ground-slucing to trace the vein southerly down the hill. Work is being financed by Coast interests and H. A. Turner is the engineer directing the work.

Wonderful.—This property, situated westerly from Sandon, has been taken under lease and bond by the Standard Silver-Lead Mining Company and preparations are being made to continue development.

Black Colt.—Development has been resumed at this property, which is situated south-east of Three Forks, and very encouraging results of recent work are reported. The *Black Colt* is included in the property controlled by the Queen Bess Consolidated Mines, Limited.

Monitor.—Leasing operations are being continued at this property, situated south of Three Forks, by George Gormley.

Victor.—At this property, situated between the *Monitor* and the *Black Colt*, George Petty, the owner, has three men mining ore for shipment. The ore is chiefly clean galena, with which is associated very high silver values.

Bluebird.—This property, being operated by the Bluebird Mines, Limited, is situated on the divide between Carpenter creek and Jackson basin. Work done by this company up to date approximates 1,000 feet of tunnelling on the Jackson Basin slope and over 500 feet on the Carpenter Creek slope. Development-work is proceeding—a crew of twelve men being employed—in the first-mentioned workings, work having been discontinued on the Carpenter Creek slope. Exploration of this property has not yet reached the stage where any appreciable tonnage of ore can be estimated. A Radiore survey was recently made.

Rambler-Cariboo.—Situated south-easterly from Rambler Siding on the Kaslo-Nakusp Railway, this property is being operated by the Slocan Rambler Mining Company, Limited. Excellent camp accommodations have been provided for about thirty men. At present the crew has been reduced to twelve men. Ore has been developed for a length of about 200 feet and a width approximating 3 feet on the fourteenth level in virgin ground beyond the lateral extent of the upper workings. The assay values of the ore are not known and the commercial importance of the showings can only be determined by systematic sampling.

Altoona Mines, Ltd.—The following report on the Altoona Mines, Limited, is by A. M. Richmond, Assistant Resident Engineer, following a detail examination made for the purpose of checking up the extraordinary statements contained in the prospectus of the company and advertising literature issued by Baldwin, Zachman & Kirschner, the promoters.

Among other exaggerations and misstatements of fact, the claim is made to 100,000 tons of indicated ore of a gross value of \$3,000,000. The truth is that at the present time it is not possible to estimate a positive or indicated tonnage to which any appreciable commercial value can be attached. There are, in places, small bunches of low-grade material which would hardly constitute mill-feed.

The investing public is therefore warned that the statements made in this literature are not in accordance with facts.

“Report by A. M. Richmond, Assistant Resident Engineer.”

“Situation.—The property of the Altoona Mines, Limited, is situated on the south-western slope of Payne mountain, approximately 1½ miles north-west of the town of Sandon, in the Slocan Mining Division. The Sandon-Three Forks road and the Sandon-Parapet branch of the Kaslo-Nakusp Railway cross the *Commander* claim of the group.

“Claims.—The property of the company consists of two Crown-granted claims, the *Altoona*, Lot 1918, and *Bowknot*, Lot 1919, as well as one claim, the *Commander*, for which Crown grant is being applied. The writer was given to understand by A. J. Murphy that an option was held on the *Emporium*, Lot 2190.

“Title.—Title to the three claims, which till recently were owned by A. J. Murphy, of Sandon, is controlled by the Altoona Mines, Limited, a recently formed company with head offices in the office of Baldwin, Zachman & Kirschner at 642 Skinner Building, Seattle, Washington. The capital structure of the company consists of 1,500,000 shares of no par value, of which 500,000 shares are for public subscription, 500,000 shares are to be paid for the property, and 500,000 shares are for the treasury. C. Zachman, president; A. J. Murphy, vice-president; M. S. Brigham, secretary; O. S. Kirschner and J. B. Conroy, directors; form the directorate of five in charge of the company affairs.

“Development.—The sheared fissure, which strikes generally N. 60° to 70° E. and dips to the south-east at 60°, cuts the slates and shales of the Slocan series at approximately right angles. The general strike of the Slocan series in this locality is N. 40° W., with a dip of 50° to 60° to the south-west. Numerous quartz-porphry dykes cut the slates on the property. The main fissured zone is called the *Washington* vein and has been opened up by four adit-tunnels, of which the No. 1 and No. 2 are of some importance.

“The No. 1 level consists of approximately 500 feet of drifting and crosscutting along a narrow fissure, which in places is heavily mineralized with pyrite, containing some lead and zinc sulphides and associated silver values. At a point 50 to 60 feet from the portal of No. 1 level a crosscut to the north intersects a quartz-porphry dyke and on the north side of the dyke a small bunch of pyrite mineralization is apparent; 90 feet to the south on this crosscut a drift 350 feet along the narrow tight fissure shows here and there small bunches of pyrite mineralization. At a point 30 feet east of the crosscut the width of mineral exposed is but a few inches and then gradually the exposure widens till at a point about 40 feet from the crosscut the width is between 6 and 7 feet. This bunch of mineralization then decreases in width till at a point 50 feet from the crosscut it is but a few inches in width. A grab sample obtained by chipping off small pieces over the entire exposure gave the following returns on assaying: Gold, 0.01 oz. to the ton; silver, 5 oz. to the ton; lead, 4.9 per cent.; zinc, 12.9 per cent.

“From a small showing of high-grade lead ore on the right side of the drift a hand-picked specimen of the best ore assayed: Gold, 0.01 oz. to the ton; silver, 44.5 oz. to the ton; lead, 44.1 per cent.; zinc, 20.6 per cent. This showing was but a few feet in length and of very narrow width. Outside of the showings mentioned, the mineralization on this level is confined to narrow short lenses in a very tight sheared fissure which extends most of the length of the 350-foot drift. A total of approximately 500 feet of drifting and crosscutting has been done on this level, which is at an elevation of 3,600 feet above sea-level.

“The No. 2 level, at 3,525 feet elevation, has been opened up by 350 feet of drifting and crosscutting. At a point 120 feet from the portal a 9-inch mineralized stringer assayed: Gold, trace; silver, 2.6 oz. to the ton; lead, 0.7 per cent.; zinc, 3.3 per cent. At 170 feet from the portal

the fissure developed on this level widens rapidly from an inch to approximately 6 feet at 175 feet from the portal and gradually decreases in width till at 200 feet from the portal the width is but an inch or two. A sample taken at the widest point over a width of 75 inches assayed: Gold, trace; silver, 2.5 oz. to the ton; lead, 1 per cent.; zinc, 15.6 per cent. A sample taken over a width of 19 inches 45 feet from the face of this level drift assayed: Gold, 0.01 oz. to the ton; silver, 2.4 oz. to the ton; lead, 0.6 per cent.; zinc, 18.4 per cent.

"The No. 3 level drift at 3,450 feet elevation is caved at the portal and could not be examined. There were no evidences of mineralization on the dump at this level, and the writer was informed by the former owner of the property, A. J. Murphy, of Sandon, that no commercial ore had been exposed in the driving of this level, which is 90 feet long.

"The No. 4 tunnel, at 3,360 feet elevation, is apparently to the foot-wall side of the fissures developed on the Nos. 1 and 2 levels of the property, and while approximately 500 feet of drifting, crosscutting, and raising has been done on this level in an attempt to locate the above-mentioned fissure, the results have been entirely negative and there is no ore exposed on this level.

"One small open-cut some 30 feet above the No. 1 tunnel level was sampled, which assayed: Silver, 2.5 oz. to the ton; lead, 1.5 per cent.; zinc, 2.7 per cent. A. J. Murphy, when asked, stated that no further open-cut work had been done above this point.

"The above work has all been done in the vicinity of what is called the *Washington* vein. The *Altoona* vein, situated to the north of the *Washington* vein, was not examined as development-work had not been done on this vein and nothing of value could be examined.

"*Ore Reserves.*—There are no official records of production from this property.

"From the buncy nature and irregular mineralization in levels 1 and 2 it is impossible to more than indicate a very small tonnage of low-grade mill-feed. A liberal estimate of probable tonnage would be 300 to 500 tons of mill-feed of assay value approximately as follows: Silver, 3 oz. to the ton; lead, 3 per cent.; zinc, 14 per cent.

"This contrasts very sharply with statements in the promotional literature of the company, in which the estimated probable and indicated tonnage of \$30 ore so far developed is given as 100,000 tons.

"*Plant and Equipment.*—A crew of six men is at present engaged in construction of a combined bunk-house, office, mess-house, and dry for accommodation of twenty men. Aside from some small tools, rails in the tunnels, one or two ore-cars, and a dilapidated blacksmith-shop at the portal of No. 4 tunnel, the property is without equipment for mining purposes.

"*Conclusions.*—The property is essentially a prospect on which some 1,500 feet of development-work has been done from time to time, and aside from a few small showings of low-grade mill-feed in the upper two levels, the property has at present very doubtful commercial value."

Mary Ryan Mines, Ltd.—The property of this company is situated at from 6,000 to 7,000 feet elevation on the ridge between McGuigan and Washington basins. When the property was visited by the Assistant Resident Engineer in July, two men were engaged in cleaning up around the camp and no mining activity had materialized. Promotional literature of the Mary Ryan Mines, Limited, a company organized in Seattle to develop the old *Soho* property, contains grave exaggerations and misstatements of fact. Among other things, the claim is made that 120,000 tons of known and probable ore, of a gross value of \$3,600,000, has been developed on the property. The true facts are that at the present time no appreciable tonnage has been developed that could be mined at a profit.

Helenitia Mines, Ltd.—No activity has been reported this year in connection with this company's *Rio* property in McGuigan basin. The ore, containing silver values, is of the "dry" type.

Silver Bell.—W. E. Zwicky is directing work at this property in the McGuigan basin. Four men are driving a crosscut on contract. Other minor activities in the Sandon camp are reported in connection with: The *Snowstorm and Good Day*, in McGuigan basin, where Jack Wilson and partner are drifting on the vein; the *Great Western*, where R. B. Kirk is preparing to go to work and ship ore already mined.

Payne Mines, Ltd.—No activity has materialized to date in connection with the *Payne*, situated north-west of Sandon, but it is understood that this once famous mine is to be reinvestigated by the above company, sponsored in Vancouver.



Mill at Second Relief Mine, Nelson M.D.



Thelma Mine—Ore sacked, 1928.

THREE FORKS.

McAllister.—This property is owned and operated by the Slocan Silver Mines, Limited, which is a subsidiary organization of the Standard Silver-Lead Mining Company. Shipments have recently been suspended owing, it is reported, to the falling market price of silver. Substantial shipments were previously made to Trail for direct smelting. The high silica content of the ore commands a low smelting charge, making this method of treatment highly profitable.

SILVERTON.

Galena Farm Consolidated Mines, Ltd.—The recent amalgamated interests include the *Hewitt*, *Galena Farm*, *Hazard*, *Noonday*, *Metallic*, and *Lake Shore* properties, aggregating some thirty claims along the same shear-zone which has been opened up at intervals for a length of about 2½ miles. The combined properties, of which the *Hewitt* and *Galena Farm* are the most developed, are being prepared for production and the capacity of the *Galena Farm* mill is being increased to handle 100 or possibly 150 tons a day. Right-of-way has been slashed out from the No. 10 West *Hewitt* tunnel to the mill for an aerial tram on which construction is to be started shortly.

Van Roi.—At this property, adjoining the *Hewitt* to the east, about seventeen men are employed on development-work by the Van Roi Mines, Limited, recently incorporated to acquire the property from the Cunningham Mines, Limited, and operate the mine.

Mammoth.—Situated on Silverton creek (4-Mile), this mine is being equipped for production. R. A. Grimes is directing operations for the Western Exploration Company. Surveys have been made and right-of-way slashed out for an aerial tram 16,000 feet in length from the mine to the proposed mill-site adjoining Slocan lake. The *Standard* property and adjoining claims have also been acquired and will be combined with the *Mammoth* in one operation. Development in the *Mammoth* since the last published report has continued to be very encouraging. Ore has now been opened up on seven levels. Wide faces of milling-ore, and in places impressive showings of clean galena, indicate large tonnages apparently warranting the construction programme undertaken, which includes a 100-ton mill.

Wakefield.—Situated above the *Mammoth*, A. Jarvis is working the property, which is under lease.

NEW DENVER.

Bosun.—This property is situated on Slocan lake near New Denver. Except for small leasing activities in the upper workings, work has been suspended at this property.

Molly Hughes.—This property is situated on Slocan lake, north of New Denver. This property was recently being worked by the Pinto Mines, Limited, but operations have been suspended.

Mountain Chief.—Situated east of New Denver, this property is being worked under lease. A shipment of ore was recently made to Trail.

SLOCAN CITY MINING DIVISION.

Up to the time of writing activities in this Division have been very limited.

Enterprise.—Situated on Enterprise creek, on the eastern side of Slocan lake, this property has until recently been continuously developed by the Yankee Girl Consolidated Mines, Limited, with a crew of about twelve men. At present a few men are reported to be employed in repairing the compressor and its housing, which were damaged when the adjoining mill and buildings were destroyed by fire recently.

Piedmont.—This property, situated on Lemon creek and owned by the Piedmont Mines, Limited, has been shut down during the period under review and future plans are not known at the time of writing.

White Hope.—A small amount of work was done on this property during the early part of the year by C. Hansen and associates. A tunnel was driven to intersect the supposed downward continuation of a broken section of the vein. Results were negative, as anticipated, and further development should be directed to exploring the vein where it is "in place" across the gulch from the working described.

AINSWORTH MINING DIVISION.

AINSWORTH AND KOOTENAY LAKE SECTIONS.

Kootenay-Florence.—This property is situated on Kootenay lake, 2 miles north of Ainsworth. Total footage accomplished on the low tunnel level by the Kootenay-Florence Mining Company, Limited, now amounts to about 7,500 feet. The crew employed was recently reduced to some seventeen men, two machines being operated on development-work in the 903 tunnel workings to explore the southern section of the property towards the "Lake Shore" ground. From an economic point of view the most definite result of work accomplished, since the low tunnel workings were described in the Annual Report for 1928, is the vertical development of the "fissure ore-body." This shoot of ore has been further explored on the low or No. 9 level, where it has a length of from 150 to 160 feet, with the best ore concentrated along the western drift for a length of about 80 feet and a width of about 4 feet. In the east drift the mineralization is not so well defined but is strong in places. Beyond the limits of both drifts exploration encountered spots and bunches of mineralization in places over narrow widths. The upward continuation of this ore-body was cut in a vertical raise at 105 feet above the No. 9 level, and at this horizon, known as the No. 8 level, it was explored by drifting in both directions. The best ore on this level is concentrated along a section of the vein for a length of about 60 feet westerly from the raise, the apparent average width approximating 6 feet. Easterly from the raise there is some lower-grade mineralization on the foot-wall side of the vein over a width of about 3 feet for a length of about 60 feet. Measured on the dip of the vein these workings are estimated to be 160 feet above the corresponding workings on the No. 9 level.

Princess Creek Mining Co., Ltd.—No activity has yet materialized in connection with this recently organized company, the property of which adjoins the *Kootenay-Florence* holdings to the north.

Krao.—Situated south-west of Ainsworth, this mine, after being dormant for many years, is being further developed by the Krao Mines, Limited, under the direction of W. E. Zwicky. In former days this mine was noted for its high-grade silver ore and exceptionally fine specimens of wire-silver were found there.

Berengaria.—This property is situated at Deanshaven, on the east side of Kootenay lake. A small amount of work done since the property was visited has proved, according to reliable reports, that the enormous mass of ore discovered in 1928 was not in place. The property has recently been taken under lease and bond by interests closely associated with the Goldfield Consolidated Company of Nevada, and the vicinity of the occurrence is to be explored following theories held that the large mass of ore is not a glacial erratic, but may have slid from its original position higher up the hill. Results of this exploration, which is to be started shortly, will be followed with interest.

Blue Bell.—Work has been resumed at this well-known property, situated at Riondel. Particulars are not yet to hand, but it is reliably reported that exploratory work is proceeding on the adjoining *Comfort* claim, which has been added to the *Blue Bell* holdings, and that S. S. Fowler and B. L. Eastman are directing the work on behalf of important interests. The *Blue Bell*, credited with a past production of around 500,000 tons, is considered to have important possibilities for lateral extensions to the already exploited ore-bearing area which has not been prospected or explored beyond the limits of the old workings. These were economic boundaries necessitated by formerly existing circumstances.

Kaslo—Properties Tributary to Kaslo-Nakusp Railway.

Whitewater.—Situated at Retallack, this mine has been operated continuously by the Whitewater Mines, Limited. Results have not come up to expectations and it is understood that the mill is to be shut down shortly. Changes in technical direction are expected and the resumption of milling operations will, it is believed, depend upon the result of detailed geological study of the deposits to be undertaken in conjunction with exploratory work with a view to more definitely assuring a continuous supply of ore of profitable grade. Mineralization is extensively distributed and the discovery of new ore-shoots from time to time can be expected as development progresses, large areas of virgin ground with good potentialities still remaining to be explored.

Wellington.—This property, operated by the Wellington Mines, Limited, adjoins the *Whitewater* holdings to the west. Over 3,000 feet of development-work has been done since this com-

pany started work in December, 1927. The *Hazel* crosscut tunnel, which is approximately at the same elevation as the No. 10 level of the *Whitewater*, has been advanced to about 1,600 feet from the portal. Exploratory work in this tunnel is still proceeding for the extension of the *Whitewater* shear-zone, which has not yet been identified. The property is very completely equipped and good accommodation is provided in up-to-date camp buildings conveniently situated to the railway.

Jackson.—Development of this property, situated in Jackson basin, by the Silver Basin Mines, Limited, has been discontinued for the present and future plans of the company are not known at the time of writing.

Utica.—Work was recently commenced at this property, situated on 12-Mile creek, southwest of Adamant Siding, by the Utica Mines, Limited. Crosscutting is now proceeding on the low tunnel (or No. 5) level to test the downward extension of ore-bodies mined in the upper levels. Past production from the latter workings is summarized in the Annual Report for 1928.

Keen Creek Area.

Cork-Province.—This property is owned and operated by the Cork-Province Mines, Limited. The mill, well designed and equipped to handle from 150 to 200 tons a day, was recently completed and is being given a trial run. The power plant, of the latest design, is operating very satisfactorily.

The situation in the mine can be briefly summarized as follows: The available milling-ore is located in the cross-fracture which intersects the main fissure some 70 to 80 feet east of the shaft on No. 4 and No. 5 levels. The dimensions of this block so far ascertained show a depth of 125 feet between levels and a length of 140 feet on No. 4 level and about the same length on No. 5 level, with an average width of 4 feet of milling-ore.

In the west end of the mine on No. 5 level the drift on the main fissure is in ore and a cross-fracture which intersects the drift some 20 feet from the face shows 4 to 5 feet of good-grade milling-ore. Intentions, it is understood, are to drift on this fracture. One or two small blocks of milling-ore are exposed near the shaft on both No. 4 and No. 5 levels. On No. 3 level, the main haulage-level of the mine, and some 225 feet above No. 5 level, there is a small block of low-grade milling-ore in what is called the "foot-wall stope," which has been developed by drifts and a raise. The milling width is narrow in this stope.

The mill was operated for eight to ten days during July, but when the property was examined on July 25th it was closed down for some minor alterations and repairs. A Radiore survey of the property was being made.

Revenue.—Development-work at this property is being done with a crew of six men under F. T. Harbour, president of the Sturgis Creek Mines, Limited, which now controls the property. The ore occurs in bunches in a shear-zone in the granite, and at the time of visiting, development-work had disclosed a showing of 18 inches of solid lead-zinc mineralization near the portal of the intermediate level.

Silver Bear.—F. Helme with two men is working this property, situated some 18 miles from Kaslo on Keen creek.

Flint.—This group on Dago creek, a tributary of Keen creek, is being worked in a small way by the owner, J. A. Carter.

Daybreak.—The buildings at the lower terminal of the Daybreak Mining Company tramway were destroyed by fire recently. The property is not being worked and is involved in litigation.

POPLAR CAMP.

White Eagle.—This group is situated at the head of Cascade creek, about 12 miles from the railway. Development-work has been continuously carried on with a small crew by J. Gallo on behalf of the Keene Mountain Gold and Silver Mines, Limited. The property is described in the Annual Report for 1928.

Comstock.—On the same creek and about 7 miles from the railway, this property is being worked with a small crew by P. J. Sheran. References to the *Comstock* and adjoining claims are contained in the Annual Report for 1928 and previous reports.

Bullock.—Situated on the west side of the railway, south of Poplar. Recent activities have been confined to intermittent work by J. J. McNamara, who installed a compressor during 1928. The property is described in the Annual Report for 1927, since when the situation has not been appreciably changed.

HOWSER LAKE AND DUNCAN RIVER.

The recently constructed section of the trunk trail, 4.6 miles in length, is being extended along the eastern side of the upper Duncan river and will eventually be completed to connect with the existing trail on the west side of the river above Haley's Landing.

Riverside.—This property, situated on the east side of the river south of McGuire creek, has been continuously worked in a small way by the Omo Mines Corporation, of Spokane. References to this property will be seen in the Annual Reports for 1927 and 1928.

President.—This property is situated on the western side of Howser lake, towards its northern end. The President Mines, Limited, of Victoria, was recently incorporated to acquire and operate this property. There has been no activity during the period under review, but R. S. Gallop is leaving shortly with a crew of men to resume work.

Lardeau River Placers.—Attention has just been directed to lurid promotional literature issued by R. W. Elsom & Company, of Spokane, in regard to a proposed placer-dredging proposition on the Lardeau river from Gold Hill south-easterly. One such folder is entitled "Rich Sands of Lardeau yield Gold, Platinum." Without wishing to discourage investigation of the placer possibilities of the Lardeau river, it is considered advisable to direct attention to the necessity for cautious investigation of this proposition.

REVELSTOKE MINING DIVISION.

Snowflake Mining Co.—In October, 1928, a special bulletin was published by the Department of Mines to satisfy the general demand for information on the *Snowflake*. This publication gave detailed information concerning the results obtained up to that time in connection with the development of silver-lead-zinc mineralization in quartz veins, which constituted the deposits under exploration by the Snowflake Mining Company since the year 1927. Recently the fortuitous discovery of the presence of tin in the form of stannite, carrying appreciable values in silver, in a vein being explored for shoots of argentiferous galena, and sphalerite, has again directed public attention to the *Snowflake*.

In a raise from the east drift on the lower or No. 4 tunnel level, which drift and raise develop a portion of the No. 1 vein opened up since the above-mentioned printed reports were published, an unusual mineral was noted by the management occurring in masses, streaks, and disseminations in association with pyrite, zinc-blende, and occasional galena. Subsequently bulk samples of selected material from this working were sent to the Vancouver assay office of G. S. Eldridge & Co., who identified the mineral as stannite, or tin pyrites. This led to more intensive examination of the original superficial workings and the tin-bearing mineral has since been identified in the same and other veins on the property, but in very small amounts and at widely separated points, occurring in such erratic fashion that its presence might easily be overlooked. The object of the examination on which the present report is based, in which the writer was assisted by A. M. Richmond, Assistant Resident Engineer, was primarily to ascertain the extent and distribution of the stannite mineralization and to determine the average tin content of ore-shoots where indicated. Accompanying this report is a plan of the underground workings, showing the places where samples were taken on this examination.

As the location, general conditions, geologic occurrence, and many other features of the *Snowflake* deposits are well known, it is not considered necessary to recapitulate all this information which can readily be obtained. For the general geology of the area the reader is referred to the recently published map issued by the Geological Survey of Canada, which was compiled from field-work by H. C. Gunning, and for more detailed information to the report of V. Dolmage, Dominion Geologist, issued as a press statement. The following is an extract from this report:—

"The veins occur in black, highly carbonaceous, in places graphitic, argillites. These are part of a thick series of quartzites, greenstones, argillites, and limestones which occupy almost this entire region, and are part of a still larger group of metamorphosed rocks widely distributed in British Columbia and considered to be of Pre-Cambrian age.

"These sediments are intruded by granite rocks, two stocks of which lie 5 or 6 miles north of the tin-deposit, and one 8 miles to the south, and 'lit par lit' injections of which lie within 3 miles or less of the deposit.

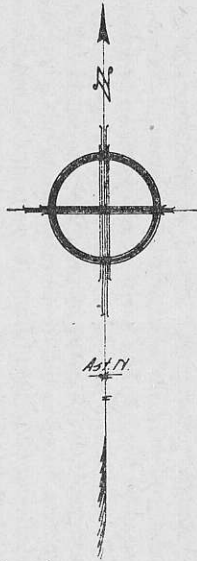
"The presence in the area of so many intrusions of closely related granite rocks strongly suggest the probability of the presence at considerable depths of a very large body of similar

SNOWFLAKE MINE

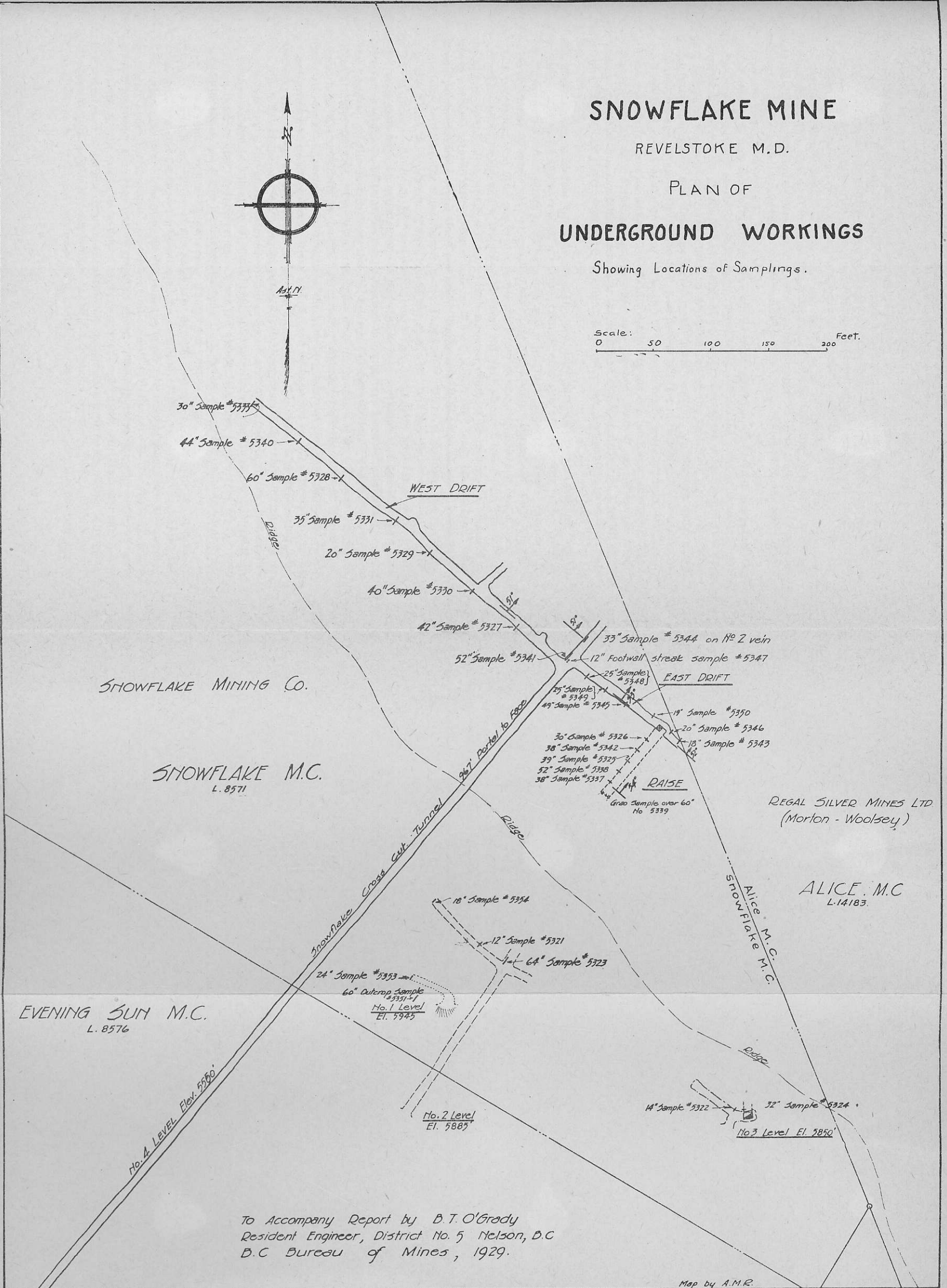
REVELSTOKE M.D.

PLAN OF UNDERGROUND WORKINGS

Showing Locations of Samplings.



Scale: 0 50 100 150 200 Feet.



To Accompany Report by B.T. O'Grady
Resident Engineer, District No. 5 Nelson, B.C.
B.C. Bureau of Mines, 1929.

Map by A.M.R.

rock, of which the smaller intrusions are mere appendices and which was probably the source of the solutions which deposited the tin and other metals.

"The main veins are parallel to the bedding of the sediments and vary from 3 to 15 feet in width. In all the veins the gangue mineral is quartz. The metallic minerals are pyrite, galena, stannite, zinc-blende, tetrahedrite, scheelite, wolframite, ruby silver (proustite), chalcopyrite, and native silver. Chalcopyrite and native silver are present in only minute quantities and are visible only under the microscope."

Summarizing the results of exploration in regard to silver-lead-zinc deposits, there has been no material change in the situation since the published report of J. D. Galloway, Provincial Mineralogist, in the bulletin referred to above—namely, that no ore-bodies of commercial importance have yet been developed.

Chief interest is now concentrated on the stannite mineralization, discovered in appreciable quantities in the workings on the No. 4 crosscut tunnel level. From the point of intersection in the crosscut tunnel the No. 1 vein had been drifted on for 112 feet in an easterly direction and for 350 feet in a westerly direction. Both these drifts follow the foot-wall plane of a wide zone of interbanded quartz and slate intersected by the main crosscut. In the east drift, which contains the "tin-shoot," an inclined raise had been driven 120 feet in length at a point about 93 feet from the intersection of the crosscut. The dip of the vein in the raise is about 54°.

In the west drift stannite was not readily discernible to the eye, and as commercial values were not expected in this working, samples were only taken at 50-foot intervals as a check. The average result of this sampling throughout the length of the west drift and a width of 39 inches was: Gold, *nil*; silver, 0.22 oz. to the ton; lead, *nil*; zinc, 1.42 per cent.; copper, *nil*; tin, *nil*.

Channel samples at 20-foot intervals along the east drift gave an average assay of: Gold, trace; silver, 3.52 oz. to the ton; lead, *nil*; zinc, 4.59 per cent.; copper, 0.46 per cent.; tin, 0.28 per cent.; over an average width of 27½ inches and a length of about 112 feet. Sampling of the raise at similar intervals gave an average assay of: Gold, trace; silver, 8.86 oz. to the ton; lead, 1.21 per cent.; zinc, 5.62 per cent.; copper, 1.35 per cent.; tin, 1.13 per cent.; over an average width of 43 inches and a length of 120 feet. A very strong development of stannite occurs 25 feet up the raise, where a sample taken across a width of 38 inches, and included in the above average, assayed: Gold, trace; silver, 43.5 oz. to the ton; lead, 7.5 per cent.; zinc, 6 per cent.; copper, 6.5 per cent.; tin, 6 per cent. The combined average of the samples taken along the east drift and the raise therefrom is: Gold, trace; silver, 6.39 oz. to the ton; lead, 0.65 per cent.; zinc, 5.31 per cent.; copper, 0.94 per cent.; tin, 0.73 per cent.; over an average width of 34 inches. Although the samples taken in the east drift and raise were widely spaced, it appeared from an examination of the vein in both workings that the samples represented a fair average, in spite of the mineralization being of very irregular character.

The "backs" on the east drift to the No. 2 level, 335 feet vertically above it, have been estimated at about 550 feet. The raise in the east drift on the No. 4 level will when completed connect with the westerly drift on the No. 2 level a short distance from the crosscut intersection.

The "tin-shoot" in the east drift adjoins the boundary between the *Snowflake* and *Regal Silver* properties and its extension in strike and dip can be expected on the latter property, as the boundary-line forms an acute angle with the direction of the drift. The tin-bearing vein, with its dip of 52° in the east drift, would enter *Regal Silver* ground in a slope-length of about 110 feet below the point of intersection of the crosscut and drift and in a few feet at the boundary-line. There is, therefore, a small block of ground below the tin-shoot, triangular in shape, lying between the two properties. A sample across 18 inches in the face of the east drift adjoining the *Regal Silver* boundary assayed: Gold, trace; silver, 5.2 oz. to the ton; lead, *nil*; zinc, 13 per cent.; copper, 1.1 per cent.; tin, 0.7 per cent.

The No. 1 and No. 2 levels of the *Snowflake* develop sections of the same No. 1 vein at elevations of 5,945 and 5,885 feet respectively, the elevation of the No. 4 level containing the tin-shoot being 5,550 feet. The westerly drifts in the upper two tunnels mentioned are situated approximately above the tin-shoot and, without allowances for any rake in the ore-body, might be expected to develop the upper part of the same shoot. The mineralization was not considered to be sufficiently continuous in these upper levels to warrant systematic sampling, and only a few samples were taken at promising points with a view to correlating silver-tin values if possible. In this connection three samples were taken in the No. 2 tunnel westerly drift and one sample in the face of the No. 1 tunnel westerly drift. A 64-inch sample taken at the intersection of

the No. 2 level crosscut and drift gave an assay of: Gold, 0.02 oz. to the ton; silver, 11.8 oz. to the ton; lead, *nil*; zinc, 2 per cent.; copper, 0.9 per cent.; tin, 0.2 per cent. A 12-inch sample taken 25 feet along the westerly drift from the crosscut assayed: Gold, trace; silver, 0.35 oz. to the ton; lead, *nil*; zinc, 1.8 per cent.; copper, *nil*; tin, *nil*. A sample across 18 inches in the face of the westerly drift on the same level assayed: Gold, trace; silver, 7.8 oz. to the ton; lead, 10.5 per cent.; zinc, 3.8 per cent.; copper, 0.1 per cent.; tin, trace. A selected sample from a narrow but continuous streak in the same working was found to contain 8.4 per cent. tungsten.

A sample across 24 inches in the face of the westerly drift on the No. 1 level assayed: Gold, trace; silver, 15.5 oz. to the ton; lead, 3.3 per cent.; zinc, 12.1 per cent.; copper, 2 per cent.; tin, 1.6 per cent.

A grab sample taken from an exposure about 60 inches wide in the shallow outcrop working on the No. 1 vein just above and west of No. 1 tunnel assayed: Gold, trace; silver, 10 oz. to the ton; lead, 6.5 per cent.; zinc, 2.1 per cent.; copper, 0.2 per cent.; tin, 0.2 per cent. A selected sample from the same place assayed: Gold, trace; silver, 5.5 oz. to the ton; lead, 2 per cent.; tungsten, 9.8 per cent. There is apparently a considerable development of scheelite at this point.

The No. 3 tunnel develops the same (or No. 1) vein some distance to the south-east of the No. 2 tunnel and at an elevation of 5,850 feet. This working contains a 24-foot winze in the short eastern drift. The lower 10-foot section approximately of this winze could not be examined, being under water. A sample across 32 inches, 6 feet down from the collar of the winze and on the west side of it, assayed: Gold, trace; silver, 9 oz. to the ton; lead, 6 per cent.; zinc, 22 per cent.; copper, 1.1 per cent.; tin, 1.1 per cent. This sample was taken at a selected point where the occurrence of stannite was quite apparent in association with zinc-blende, galena, and pyrite. Another sample taken in No. 3 level across 14 inches at the intersection of the crosscut and drift, about 15 feet west of the collar of the winze, assayed: Gold, 0.01 oz. to the ton; silver, 10.5 oz. to the ton; lead, 13.5 per cent.; zinc, trace; copper, *nil*; tin, *nil*. The No. 3 tunnel workings are about 80 feet away, measured along the strike of No. 1 vein, from the boundary-line of the *Snowflake* and *Regal Silver* properties.

Several hundred feet north-westerly from the western extremity of the No. 4 level west drift and at an elevation of about 6,300 feet an open-cut has been made in the No. 1 vein, only partially exposing it. A sample taken in this working across 6 inches on the hanging-wall side of the vein assayed: Gold, trace; silver, 5.4 oz. to the ton; lead, 1 per cent.; zinc, 1.6 per cent.; copper, 0.2 per cent.; tin, trace. Outcrops of the same vein can be seen about 500 or 600 feet farther westerly, but no samples were taken owing to the vein being poorly exposed at these points. All the above-described underground and surface workings develop the No. 1 vein.

The Nos. 2 and 3 veins are in close proximity to and parallel to the No. 1 vein and northerly from it. The No. 4 vein outcrop as exposed in two shallow surface workings also parallels the other veins and is about 160 feet to the north of the No. 3 vein. Commencing at the north-western extremity of the outcrop workings, or about 1,000 feet north-westerly from the face of the west drift on No. 4 level, the following samples were taken:—

Open-cut on No. 2 vein at approximately elevation of 6,280 feet, sample across 24 inches which assayed: Gold, trace; silver, 9.1 oz. to the ton; lead, 6 per cent.; zinc, 1.5 per cent.; copper, trace; tin, *nil*. Selected material from the same place assayed: Gold, trace; silver, 20.2 oz. to the ton; lead, 18.5 per cent.; zinc, 2 per cent.; copper, 0.8 per cent.; tin, 0.8 per cent. Open-cut in No. 3 vein at approximate elevation of 6,300 feet, sample in face across 4 inches of partially oxidized ore, containing copper-carbonate stains, assayed: Gold, trace; silver, 23 oz. to the ton; copper 2 per cent.; tin, 2.8 per cent. A 24-inch sample on west side of same open-cut assayed: Gold, 0.08 oz. to the ton; silver, 46 oz. to the ton; lead, 39 per cent.; zinc, 0.5 per cent.; copper, 0.2 per cent.; tin, trace. A sample from the No. 4 vein, outcropping at an elevation of between 6,400 and 6,500 feet, across 24 inches, assayed: Gold, trace; silver, 1 oz. to the ton; lead, *nil*; zinc, 0.2 per cent. No stannite could be detected in this sample, which consequently was not assayed for copper or tin. Open-cut on No. 2 vein at 6,042 feet elevation, and almost directly above No. 2 tunnel, sample of selected ore assayed: Gold, trace; silver, 13.5 oz. to the ton; lead, 18 per cent.; zinc, 0.7 per cent.; copper, *nil*; tin, trace. A short distance easterly, and about 20 feet higher up the hill, No. 3 vein, about 12 inches wide, is exposed for a short length, but no mineralization is apparent at this point and no sample was taken.

An analysis of the sampling in the surface and underground workings indicates widespread, erratic distribution of stannite, somewhat concentrated in the east drift and raise therefrom on the No. 4 level.

The main consideration at the present time is the development of tonnage and a considerable time must necessarily elapse before it will be known if the stannite mineral occurs in paying quantities. Milling tests are now being made, and in this connection there seems little doubt that a satisfactory separation of the sulphides will be evolved by selective flotation processes. Questions of further treatment, dependent on the results of the concentrating tests now under way, have not yet been considered.

The recently discovered deposits are believed to be unique, in that stannite is found without any associated cassiterite, which latter mineral is the recognized ore of tin. In the known tin-deposits of the world, stannite, a comparatively rare mineral, has not yet been known to occur in large quantities, and consequently as an ore of tin has not been considered seriously from the commercial point of view.

Results of development will be awaited with unusual interest and it is hoped that further discoveries will be made which will result in the commercial production of tin from the Woolsey (Silver) Creek area.

Regal Silver Mines, Ltd.—The property of the Regal Silver Mines, Limited, more generally known as the *Morton-Woolsey*, adjoins the *Snowflake* on the east and covers the extension of the same vein system to considerably lower altitudes. The No. 3 crosscut tunnel, where work is proceeding, develops several veins of this system at an elevation of about 4,200 feet. The correlation of the veins on the two properties is not yet definitely known, but the *Morton-Woolsey* No. 5 vein probably corresponds to the No. 1, or possibly the No. 2, *Snowflake* veins. Assuming that the No. 5 and the *Snowflake* No. 1 veins are the same, the No. 3 *Morton-Woolsey* tunnel develops this vein at a depth of about 2,000 feet, measured on its apparent average dip, below the *Snowflake* No. 4 tunnel.

Summarizing results of *Morton-Woolsey* development generally, it may be said that silver-lead-zinc mineralization in some degree is widespread, but continuity of commercial values remains to be demonstrated and exploration has not yet reached the stage where any important tonnage can be estimated.

The interesting discovery of stannite at the *Snowflake*, on ground adjoining the *Morton-Woolsey* boundary, has had the effect of stimulating exploratory work at the latter property, and future efforts, it is understood, will be largely directed towards exploration for tin-bearing deposits. In this connection some samples were taken in the No. 2 and No. 3 tunnel workings and assayed for tin, but with negative results. Stannite was detected in small amounts in the old No. 1 prospect-tunnel, which is believed to be driven on the No. 5 vein (corresponding to the No. 1 *Snowflake*). A sample across a 10-inch streak in a 24-inch vein in this working, which is situated at an elevation of about 4,995 feet, gave an assay of: Gold, trace; silver, 8 oz. to the ton; lead, 5.9 per cent.; zinc, 2.8 per cent.; copper, 0.3 per cent.; tin, 0.6 per cent. A sample of selected ore from a small pile outside the portal of this tunnel assayed: Gold, trace; silver, 6.8 oz. to the ton; lead, trace; zinc, 1.1 per cent.; copper, trace; tin, 0.3 per cent.

This No. 1 tunnel is situated between 750 and 800 feet, measured parallel with the strike of the vein, from the eastern boundary of the *Snowflake*.

In addition to the above-described workings on the East fork of Silver creek, development-work is being carried on by the Regal Silver Mines, Limited, its claims on Tangier river (North fork of the Illicillewaet river), which have not yet been visited. This company's holdings extend from its *Morton-Woolsey* property over the mountain to Tangier river and cover a large territory.

Woolsey Mines, Ltd.—The property of this company, which includes the *Donald* and *Round Hill* claims, is situated near Flat Creek siding on the main line of the Canadian Pacific Railway. The ore is silver-lead-zinc. Work has been continued during the season with a small crew.

Wigwam.—This property is situated on Akolkolex creek (Isaac creek) at a distance of about 6 miles from the Revelstoke-Arrowhead branch of the Canadian Pacific Railway. Exploration-work, which has been carried on for a number of years under the direction of W. T. Dumbleton, has been resumed and diamond-drilling is being done.

BIG BEND.

The Big Bend district extends northerly from Revelstoke along the Columbia river to Canoe river. The only property working in this area at the present time is a placer property on French creek, where hydraulicking operations are being carried on by L. N. Remillard for

the French Creek Development Company. Considerable activity, however, is being manifested in connection with the investigation of long-dormant mining properties which are distributed at intervals for a length of over 100 miles north of Revelstoke. Lack of activity at some of these prospects was probably largely owing to their remoteness from transportation. In this connection assistance is being given by the Department of Mines towards reconditioning of the trunk trail from Carnes creek to Mica creek. At the present time motor-vehicles can be used as far as Carnes creek.

TROUT LAKE MINING DIVISION.

Activity in this Division has been somewhat disappointing, but it is reported that work will soon be resumed at several properties which have recently undergone investigation. In this connection a consolidation of the *White Quail* and *Molly Mack* properties is reported to have been effected, whereby a large area covering a promising mineral-belt will be available for development. The properties have exploratory possibilities of considerable interest. Geological conditions on the *Molly Mack* indicate large concentrations of mineralization in areas of folding and contortion of the limestone strata.

LARDEAU MINING DIVISION.

Due to pressure of work in other sections of the district it has not yet been possible to visit this Division. According to reliable reports, work is being resumed on the *Teddy Glacier* by the Bush and McCulloch interests and preliminary work includes the improving of transportation facilities. The property has exceptionally strong surface showings of ore containing values in gold, silver, lead, and zinc, the gold content being appreciable. A small amount of work is also reported to have been done at the *Paymaster* property by the Paymaster Mines, Limited, which is a subsidiary of the Lardeau Mines Exploration, Limited, whose activities were initiated and sponsored by J. M. Humphrey, managing director. It is understood that work has been resumed at the *Multiplex* by O. T. Bibb.

NELSON MINING DIVISION.

Results of development-work done at numerous points in this Division are very satisfactory. Interesting new activities are developing in places, and investigation being made of dormant mining properties indicates resumption of work in some cases. The leading development operations at the present time are those at the *Reeves-McDonald* on the Pend d'Oreille river and the *Yankee Girl* near Ymir.

NELSON SECTION.

Silver Reef.—Situated on Anderson creek, this property has been worked in a small way by the Silver Leaf Mines, Limited.

Queen Victoria Consolidated Mines, Ltd.—No activity has yet materialized in connection with the holdings of this recently incorporated company near Beasley. Information regarding the claims constituting the property is contained in the Annual Report for 1928.

Granite-Poorman.—After a long period of inactivity, work has been resumed at this property, situated west of Nelson, by the recently incorporated Granite-Poorman Gold Mines, Limited. A good start has been made on the crosscut tunnel on the mill level, which, when visited recently, had been driven between 600 and 700 feet in from the portal. The work is being done under contract by F. H. Fox and associates. The company has announced its intention to drive this crosscut tunnel several thousand feet farther to the area below the upper workings, where a considerable amount of crosscutting and raising will be necessary to explore the downward extensions of several veins, some of them very widely separated. A large development project is thus involved. Descriptive literature published about the *Granite-Poorman* mine towards the end of last year was so sensational that some special comment was thought advisable, and the Annual Report for 1928 contains a brief summary of conditions in regard to past production. Similar literature has since been published and it is now considered necessary to redirect attention to the information already submitted. While it is hoped that the proposed deep development will be successful, the experience gained from past exploitation of the deposits can hardly be used to endorse a recent advertisement which is entitled "Granite-Poorman Gold Mines are expected to help overcome World's Gold Shortage."

Kootenay Premier Mines, Ltd.—No appreciable activity has yet materialized in connection with the *Royal Canadian, Nevada*, and adjoining claims. The property is conveniently situated on the upper Granite road west of Nelson. The ore contains gold values associated with iron and copper sulphides.

Good Hope.—This property is situated on Bird creek, south-west of Nelson. Work has been resumed by J. B. Baxter, the owner, who proposes to install a small prospecting-mill. The *Good Hope* is briefly described in the Annual Report for 1928.

Forty-nine Creek Placers, Ltd.—Work on this company's placer leases on Forty-nine creek, west of Nelson, has been carried on continuously by H. W. Robertson and associates. Work in the old tunnel was greatly handicapped by running ground and this working was finally abandoned. A shaft was then sunk to bed-rock outside the portal of the tunnel, but no appreciable values were encountered there. Subsequently a shaft was started at a point some distance farther up-stream to test bed-rock, where better results were expected.

Golden Age.—This property is situated south of Nelson on the Great Northern Railway. A small amount of tunnelling was done in the lower level. The mill, not in use, recently burned down. The property is referred to at some length in the Annual Report for 1928, since when there has been no appreciable change. According to reports the mine has recently been leased to Spokane interests.

Euphrates.—Situated on the opposite side of the Salmo River valley from the *Golden Age*. Since the last published report a new tunnel has been driven several hundred feet on the *Ell Tee* vein. In this new tunnel, which gains a vertical depth of about 400 feet on the No. 1 level, developing the same vein, the vein is reported to average 12 inches and to contain high-grade gold ore similar to the tunnel above it. The flume has been extended about 5,300 feet to Clear-water creek. It is reported that a contract is to be let to extend the lower tunnel to a total distance of 800 feet from the portal. Other work done includes the sinking of a short section of shaft on the *Lost Cabin* claim.

Perrier.—This property is situated on the Great Northern Railway south of Nelson. Development-work being done in the shaft-workings were recently discontinued, but according to reports further activity is likely to develop in the near future.

KOOTENAY LAKE.

Wisconsin.—Situated on Midge creek, 14 miles from Kootenay lake, this long-dormant property is being reinvestigated by R. H. Stewart, H. L. Batten, and associates. During the fall of last year a Radiore survey was made, which indicated possibilities for a considerable lateral extension of the known ore-body. Diamond-drilling is now being considered. Extensive showings of low-grade gold-silver ore on the surface and in superficial underground workings indicate very favourable possibilities for important tonnage.

Sanca Mines, Ltd.—The property of this company includes a large number of mineral claims situated on the eastern side of Kootenay lake, between Sanca creek and Ginol's Landing. Mining activities during the period under review are reported to have been confined to assessment-work on the large holdings involved. An elaborate headquarters camp at the lake-shore south of Sanca creek includes some twelve frame and log buildings. Accommodation has also been provided at individual properties and considerable trail-work has been done. For some time reports have been current that diamond-drilling is to be undertaken, but this has not yet materialized.

Iva Fern.—This property is situated on Cultus creek, some 7 miles from Kootenay lake. About fifteen men are employed on development-work by the Consolidated Mining and Smelting Company. The main vein in the crosscut tunnel has been drifted on to the south and the same vein has been traced in the same direction by trenching on the surface.

Spokane.—This property, on Canyon creek, 18 miles from Kootenay lake, is being worked by the owners, the Laib Bros. Transportation to this promising little mine is gradually being improved.

Bayonne.—Work has been resumed at this property, situated at the head of Summit creek, by B. N. Sharp with a small crew. J. B. Gerrard, war-time American ambassador in Germany, is financing the work.

Humdingar and Hunkadora.—Since the last published report a short crosscut tunnel has been driven below the interesting showing exposed in an open-cut by the side of the Cultus-

Canyon Creek trail, 9 miles from Kootenay lake. The tunnel has cut a width of 10 feet of strong mineralization consisting of copper and iron sulphides uniformly distributed through a calcareous and siliceous gangue.

YMIR SECTION.

Yankee Girl.—This property is situated near Ymir. A full description of the substantial operations of the Yankee Girl Consolidated Mines, Limited, is contained in the Annual Report for 1928. Since then the big low-level tunnel on the Wildhorse Creek side has been advanced to about 2,000 feet in from the portal. Progress has been at the rate of about 300 feet a month.

Hunter V.—This property, situated south-east of Ymir, has been continuously operated by the Consolidated Mining and Smelting Company in connection with fluxing requirements at the Trail smelter. A brief description of the deposits is contained in the Annual Report for 1928.

Consolidated-Alabama.—These old claims, on the western side of the Salmo River valley near Ymir, are being reinvestigated by Seattle interests and four men are engaged on preliminary work under the direction of A. R. MacDonald.

ERIE CREEK (NORTH FORK OF SALMO RIVER AND VICINITY).

Second Relief.—This property is situated on Erie creek, 13 miles from Erie. The name of the operating company was recently changed from the Second Relief Mining Company, Limited, to Relief Arlington Mines, Limited. At the time of the change of name the company acquired the *Arlington* near *Erie* and consolidated several holdings in the vicinity. During the period under review work has been confined to the *Second Relief*, where crosscutting, drifting, and stoping is being done. High gold values have been encountered in the low tunnel level, where the main drift has been extended about 100 feet. For 50 feet of this length samples taken by the management assay between \$40 and \$90 to the ton across an average width of 4 feet. The interesting character of the mineralization in the *Second Relief* veins is described in the Annual Report for 1928. Former operations were confined to the exploration of one vein, but there are several promising parallel veins which can be reached by comparatively short crosscuts from the present workings. An amalgamating unit has been added to the mill, which resumed operation about the middle of June, and the recovery of several thousand dollars in bullion and concentrates is reported.

Erie.—Situated near Erie, this property has been worked in a small way by J. E. Webber and associates. Brief mention is made of the *Erie* group in the Annual Report for 1928.

Howard.—A detailed description of the property, which is situated on the South fork of Porcupine creek, is contained in the Annual Report for 1928. Since then development-work has been prosecuted with a small crew in charge of F. W. Holzheimer, mining engineer for the J. F. Duthie interests.

Big Horn.—This property is situated at the head of the South fork of Porcupine creek. A small amount of development-work is reported to have been done under the direction of J. W. Peck.

SHEEP CREEK AND SOUTH OF SALMO.

Reno Gold Mines, Ltd.—The property of this company is situated on Fawn creek. Since the description published in the Annual Report for 1928, results of development-work have been very satisfactory. Shoots of high-grade gold ore have been opened up in the *Reno* vein-workings and the property has been prepared for small-scale production. The cyanide-mill, recently installed by the Southwestern Engineering Company of Los Angeles, is expected to start up shortly.

Salmo Consolidated Mines, Ltd.—Since this property, situated on Elk creek, was described in the 1928 Annual Report, the mineralized zone has been further explored by north-easterly and south-westerly drifts from the lower tunnel. While commercial ore has not yet been encountered, the mineralization is getting stronger towards the extremity of the south-western drift. At the time of writing work has been suspended at this property.

Salmo-Malartic Mines, Ltd.—At the *Aspen* property on Deer creek a Radiore survey was made early in the year, followed by diamond-drilling, which is still being continued. More surface-trenching was done on the upper mineral-zone and encouraging mineralization found.

Queen.—At this property on Sheep creek W. A. Lavigne and associates, of Spokane, have done a small amount of preparatory work with a view to resumption of activity.

Molly Molybdenite.—A small amount of surface work is reported to have been done by the Consolidated Mining and Smelting Company at this property on Lost creek. Molybdenite occurrences are found at widely separated points in the adjacent area.

Reeves-McDonald.—This property is situated on the Pend d'Oreille river. Excellent progress is being made in the driving of the low-level river-tunnel, which is now in about 1,600 feet. This tunnel, which is to be extended to about 4,000 feet, is being driven at the rate of about 15 feet a day, working three shifts. A mucking-machine of the drag-scraper type and electric haulage are being used. In the first few hundred feet of the long tunnel carbonate ore carrying about 25 per cent. combined lead and zinc was encountered, which will at some later date be further explored to determine its extent and commercial possibilities. Recent investigation of the geological conditions east of the *Reeves* ore-body indicates good possibilities for the existence of an important ore-body between the *Reeves* and *O'Donnell* workings. In this section of the ore-zone surface prospecting has disclosed an exposure about 30 feet wide of similar material to that found at other important outcrops. A detailed description of the *Reeves-McDonald* deposits is contained in the Annual Report for 1928, which should be read in conjunction with the brief notes now submitted.

Red Bird.—This property, briefly described in the Annual Report for 1928, is situated across the river from the *Reeves-McDonald*. Diamond-drilling is being done by the Boundary Basin Mines, Limited, under the direction of R. H. Stewart, with a view to development by deep tunnelling.

TRAIL CREEK MINING DIVISION.

Details of the Consolidated Mining and Smelting Company's fertilizer plant to be built on the Warfield flats, Trail, indicate an immense project. The plant will cost from \$7,000,000 to \$8,000,000 and will require about two years to construct. The first unit will produce 35 metric tons of fixed nitrogen a day, which means a daily production of approximately 192 short tons of ammonium sulphate, or alternatively 260 short tons of ammonium phosphate. Total power-consumption arising out of the first unit will be approximately 30,000 horse-power. An electrolytic hydrogen plant will account for 23,000 horse-power of this. There will be a liquid-air plant for extracting pure nitrogen from the air. A synthetic-ammonia plant will fix the pure nitrogen and the hydrogen gases from the foregoing two plants into anhydrous ammonia, which is ammonia vapour compressed into a liquid state. About 350 tons of acid will be produced daily by a contact sulphuric-acid plant, which will take the sulphur dioxide from the zinc-roaster gases and convert it into sulphuric acid. The Consolidated has already a 35-ton sulphuric-acid plant which has been working on these gases since January and this has proved very satisfactory. In addition to these plants, there will be the auxiliary plants for conversion of the ammonia into ammonia sulphate, plants for making phosphate rock from the company's beds at Fernie with sulphuric acid into fertilizers, such as triple superphosphate, mono-ammonium phosphate, and possibly di-ammonium phosphate. With the exception of the sulphuric-acid plant, which, like the present one, will be in conjunction with the metallurgical works, the first unit will be situated on the Warfield flat above the smelter, commonly known as Heintz flat. The site will be so arranged that the plant can be extended to ten times its initial unit if required. While these plants are being built to make fertilizer for the Canadian prairies, the programme has been much hastened on account of the desire of the International Joint Commission to obviate any smoke damage south of the International boundary. Representatives of various Canadian, European, and American firms were recently at Trail tendering on the electrical machinery for the first series of plants. In this connection contracts have been awarded to the American Brown Boveri Company and the General Electric Company. The liquid-air plant is already ordered and the sulphuric-acid and other plants are being designed. It is expected that the whole first unit in connection with fertilizer-manufacture will be in operation within two years. With this in view the Consolidated for the last two years has been carrying on extensive experiments in conjunction with the Governments and universities of the three Prairie Provinces and the Canadian Pacific Railway, with all kinds of chemical fertilizer, so that when the plant is ready to produce, information will be available as to what results can be expected from the different kinds and in what districts they can be profitably used. A handicap to be overcome is the somewhat common but erroneous impression that any chemical fertilizer is suited to any land. Experts concede, however, that practically any land can be made to yield considerably more by means of chemical fertilizer if the type it needs is selected. Oxygen, which will be a

by-product of the manufacturing of nitrogen from the air, will be made use of in metallurgical processes at the Trail plant. A thorough canvass has been made of the practices obtaining and the processes used in Europe, where this chemical-fertilizer question has been given serious attention, and where about 3,000 tons of atmospheric nitrogen is fixed as ammonia daily, against 200 to 300 tons on the whole American continent. Up to a very few years ago the world's nitrogen-supply came exclusively from Chile in the form of sodium nitrate, while to-day the nitrate used is largely derived from atmospheric nitrogen.

Large expenditures have recently been made by the same company in connection with important improvements and additions to existing zinc plants which provide for a largely increased production of zinc. The first 50-ton unit of the new zinc-oxide fuming plant is to be ready by the end of the year. A second unit is also to be built. The first unit will treat current slag from the lead-furnaces. In connection with the electrolytic plant a battery of three Brown Boveri mercury-vapour rectifiers is being installed, each unit having a capacity of 10,000 to 12,000 amperes at 500 volts, also accessories, for stepping down the 60,000 volts from the transmission-line to 13,000 volts and converting the alternating to direct current for the precipitation of zinc from its solution as sulphate. This is the latest European practice for stepping down and converting. This installation represents the largest application of mercury arc rectifiers to electrolytic work in the world. It will cost approximately half a million dollars, but will result in considerable economy and a large increase in the yield of zinc per unit of current used.

Since the closing-down of the once famous Rossland mines of the Consolidated Mining and Smelting Company mining activities in the Trail Creek Mining Division have been restricted to small properties, chiefly in the vicinity of Rossland. Among these recent activity has been reported at some of the high-grade gold properties, including the *Snowdrop*, which Ole Osing and associates are working under lease. Rich pay-streaks are reported to have been opened up in a tunnel being driven on the vein. Osing was interested in the highly successful leasing operation at the *I.X.L.* some years ago. At the *Mayflower*, just south of Rossland, R. H. Hackney has done a small amount of development-work. The ore carries values in gold, silver, lead, and zinc.

Norway.—This property adjoins the Trail city limits. Since the property was visited in the spring the lower tunnel is reported to have been extended 97 feet. Two tunnels develop a quartz vein, containing gold values, in granitic rocks. Work is being financed by Trail residents under the name of the Norway Mining Company. Lack of space prevents more extended reference and a detailed description will be prepared for the Annual Report for 1929.

ARROW LAKE MINING DIVISION.

There is evidence of renewed mining activity around Burton, probably due to some extent to the exploration of the *Hailstorm* property being carried on by the Consolidated Mining and Smelting Company. This property, situated on Canyon creek, a tributary of Caribou creek from the south, is reached by road and trail 18 miles in length from Burton. Fifteen men are employed and a crosscut tunnel is being driven to explore the ground 300 feet below the surface outcrops. The ore carries silver values and a little gold, associated with sparsely disseminated sulphides of iron, lead, and zinc, in a calcite gangue. The country-rock is granite, with inclusions or roof-pendants of limestone in the vicinity. The general geology of the adjacent area consists of repeated contacts of rocks of the Slocan series and granitic rocks of the Nelson batholith. It is proposed to do about 900 feet of tunnelling on the crosscut tunnel level.

Production Mining Co., Ltd.—Early this year a company of this name was formed at Vancouver to operate six claims on Mineral creek, which is a tributary of Caribou creek, but up to the time of writing no appreciable activity has materialized.

Situated on the Vernon-Edgewood road, work is reported to have been carried on at the *Meadow View* property by the Cotton Belt Mines, Limited. It has not yet been possible to visit this area.

WESTERN MINERAL SURVEY DISTRICT (No. 6).

SUMMARY REPORT FOR SIX MONTHS ENDED JUNE 30TH, 1929.

BY GEO. A. CLOTHIER, RESIDENT MINING ENGINEER.

The Western or No. 6 Mineral Survey District includes the following seven Mining Divisions of the Province: Victoria, Alberni, Clayoquot, Quatsino, Nanaimo, Vancouver, and New Westminster.

Many important developments in connection with the mining industry are taking place in this Coast district at the present time, and I can safely say that the mining outlook for this particular district has never been more encouraging than right now. The probability of the establishment of a smelting and refining plant on the Coast by one or more of the large corporations obviously has had a very beneficial effect on development throughout the district. Also the very keen interest taken by the large companies in examining and exploring prospects of merit has encouraged the prospector and small operator to find and develop something worth turning over to the large operators.

The remarkable development of the Canadian oilfields has possibly curtailed capital for mining purposes, especially for smaller operators depending on financing by new stock issues. There is, however, a surprisingly large number of private syndicates putting money into meritorious prospects and as a consequence mining development is not being hampered as much as might be expected.

From a prospecting standpoint the outstanding discovery this year has been in the Nimpkish Lake area, where probably 200 claims have been staked within the last year on a belt showing some very promising copper-outcrops.

A party of the Dominion Geological Survey under the supervision of H. C. Gunning is making a reconnaissance of that area this season north of Quatsino sound, which will be of great benefit to that hitherto unsurveyed portion of Vancouver island.

Geophysical prospecting is also being increasingly used, and is proving very adaptable for the location of ore-deposits on Vancouver island as well as the ore-bodies in the included belts in the Coast Range granodiorite.

Much is being done to encourage prospecting and development in this district, by way of assistance to trail-work. Few trunk trails are required in this district, but many short ones up the rivers emptying into the numerous inlets will be necessary to promote the prospecting of the higher and more favourable ground.

The mining situation will be briefly reviewed under the headings of "Vancouver Island" and the "Mainland and Coast Islands."

VANCOUVER ISLAND.

On the southern end of the island the *Gabbro* group, adjoining the *Sunloch*, is under option to the Pacific Tidewater Mines, Limited, a subsidiary company of the British Metals Corporation. This company had the ground surveyed by the Radiore Company early in the year, obtaining sufficiently encouraging indications to warrant diamond-drilling. This has been under way for some time, with only fair progress due to unfavourable rock conditions. It is the company's intention to exhaustively test the property.

The Kootenay Central Mining and Development Company, Limited, of 736 Granville Street, Vancouver, is doing some preliminary work on its placer leases on Sombrio and Loss creeks on the west coast of Vancouver island, about 8 miles below Port San Juan. Considerable prospecting and testing, and a small hydraulic operation several years ago, indicate workable placer-gold values distributed throughout an immense yardage of gravel-deposits extending from the beach up and between the above-mentioned creeks. The company proposes installing a small hydraulic outfit to sluice a sufficient yardage of gravel in a number of places to conclusively prove whether the values and operating costs warrant attacking the undertaking on a large scale. Given satisfactory values, it has all the requisites of a big operation.

The *Alpha-Beta* group (see 1928 Annual Report) on Robertson creek, south-west end of Cowichan lake, is under option to a Vancouver syndicate. A trail has been built to the showings from the logging-railway of the Victoria Lumber and Manufacturing Company, of Chemainus. Transportation offers no difficulties with the logging-road in operation.

A crew of four men has done considerable exploratory work to date, mainly in stripping and open-cutting, showing a width of over 100 feet of a metamorphic belt of garnetite and epidote, along the contact of granite and limestone. An open-cut along the bank of the creek has disclosed a width of about 50 feet mineralized with chalcopyrite that I judge will average better than 4 per cent. copper. The continuation of the mineralization has been shown in a couple of places farther up the hill. A short tunnel being driven from the creek on the strike of the belt is all in ore.

Altogether the results of the work have been most promising and work will be continued to prove the belt at greater depth, which can be obtained by crosscutting from a small tributary creek. E. J. Conway, formerly with the Granby, is consulting engineer.

Further work is being done on the *El Capitan*, *Cottonwood*, and *Silver Leaf* groups on the north side of Cowichan lake, at the head of Cottonwood creek, by the owners. I have not examined them yet this year.

The old trail and Canadian National Railway grade has been repaired this summer, by the Department of Mines, from Alberni canal to about 3 miles east of Francis lake. Several groups have been staked showing copper possibilities. This is no doubt a very favourable prospecting area and the completion of the trail through to Cowichan lake will be recommended for next year.

The Island Copper Company, of Port Alberni, with a capitalization of \$250,000, with shares at 25 cents, acquired the old Crown-granted *Modoc* and *Kitchener* claims, and seven adjoining claims on the east side of Alberni canal, about 12 miles down from Port Alberni. The property is situated on the beach and therefore ideal for mining and transportation.

The general rock formation is the Vancouver volcanics, here mainly andesite, with belts of crystalline limestone. The general strike of the formation is north-west and south-east, which is characteristic of Vancouver island.

The mineral-showings, so far as exposed, are contained in shear-zones within the volcanics and as masses within the limestone. There is little or no evidence of metamorphism or change in the limestone, and I therefore conclude that the limestone merely overlies the mineral-bearing volcanics and has no influence whatever on the mineralization, the mineral masses in the limestone being exposed by the erosion of the limestone. The ore consists of chalcopyrite and iron sulphide in a gangue of chiefly hornblende.

A shipment of 25 tons of chalcopyrite was made to the Tacoma smelter early in the summer, the returns showing about 7 per cent. copper and about \$1 in gold and silver. The ore was not hand-sorted. It was mined from a surface showing, the open-cut showing some ore in the bottom yet, as well as indications of ore along the shear, and consequently justifying further exploration.

On the *Modoc* and *Kitchener* claims some work had been done by former owners and operators and some promising ore-exposures made, the work consisting of several open-cuts and two shallow shafts. The present company is driving an open-cut from the side-hill to gain a little more depth under one of the shafts where ore was exposed. About 200 feet south of this, along the contact of the volcanics and limestone, the showing at the other old shaft, from which about 20 tons of good chalcopyrite ore is piled on the dump, has been extended by open-cutting for about 40 feet, showing some promising ore mixed in with limestone. About 50 feet west of the first-mentioned shaft, and therefore well out in the limestone-belt, an exposure of hornblende carrying chalcopyrite was broken into with a few shots, which exposed another promising mass of shipping-grade chalcopyrite. There is apparently a width of from 4 to 6 feet of ore here. Still farther west where the ground breaks away to a gulch an exposed bluff of volcanics was broken into, exposing about 2 feet in width of clean, fine-grained chalcopyrite, which is being mined and sacked for shipment. Assays by the company show gold values up to \$10 or better in this class of ore.

Altogether the work done, though only surface work, has proven very encouraging as indicating ore possibilities in the volcanics underlying the limestone. It remains to be demonstrated by deeper development the importance of these ore-bodies. The company has a good camp on the beach, accommodating a crew of eight men.

The Canadian Quicksilver Company, Limited, owns a group of claims near Sechart, in Barkley sound. Several years ago some work was done by way of open-cutting, short crosscut tunnels, and a couple of shafts, one of which is about 40 feet in depth. The old shaft-dump shows some good cinnabar ore and will average about 0.4 per cent. mercury, or about \$10 a ton.

Assistance was given the company this season to clear and repair the old trail from the beach to the showings, a distance of less than a mile. Under the supervision of J. E. Boss, one of the original owners, preparations are now under way to pump out the old shaft, sink it to a depth of at least 100 feet, and explore the vein at that depth. If satisfactory results are obtained from development-work a plant for the recovery of the mercury will be installed on the ground. The property no doubt merits exploration.

The *Sunshine* and *Belvedere* groups on Uchucklesit harbour and the *Seattle* group on Bedwell sound are under bond to the Consolidated Copper and Gold Mines, Limited, of 602 Hastings Street West, Vancouver.

The *Forfershire* group on Henderson lake is under bond to Wm. McNair and associates, who have repaired the trail from the lake to the showings, built camps at the lake and above at the showings, and are now doing surface prospecting.

Work is proceeding toward the construction of the trail from the head of Kennedy lake up the Elk river to Taylor river and on down to Sproat lake. This will make accessible a promising mineral-belt containing gold-bearing quartz veins.

The *Big Interior* property at the head of Great Central lake has been bonded by an Eastern company and I am informed that exploratory work will be proceeded with at once. This is reported as an extensive, low-grade copper property and is therefore fortunate in getting the attention of a financially strong company.

The Buttle Lake section is reached by auto from Campbell River to Upper Campbell lake, from which it is 9 miles by good pack-trail to the north end, or foot of Buttle lake. Contiguous to the lake are wide schistose belts or shear-zones in the Vancouver volcanics, in which comparatively little prospecting has found lenses of zinc-copper ores, carrying fair silver values. Only three groups of claims have been staked in this section, on Price and Myra creeks at the south end of the lake, and I consider it a very promising prospecting area, to which transportation will eventually be provided by the extension of the logging-railway from Campbell River.

There are several properties on the west coast, but I have not examined them yet this season. Two companies, the Canada Copper Company, Limited, and the Armac Silver Lead Mines, Limited, have each staked and recorded large areas extending from the head of Kokshittle arm toward the Coast Copper Company's property on Elk lake.

The Coast Copper Company, Limited, has steadily carried on development-work on the tenth and twelfth levels and, I am informed, is deepening the shaft to the fourteenth level. This company acquired the old *Jeune* group on Alice lake and is proceeding with its exploration.

The Quatsino Gold Copper Mines, Limited, adjoining the Coast Copper Company on the south, has had a small crew on development-work this season. A tunnel has been driven about 70 feet toward intersecting one of the cross-veins which shows good gold values in the outcrops. The tunnel has not yet reached the vein. Surface prospecting is being carried on as well and a thorough geological survey will be made of the property.

The *Alice Lake* group is being developed by the owners, Clancy & Kinsey, of Quatsino.

The Caledonia Mines, Limited, property near Quatse lake is under option to the Consolidated Mining and Smelting Company. No information is available at the present time as to the results of exploratory work.

The Nimpkish Lake section is having an extremely busy prospecting season, due to the copper discoveries on the groups owned by E. L. Kinman and partners. Over 200 claims have been recorded in that area lying east of the south end or head of the lake. The lake is reached either from Englewood, from which the English-Wood Lumber Company's railway runs 14 miles to Camp 2 on the lake, or by a 5-mile trail up the Nimpkish river from its mouth, about opposite Alert Bay. The Kinman claims lie about 4 miles east of the head of the lake. They were staked last year, a trail built in from the lake, camp constructed, and work carried on by E. L. Kinman and two partners all winter.

An extraordinary amount of stripping and open-cutting has been done in the time, disclosing some extraordinary surface showings of ore, ranging from straight chalcopryrite to straight sphalerite. The ore occurs in a contact-belt of altered greenstone, up to 200 feet or more in width, lying between the main granite range to the west and greenstone and limestone to the east. The strike of the contact is very irregular, but in general is about N. 70° to 75° W. (mag.) and the dip is 80° to 85° E. with the slope of the hill.

Ore has been exposed in four places within a length of 3,000 feet, showing the mineralization to extend across a width of over 100 feet, in which are masses of chalcopryrite 10 to 15 feet wide.

The farthest-north showing is stripped 60 feet wide and on the north end of this at one point there is a width of 25 feet of practically solid chalcopryrite, the balance showing masses of ore in which masses of limestone are embedded. This stripping is about 100 feet along the "vein," but has only been made for a width of about 30 feet on the south end, where similar massive bodies of chalcopryrite have been exposed, but cut by a couple of small cross-dykes. Some 2,500 feet south of this, two other large strippings have exposed the mineralization across a width of 70 to 90 feet, showing widths of 10 to 15 feet of chalcopryrite. At one place lower down the hill and in the limestone a showing of sphalerite 15 to 20 feet wide has been uncovered.

Below the cabin on the edge of a deep canyon another cut has been made, exposing a width of over 20 feet of chalcopryrite. This is probably on a parallel belt to the upper one and has not been traced out as yet.

Altogether it is a remarkable surface showing of ore and should it maintain its surface proportions and mineralization will produce an immense tonnage for every 100 feet of depth obtained.

On the *Copper King* group back of Humpback bay the owner, Thos. Russell, of Vancouver, is continuing development this season. This will be examined later.

MAINLAND AND COAST ISLANDS.

Considerable interest is again being shown in some of the old mining properties along the Fraser river, as in the Chilliwack section, the Cheam range, around Agassiz, as well as around Harrison lake and north of it in the Fire Mountain section.

The Pitt Mining Company is proceeding with the installation of its power plant. The dam has been constructed, pipe laid, and the generator is now being placed. The compressor is set and power is expected to be ready in another month. Underground development will then be pushed as the concentrator machinery is being installed. The concentrator building is built and foundations laid for the machinery. The whole plant is being built in a very substantial way and production is expected in two or three months.

A number of claims have been staked by Marcus Cox at the head of Scott creek, emptying into Pitt lake near its head. I am informed that a company is being organized to develop these claims, on which some good chalcopryrite ore has been found.

Another group up from the mouth of Scott creek, staked by F. Johnstone and partners, is being prospected. This group also shows possibilities. They will be examined later in the year.

The trail to the Cox claims, 14 miles up from the head of the lake, has been completed and exploratory work on the molybdenum-showings will be started.

The Bowena Copper Company property on Bowen island was surveyed by Radiore this season, resulting in the indication of four veins. The axis of one of these veins was traced across the length of two claims; the others were shorter and more or less paralleling the main ore. The reactions in two or three places were sufficiently encouraging for the recommendation of diamond-drilling. Such work is now under consideration by the company.

The Britannia Mining and Smelting Company (*see* 1928 Annual Report) has had a very successful half-year's steady operation, resulting in a copper production about equal to the same period of last year, which was the greatest in the company's history.

Developments at the mines have been very satisfactory. The *Bluff* deposit is being developed below the 2,700-foot level and the diamond-drilling on the 2,800-foot level of the *Victoria* mine has proven ore-bodies warranting the sinking of the main *Victoria* shaft for regular operation of this level.

The main underground haulage of mine ore has been improved by the purchase of a full quota of 20-ton gable-bottom cars from the Vancouver Engineering Works, which will eliminate the necessity of dumping the cars through a rotary tippie. In the concentrator the addition of another flotation-machine and a bowl Dorr classifier for reconditioning rougher concentrates before regrinding are about the only important changes.

The company's field staff has been active throughout the Province, and two properties, the *Kootenay King* in Fort Steele Division and the *Toric* in the Alice Arm section, are now under development by diamond-drilling, about twenty men being employed at each property. Sufficient information is not as yet available to form any impression as to the possibilities of these properties.

The Radiant Copper Company, Limited, was organized last winter to exploit three groups of claims on Ray creek, a tributary of the Stawamus river which empties into the head of Howe sound at Squamish.

A programme of Radiore prospecting was carefully carried out across a width of a couple of thousand feet. While no particularly strong mineralizations were indicated, yet there were sufficient reactions to establish a number of veins, several of which show a decided tendency to converge. Diamond-drilling has been recommended, to prove whether or not the weaker reactions indicate commercial bodies of disseminated ore. No late information is available as to present operations.

The *Goat Creek* claims, situated on a tributary of Mamquam river and owned by McVicar, Manson & Tocher, were surveyed by the Radiore system and diamond-drilled last year by the Britannia Company, but disclosed nothing suitable for that company's requirements. The owners are confident that the work done was by no means conclusive as to the merits of the property. It will be examined later.

On the *Blue Jack* group of eight claims, about a mile from Brandywine falls on the west side of the Pacific Great Eastern Railway, there is a width of about 24 feet of mineralization containing lenses of lead and zinc ore carrying gold and silver values in a pyritized greenstone-schist. The surface indications justify deeper exploration.

Some promising-looking samples of lead-zinc ore carrying fair gold and silver values have been brought in from the *Venus* group on the North fork of the Cheakamus river, about 4½ miles from the Pacific Great Eastern Railway, by the owner, Dan McKinnon. This will be examined later.

The Pacific Copper Mines, Limited, whose holdings are situated above Clowhom lakes up from the head of Salmon arm, Seechelt inlet, has not been able to do any actual development so far this season on account of abnormal snow conditions. However, a camp has been constructed at the beach and 7 miles of trail built toward getting up to the showings at about 5,000 feet elevation. It is the company's intention to have a Radiore survey of the ground as soon as clear of snow, the results of which will determine future operations.

The Mount Diadem Mines, Limited, has completed the trail from the beach to its camp at about 2,500 feet elevation. Some further work has been done on the galena-showing mentioned in the 1928 Annual Report, consisting, I am informed by the directors, of an open-cut about 15 feet below the ore-croppings. There is said to be a vein about 3 feet wide in the bottom of the cut carrying commercial values in silver. This will be examined later.

Nothing has been done on the Britain River Company's property, above and beyond the Mount Diadem Mines property, so far this season.

The Central Copper and Gold Company, Limited (*see* 1928 Annual Report), has had its property at Vananda, Texada island, under continuous development all year. Further surveying by the Radiore process was done early in the year and some twenty diamond-drill holes run, testing the Radiore indications of ore. The results of this work have proven very encouraging. More recent work consists of surface-stripping, which has exposed a very promising ore-body. Altogether the exploratory work on this property over a period of two years shows every probability of its again becoming a profitable mining operation of considerable magnitude.

The *Nancy Bell* group, situated about a mile from Vananda, on Texada island, was prospected by the Radiore process earlier in the season, and I understand that indications of ore-bodies were sufficiently positive to warrant their exploration.

The *Stromberg* group, on the south-west side of Texada island and on which extensive stripping was done last year by the Pacific Tidewater Mines, disclosing a large area of bornite-bearing porphyrite, has been recently bonded by a substantial Vancouver syndicate. The surface showings indicate a wide zone of movement in the porphyrite mass. Within this shear-zone are small veinlets and bunches of bornite which may constitute an immense tonnage of low-grade commercial ore, ideally situated for mining and transportation. I am authentically informed that the syndicate is laying out an extensive diamond-drilling programme to be started right away.

The Romana Copper Mines, Limited, property on Goat island, in Powell lake, has been under development since the first of the year. A tunnel is being driven to gain depth under some interesting copper-showings exposed by stripping and open-cutting on the surface. The tunnel has been driven 124 feet, gaining about 100 feet depth. The last 40 feet shows chalcopyrite along the left side of the tunnel and two short crosscuts into it are in good-grade chalcopyrite.

The face of the main tunnel is now all in ore. The management states that the underground ore exposed will average about \$15 a ton in copper values. Work to date has therefore proven decidedly encouraging.

The Thurlow Gold Mines, Limited, property has been under development this year, but I have no information as to results obtained or present operations.

The *Douglas Pine* claim, on Thurlow island, just up from Shore bay, has been bonded by a Vancouver syndicate and adjoining claims staked. A small compressor plant will be installed right away and development of the property started as soon as possible.

The Nimrod Mining Company, with holdings north of the entrance to Frederick arm, has been doing some surface prospecting by way of stripping and open-cutting to trace the vein. More extensive development-work will be undertaken when information is more complete.

The Colossus Copper Company, Limited, has been doing some preliminary work on its property on Ostero basin, at the head of Frederick arm. The old trail has been repaired, the lower tunnels cleaned out, and other underground workings put in shape to facilitate a thorough examination and sampling of the property.

The work on the property of the Alexandria Mining Company, on the west side of the entrance to Phillips arm, has been confined mainly to the sinking of the shaft in the lower level. This is now down 80 feet. Some lateral work has shown the vein to be about 12 feet wide of \$8 to \$10 ore. The ideal location of this property on tide-water will make a comparatively low-grade ore profitable.

The Cambria Copper Company, Limited, has this year done an appreciable amount of work on its property on the north side of Knight inlet, about opposite Glendale cove. The formation here is a belt of altered rocks enclosed in the Coast Range granodiorite. The greater part of the development consists of a tunnel 370 feet long driven in a limestone-belt. Two or three small showings of chalcopryrite were encountered in this work, but a little work proved them small, unimportant lenses. A lower tunnel 40 feet long shows some garnetite in which are small patches of chalcopryrite. Altogether for the amount of work done, both surface prospecting and underground, the results have not been at all encouraging. The property might be sufficiently attractive for one of the large operating companies to undertake geophysical prospecting and diamond-drilling.

COAL-MINING.

SUMMARY REPORT FOR SIX MONTHS ENDED JUNE 30TH, 1929.

BY JAMES DICKSON, CHIEF INSPECTOR.

The gross production of coal for the first six months of 1929 was 1,172,645 long tons, as compared with 1,285,278 long tons for the similar period in 1928.

The two larger coal-producing areas—namely, Vancouver Island and the East Kootenay Districts—show a decreased output as compared with last year, while the Nicola-Princeton District shows a slight increase.

On Vancouver island the Extension mines of the Canadian Collieries (Dunsmuir), Limited, have been closed for several months, but are now being prepared for operation.

The following table shows the production of the different mines and districts for six months ended June 30th, 1929, with comparative figures for the same period in 1928:—

PRODUCTION FOR SIX MONTHS ENDED JUNE 30TH, 1929, COMPARED WITH SAME PERIOD FOR 1928.

VANCOUVER ISLAND DISTRICT.

	1929. Tons.	1928. Tons.
Canadian Collieries (D.), Ltd.—		
Comox Colliery	140,581	127,972
Extension Colliery	51,433	80,149
South Wellington, No. 5 mine	34,287	31,480
Wellington-Extension, No. 8 mine .....	.....	9,642
Wellington-Extension, No. 9 mine	4,327	9,197
Totals	230,628	258,440
Western Fuel Corporation, Ltd.—		
No. 1 mine	167,799	157,630
Reserve mine	80,300	78,374
Wakesiah mine	33,657	36,117
Totals	281,756	272,121
Other collieries—		
Granby Consolidated M.S. & P. Co.	88,121	95,897
East Wellington Coal Co., Ltd. ....	.....	3,757
Diamond Jubilee mine .....	.....	194
Fiddick mine	1,246	663
Little Ash mine	3,251	6,146
Round Island mine .....	.....	.....
Richardson mine	133	.....
Lantzville Collieries, Ltd.	587	.....
Totals	93,338	100,608
Total for Vancouver Island District	605,722	631,169

NICOLA-PRINCETON DISTRICT.

Coalmont Collieries, Ltd.	79,263	78,552
Middlesboro Collieries, Ltd.	21,676	23,146
Tulameen Valley Coal Co., Ltd.	13,607	7,027
Lynden Coal Co., Ltd.	3,191	6,950
Normandale Collieries, Ltd.	171	.....
Total for Nicola-Princeton District	117,908	115,675
<i>Carried forward</i>	723,630	746,844

PRODUCTION FOR SIX MONTHS ENDED JUNE 30TH, 1929—*Continued.*

	1929. Tons.	1928. Tons.
<i>Brought forward</i>	723,630	746,844
NORTHERN DISTRICT.		
Telkwa Collieries, Ltd.	487	723
EAST KOOTENAY DISTRICT.		
Coal Creek Colliery	184,901	228,213
Michel Colliery	185,146	201,720
Total for Crow's Nest Pass Coal Co.	370,047	429,933
Corbin Colliery	78,481	107,778
Total for East Kootenay District	448,528	537,711
Total for Province	1,172,645	1,285,278
SUMMARY OF PRODUCTION.		
Vancouver Island District	605,722	631,169
Nicola-Princeton District	117,908	115,675
Northern District	487	723
East Kootenay District	448,528	537,711
Total for Province	1,172,645	1,285,278

A large part of the decrease in production is due to a decrease in exported coal; in the first six months of 1928 this amounted to 201,000 long tons, while during the first six months of 1929 the total exported was 155,000 long tons.

The above figures, which are supplied by courtesy of the operating companies, are approximately correct, but subject to a slight revision.

VICTORIA, B.C.:

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1929.