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MINING RECORD

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E. JACOBS.....Managing Editor

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NOTES AND COMMENTS.

The Armstrong and Treasure Box group, owned by the Transvaal-Zambezi Co., of London, England, has been leased by Mrs. Martha Collins, who has had mining experience in Yukon.

Under date October 18 market prices for Boundary copper stocks were quoted in New York as follows: British Columbia Copper Co. (par value, \$5) closed at \$8⁷/₈; Granby Consolidated (par value \$10) at \$8³/₄.

This month a shipment of a ton and a half of silver bullion, from the Canadian Smelting Works, Trail, was made to the Orient from Vancouver. The silver is for minting purposes at Canton and Tientsin.

Recent developments at the Hunter V. mine, which is under lease to the Hall Mining & Smelting Co., Nelson, are regarded as satisfactory, the ore being mined proving of a grade that leaves a margin of profit to the lessees.

The concentrating plant at the La Plata Mining Co's Molly Gibson mine, near Nelson, will shortly be completed and in operation. Development work at several levels in the mine has proved the occurrence of high grade silver-lead ore in considerable quantity.

The strike declared September 5 by the United Mine Workers of America against the Canadian-American Coal & Coke Co., at Frank, Alberta, has been settled by a compromise agreement in regard to the check-off system which was the main cause of the trouble.

The Department of Mines has announced that there will be held at Victoria, on December 4, and following days, examinations for efficiency in the practice of assaying. Particulars may be obtained from Mr. Herbert Carmichael, secretary to the Board of Examiners, Victoria.

Members of the American Institute of Mining Engineers have presented to President Shaughnessy of the Canadian Pacific, a solid gold fob, richly enamelled, as a mark of appreciation of courtesies received when they travelled over the Canadian Pacific lines, on their trip through the west, last summer.

Mr. J. A. Whittier, manager of the Goodenough Mines, Ltd., who shipped the first car of ore hauled over the Kaslo & Slocan railway, is still in the pioneer class. Recently he shipped the first car of zinc to reach the Canadian Metal Co's zinc smelter, at Frank, Alberta. The zinc was from one of the Goodenough company's properties, that known as the Grey Copper.

The Highlander mine, at Ainsworth, owned by the Highlander Mill & Mining Co., H. M. Stevenson, manager, has come to the rescue of the Hall Mining & Smelting Co's smelter at Nelson, by shipping enough silver-lead ore to keep those works going for the present, and so obviated what would otherwise have been the necessity for closing down. The Highlander will probably maintain shipments of ore of good grade at the rate of about 20 tons a day.

The Le Roi Mining Co's smelter at Northport, Washington, has been closed down, consequent upon the directors having arranged to ship Le Roi ore to the Canadian Smelting Works, Trail, B.C., for treatment there. Mr. Albert I. Goodell, with whom on June 30 last a fresh twelve months' engagement was entered into, with the authority of the directors, to continue the management of the smelter, is stated to have written the London office of the company "I can see nothing but folly in abandoning this plant."

It is of interest to note that the main shaft of the Tyee mine, at Mount Sicker, Vancouver Island, which at the close of the Tyee Copper Co's fiscal year, on April 30, 1905, was 760 ft. in depth, had by the close of last month reached a depth of 905 ft., and is now being deepened to 1,000 ft. Perhaps those who have been publishing statements suggesting that there had been no development work done below the 200-ft. level of this mine will now have the common fairness to publish the foregoing statement of actual fact.

The mineral exhibit made by the Trout lake district at exhibitions held recently at Nelson, B.C., and Spokane, Washington, secured leading awards. At Nelson, the Widdowson gold medal for the best mineral specimen was awarded to a gold nugget from the Lucky Jack, at Poplar creek; the silver medal for the best all round exhibit of minerals fell to the Trout lake collection. At Spokane this collection won the silver cup—the only trophy offered, while a special award was made for the Poplar creek specimen.

The Lucky Jim mine, situated near the boundary line between the Ainsworth and Slocan mining divisions, and which has been, since late in 1904, producing ore carrying a high percentage of zinc, has paid its owners, Messrs. Geo. W. Hughes and John Wolverton, about \$80,000 during the year 1905, Mr. Hughes, who holds a seven-eighths interest in this mine, has shown much enterprise in mining in the district, and the Lucky Jim is rewarding him well for the persistent development work he has done on several properties.

Shipment of ore in quantity from the King Solomon mine, Koksilah, has been commenced. Arrangements have been made for hauling 1,000 tons by wagon to the Cowichan station, on the Esquimalt & Nanaimo railway, for shipment thence to the Britannia Smelting Co's smelter at Crofton. There are at the mine large showings of ore, near the surface, estimated to run from 5 to 20 per cent copper, with small gold and silver values as well. Trial shipments of about 56 tons gave returns that left a good margin of profit above mining and smelting costs.

The structural survey of Rossland camp by members of the Geological Survey Department of Canada that has been in progress for several months, is stated to be well advanced. Mr. R. W. Brock, who was engaged in it, has returned to Ottawa. District newspapers have published comments from which it is gathered that it is understood the geological structure of the camp has been found to be of extraordinary complexity. It is intimated, too, that the geologists employed in the work consider the conditions favourable to the formation of ore bodies and to indicate their permanence at depth.

In its issue of 14th inst. the *Sandon Mining Standard* says editorially: "The *Rossland Miner* and the B. C. MINING RECORD are at it hammer and tongs. Each accuses the other of lack of independence. The past record of the Victoria monthly (the B. C. MINING RECORD) speaks for itself. Although the *Mining Standard* cannot agree with some of its utterances, still there is one thing certain—the MINING RECORD is sincere and independent. As for the *Rossland Miner* the opposite must be said. Its editorial utterances are sold for cash, to interests who must have some one to tell the public what benefactors they are for its welfare."

The first cargo of matte produced in Alaska was shipped to the Tacoma smelter a few weeks ago, by Mr. J. Cuthbert Welch, manager of the Alaska Copper Co's smelter, at Coppermount, Prince of Wales Island, south-east Alaska. The shipment consisted of about 170 tons. More development work, preparatory to ore production on a commercial basis, has been done this year in the Ketchikan district (which includes Prince of Wales Island) than ever before. As the district gives promise of proving productive to a considerable extent, the beginning made as above-mentioned is worthy of record and may later by regarded as an interesting historical fact.

On his return from a business trip to northern mines in the interests of the Tyee Copper Co., Mr. W. M. Brewer, the well known mining engineer, confirmed reports from other sources relative to increased activity on Prince of Wales Island. Among other properties he mentioned were those of the Copper-Gold Mining Co., at Niblack entrance, and the Omar Mining Co., owning the Khayyan group. The former is shipping 7,000 tons of ore to the Tacoma smelter, Puget sound, and the latter is expected to ship

ere long to the Tyee Co's smelter from 3,000 to 7,000 tons of ore per month. The Omar Co. is reported to intend to expend about \$70,000 in development work.

From an October weekly review of the mining market by the London *Mining Journal* the following has been taken: "Ymir's are better at 5-16. An encouraging report on the property has been made by Mr. Gilman Brown, of San Francisco, who says the discovery in the No. 5 west appears to be the cap of a valuable shoot increasing in length underfoot, and that a new vein parallel to the original Ymir vein appears to be important. There is no further development in Le Roi though the price is better, but Le Roi No. 2 have been strong on latest information. The new ore body is estimated to be 500 ft. long, and worth \$47 over 2 ft. wide. The values, we are told, are mostly gold, with very little copper."

Announcement has been made that negotiations, in progress for several months between the Consolidated Cariboo Hydraulic Mining Co. and New York capitalists, for the acquirement by the latter of the company's big hydraulic mine at Bullion, have been brought to a successful issue. It is stated that sufficient capital will now be available for bringing in more water, to the extent of about 5,000 miners' inches. The company's existing water system has a capacity for delivering at the mine 5,000 miners' inches, under a 430-ft. head, but the supply is inadequate. More than \$1,000,000 worth of gold has been recovered from the gravels of this mine since Mr. J. B. Hojson, the company's manager, took charge of the property.

In its New York special correspondence the *Engineering and Mining Journal* observes: "Interest in British Columbia just now centres chiefly in the new extensions which the Canadian Pacific and the Great Northern are building. These lines will make possible the exploitation of many mines which cannot now be worked profitably on account of the high cost of fuel and supplies, and the difficulty of shipping ores. This is notably the case in Lardeau, the Slocan and the Similkameen country." Referring to Yukon it says: "In the Yukon, the miners hope for large results from the proposed plans of the government for the regulation and improvement of water supply. This supply is a vital point in the Klondike, where new development has rather halted this season."

A serious fire, reported to have been of incendiary origin, occurred at the St. Eugene mine, Moyie, East Kootenay, on 6th inst. The building and machinery over the main shaft were destroyed, the direct loss being estimated at about \$30,000. As the mine must be kept closed down until new plant shall have been installed, the indirect loss to the miners and business men of Moyie will be considerable. The shaft did not cave in, although the timbers were burned for about half way down. During the fiscal year ended June 30 last the St. Eugene produced ore from which about 19,217 tons of metallic lead were smelted. This

mine is the chief source of lead ore supply for the lead smelters at Nelson and Trail, so the suspension of production at it may compel a curtailment of operations at those works.

The Canadian Metal Co., which is being financed by French capitalists, has secured control of the Pilot Bay smelter, on Kootenay lake, and will operate it in connection with the zinc smelter it has built at Frank, south-west Alberta. Erection of the Pilot Bay smelter was begun in 1891, but construction work was suspended for two years and it was not until the latter part of 1894 that the works were completed. Difficulties were experienced in 1896 in obtaining dry ores for fluxing the silver-lead ores treated; also in getting good coke and coal. Then the average grade of ore produced at the mine from which the main supply was drawn was low. Eventually, early in 1896, the smelter was closed down, and with the exception of the concentrator having been used in 1896, it has been inoperative ever since. The extensive work of putting it in running order is in progress and it is expected that it will shortly be in operation again.

The manager of the Western Fuel Co., upon the recent settlement of the coal miners' strike at Nanaimo, Vancouver Island, addressed the following letter to the Hon. the Minister of Labour, Ottawa: "We wish in this manner to record our appreciation of the efficient services performed by the Deputy Minister of Labour, Mr. W. L. Mackenzie King, in settling the industrial unpleasantness, which disturbed this community during the past four months. It is within bounds to say that but for the energetic and impartial manner in which Mr. Mackenzie King handled the trouble, within all probability it would have continued some months longer. The result is another triumph for the Labour Department and another evidence of the wisdom of the *Conciliation Act*. The company's workmen and community should long remember and appreciate the timely work of your department."

The managing director of the British America Dredging Co., which has been operating on both Spruce and Gold Run, Atlin, has stated that the company has had a successful season. During the summer nine miles of transmission line were constructed, from the central hydro-electric power plant on Pine creek to Spruce creek where, at Blue canyon, the company built a large dredge with a capacity of 3,500 cu. yd. of gravel per diem. This dredge is so built that it has a digging range, up and down, of about 40 ft. It was started on September 10, and was run during the short period intervening between then and the close down for the season. The dredge of the Bucyrus type the company previously put in on Gold Run was stated to have done good work until, late in the season, the breakage of the main driving shaft necessitated a stoppage, and the dredge was then put into winter quarters to await completion of repairs and a return of conditions favourable to work.

An example of a big blast as an aid in hydraulic operations comes from California. The *Engineering and Mining Journal* states that in the famous old Spring Valley hydraulic mine at Cherokee, in Butte county, eleven tons of dynamite were exploded recently. For some time the miners were engaged in driving tunnels into the face of the mine and charges of dynamite were placed with a view of shattering the clay and gravel, so that it would be washable. The face of the bank was some 400 ft. in height and upward of 120 ft. was pipe-clay. A tunnel had been run under this body of pipe-clay and the principal charges were placed there. The managers of the mine report that the big blast was a complete success in every particular, the object being accomplished far better than they expected. The large pipe-clay bank, which for a number of years had been a menace to the lives of the miners, has been entirely removed and so reduced that it can be easily washed.

The recent cost of smelting ores at the Northport smelter has been made public. On the authority of the late general manager of the Le Roi Mining Co. it is stated to have been \$3.37 per ton in September. For the purpose of comparison it is of interest to note that for the fiscal year ended June 30, 1904, the Le Roi company's published statement of costs showed "Smelter expense, \$3.922" and "Depreciation of smelter plant \$0.183." The War Eagle company's balance sheet for the year 1904 showed the cost of smelting at Trail as follows: "Direct smelting charge, including freight from the mine, \$4.46 per ton." The Centre Star company's cost statement for the fiscal year ended September 30, 1904, showed the direct smelting charge at Trail, including freight, to have been \$4.09 per ton. If a freight charge of 30 cents per ton be allowed, it will be seen that at Northport Mr. Goodell has made for the Le Roi a considerable reduction in cost as compared with costs in 1904 of the two other mining companies named above.

The metallurgy of zinc, observes the *Engineering and Mining Journal*, is frequently spoken of as a backward art, the smelting process still being expensive as compared with that of lead and copper ores, while the proportionate extraction of metal is greatly inferior. This idea rests, however, on false standards of comparison. The zinc smelter, as a rule, deals with ore which has already been concentrated to a high degree, so that his practice is comparable to that of the smelter of galena concentrate, or of black tin ore, rather than to that of the silver-lead or copper smelter, who has to treat a very large quantity of ore for a comparatively small production of metal. In other words, while the copper smelter makes commonly a concentration of 20:1 and even 50:1, the zinc smelter makes a concentration of only 2:1 or 3:1. In handling the less quantity of raw material it is generally permissible to utilise wheelbarrow and shovel to a greater extent; but if the cost of the process be referred to the basis of the crude ore raised from the mine, the smelting expenses may not appear unduly heavy.

When, in last month's issue of the *MINING RECORD*, we challenged the statement, made in a provincial newspaper relative to the payment last December of a dividend by the Tye Copper Co., that "it was paid out of capital, not a dollar of it was earned," we had not before us any particulars of the year's accounts. This month we print, on another page, a summary of the company's receipts and expenditures during the financial year ended April 30, 1905, from which it will be seen that the *credit balance* of the year's operations was £71,610. Two dividends, totalling £27,000, were paid during the year and liberal deductions were made from amounts standing at debit of development, properties, and plant, yet the year closed with a surplus of £28,307 (including £14,350 from the year immediately preceding), which amount was carried forward to the present year. Whether the attempted discrediting of the Tye Copper Co. which we last month characterised as a gross misrepresentation, was the result of ignorance or a reckless disregard of facts, it was equally culpable to a degree and deserving of unqualified condemnation.

So far as we are aware no notice of a general meeting of the shareholders of the Le Roi Mining Co. has yet been given. Lengthy circulars have been issued by the company on one side and the late general manager and managing director, Mr. A. J. McMillan, on the other. We shall not at this time further discuss the matters at issue between the directors and the late general manager, having last month very plainly expressed our opinion. We call attention, though, to one significant fact. The directors now state that their present general manager writes: "There is not the slightest doubt that the amalgamation with other mines will be a good business move for your company if you receive your just proportion of the new consolidated company." (The italics are ours.) This proportion, they announce, it will be left to Messrs. Bradley and Mackenzie to arrange. The question suggests itself—if Mr. McMillan had to be dismissed because he did not agree to a proportion proposed by Mr. R. W. Brock, will it follow that Mr. Mackenzie shall be similarly treated if he shall also question the fairness of Mr. Brock's proposed apportionment?

A recent development of Le Roi difficulties is that the late general manager and managing director, Mr. Anthony J. McMillan, has brought suit in the State of Washington to restrain the directors of the Le Roi Mining Co. from dismantling the Northport smelter. A temporary restraining order has been issued in the Superior Court at Colville, Washington. The specific ground of action is the allegation that notwithstanding the board of trustees and directors of the Le Roi Mining Co. are without legal authority to enter into any scheme of amalgamation, they have fraudulently and in disregard of the best interests of the shareholders connived with the officers of the War Eagle and Centre Star mines, the Trail smelter and other mines and coal lands to abandon the Northport smelter, and are treating the amalgamation scheme as perfected. In pursuance of this alleged conspiracy,

instructions have been issued to A. I. Goodell, superintendent of the smelter, to commence removing the machinery and dismantling the plant, notably to ship one of the large blowers to the Trail smelter. John H. Mackenzie, acting general manager of the Le Roi Mining Co., and A. I. Goodell, smelter manager, are joined as defendants.

"The principle laid down by the Department of Lands and Mines, that prospectors must be able to point out valuable minerals 'in place' before being permitted to record their claims, is a sound one," observes the *Toronto Globe*. "There has been too much locking up of land by prospectors on mere speculation. We are entering into a large new region, and in its exploitation the public interest in its natural resources must be kept constantly in view." This theory is sound enough, but if Ontario shall succeed in carrying it out in actual practice it will be more diligent in its endeavours to conserve the "public interest" in this direction than has been, or is, British Columbia, for in this province the government seldom, if ever, attempts to ascertain whether the statements made in the affidavits of those recording mineral locations are true or false. Similarly, affidavits concerning the performance of assessment work are usually accepted without question, notwithstanding that the practice of false swearing in this connection is, in most mining camps in the province, known to be common. As a rule the recording fees are accepted without question, for it is revenue that is required—the public may look after its own interests. In this respect, though, the present government is neither better nor worse than were its predecessors.

The customary extravagant statements about the season's yield of gold in Atlin, Yukon and Alaskan gold fields have, during several recent weeks, been published with the object of conveying the impression that much better general results have been, and are being achieved this season than last. The crop of misstatements on this subject is an annual one, yet there always seem to be people ready to be gulled by these airy flights of imagination which make pleasant enough reading for those who are credulous, or ignorant, or both. What specially favourable conditions have been experienced this season to nearly double Atlin's total recovery in 1904 are not stated. Official figures show that Atlin Lake division produced \$530,000 last year; the public has lately been informed that its yield will reach \$1,000,000 this year, but when the actual recovery shall be ascertained it will most likely be found to show little, if any, increase over last year's total. As to the Yukon, there is good reason to look for a much lower total production in that country than last year's estimated yield of \$10,337,000. From information we believe to be dependable we think the decrease will be more than \$2,000,000 in the Yukon, where lack of water has made the season a short and generally disappointing one. Similarly, in Alaska conditions have not been favourable, so we

are informed. Summing up the position, as stated to us by competent observers lately returned from the north, we think it probable the total yield of gold from Atlin, Yukon and Alaska, for 1905 will be considerably less than published estimates have indicated.

Some months ago we called attention to the fact that British Columbian mining news the *San Francisco Mining and Scientific Press* was publishing was not appearing under the head "Canada." With prompt courtesy the correction we suggested was made and thereafter the sub-head "British Columbia" was placed under its proper heading. In the hope that the *Daily Mining Record*, of Denver, Colorado, will similarly make it plain in its General Mining News columns that certain places it mentions are in Canada, and not continue to place them under the incorrect and misleading "Alaska-Northwest Territory" head, we respectfully request its attention to its shortcomings in the same direction. In its issue of September 9, for instance, there are three sub-heads under the Alaska-Northwest Territory heading, viz., "Phoenix, B.C.," "Dawson," and "Vancouver, B.C." Not one of these three places is in either Alaska or the Northwest Territory, not, at least, as we in western Canada understand the position. The *Daily Mining Record*, though, is usually too mixed in its British Columbian geography, to admit of a hope being entertained of any approach to accuracy in this respect. A newspaper which purports to receive "special" despatches from Phoenix concerning Sloean and East Kootenay silver-lead mines, from Vancouver concerning Phoenix mines, and from Ladysmith relative to mines situated anywhere and everywhere but on Vancouver Island, is so hopelessly at sea as to make it altogether unlikely it will attain to even approximate correctness. Yet it is not too much to ask that it substitute the heading "Canada" for "Alaska" when publishing news from British Columbia and Yukon Territory, and we trust this change will be promptly made, so that the Dominion may receive its due in this connection.

Last June the *MINING RECORD* had the pleasure of publishing the unsolicited favourable testimony of Dr. H. S. Poole, F.R.S.C., of Halifax, Nova Scotia, (who was at that time in British Columbia for the purpose of obtaining for the Geological Survey Department of Canada information relative to the coal fields of Vancouver Island), concerning the comparatively early date of publication of the Annual Report of the Minister of Mines for British Columbia, and to express the opinion that no report of similar nature and scope is published earlier in Canada, the United States, or Australia. Additional and voluntary testimony in the same direction has just been received from Mr. Horace J. Stevens, of Houghton, Michigan, U.S.A., whose annual work *The Copper Handbook*, is recognised as one of the most valuable and exhaustive publications on its subject extant. Mr. Stevens' letter follows:

"The Editor BRITISH COLUMBIA MINING RECORD,
"Victoria, B.C.

"Dear Sir:

"I have been so busy for some time past that I have run slightly behind with my reading, and have only just now come to your June issue. I notice therein your good editorial defending the British Columbia Bureau of Mines, against the charge of dilatory issue of its reports. It seems to me most remarkable that any one could be so badly warped as to make this complaint. In my work on the *Copper Handbook* I have to keep in touch with the mining bureaus of the entire globe, and I wish to go on record as stating that for some years past, without exception, the annual report of the British Columbia Bureau of Mines, has been the first to reach me from any official bureau, division or department, dealing with mining matters. I consider that Mr. W. F. Robertson, provincial mineralogist, is entitled to great credit for the remarkable promptness with which his reports are issued, as well as for the vast amount of territory covered in a fairly complete manner by a very small force.

"The people who are complaining about Mr. Robertson's work are either badly prejudiced or else utterly unfitted to judge work of this nature.

"Very truly,

(Signed) "HORACE J. STEVENS."

DEPARTMENT OF MINES.

THE demand for a Department of Mines and Mining in the Presidential cabinet is not a passing whim or a scheme of mining men to further the interests of that industry. It is being taken up by United States senators and governors and prominent men in all branches of business because they recognize the importance of the industry in contributing to our national growth and wealth and the desirability of controlling it in the right direction and safeguarding it from the swindlers to whom it has been a peculiarly tempting mark.

A Department of Mines and Mining which would give as systematic and thorough attention to the mining industry as is now given farming by the Department of Agriculture would raise mining to the prominence it deserves and result in developing our mineral resources as nothing else could do. As it is mining is largely a matter of speculation so far as its legal status is concerned. In many states the statutory regulations are almost wholly devoted to the punishment of criminal acts committed through cupidity and because of the peculiar opportunities often presented in the search for mineral wealth. Few people, and especially those east of the Mississippi river, realize the meaning of development of the mineral resources of the west and the tremendous increase to our national wealth they have given and are giving. Colorado alone is credited with having produced more than three-quarters of a billion dollars, mostly in gold and silver. All this was in solid value, dug from the ground, wrung from nature's own storehouse, not the result of watering stocks or profits on sales, but a *bona fide* addition to the world's stock of values.

There is really no very sound or reasonable argument against the establishment of the department. Perhaps the one that would be strongest with most is that the addition of new departments tends to make the cabinet unwieldy—*Pan American Banker*, N. Y.

THE AMERICAN MINING CONGRESS AND ITS LESSONS.

SEEMINGLY the technical mining press of the United States, as a whole, has not yet extended a warm welcome to the *American Mining Congress*, nor have professional mining men as a body exhibited any enthusiastic interest in its proceedings. Yet it appears that it has come to stay, and it may be expected that if its next annual meeting, convened to be held at El Paso, Texas, on November 14, shall be numerous and influentially attended, its strength thereafter will be sufficient to in large measure overcome the evident "stand off" disposition heretofore manifested towards the organisation in the quarters mentioned.

Colorado, among the mining states, is likely to give the movement hearty support, and the *Denver Daily Mining Record* has noted that "it is an interesting coincidence that the establishment of the permanent headquarters of the congress in Denver has been accompanied by the seating of an experienced mining man in the governor's chair. Governor McDonald should prove a strong moral influence in starting the membership ball a-rolling."

Further comment is as under:—"The board of directors of the American Mining Congress has named a strong list of committees, and it is fair to say that worthy practical results will grow out of their endeavours. Ordinarily a committee on membership might not be expected to pose as important, but in this case the building up of a large and representative membership is one of the chief duties before the congress. The reason for this is that the directors have instructed the legislative committee to prepare a bill for introduction at the next session of the national legislature to create a department of mines and mining, and such a bill naturally calls for influential backing. The greater and more representative the membership of the mining congress, the more effective its efforts in securing government recognition for the industry."

It may be that the results that shall be achieved at and after the next annual meeting of the congress will prove an object lesson for British Columbia, where, despite its oft-repeated claim to be the "Mineral Province" of Canada, there is in the local legislature general ignorance of, and indifference towards, the growing importance of the mining industry, with a passive policy on the part of the government, by whom it seems to be regarded in the light of an industry that must under any and all circumstances contribute freely to the revenue of the province and so may safely be denied even a reasonable measure of fostering support. There appears to be but one remedy to this unfortunate condition of things, viz., a considerable increase of voting power, which, it is encouraging to observe, is steadily, if slowly, being gained in the newer mining sections of the province, if not in the older. It is not unlikely that two or three years hence, the value and importance to the province of mining will be generally recognised, and

the best means of furthering the interests of the industry be freely given attention and consideration now withheld.

RAILWAYS TO SIMILKAMEEN AND NICOLA.

THE president of the Great Northern Railway Co., when visiting Vancouver recently, announced that construction work on the western section of the Vancouver, Victoria & Eastern railway is to be commenced during the ensuing winter and be proceeded with expeditiously. The starting point will be Cloverdale, on the New Westminster & Southern railway, connecting New Westminster, B.C., with the Great Northern Co's line thence to Seattle, Washington. The work on the V. V. & E. railway will be divided into sections, working eastward through the Fraser valley and over the Hope mountains to meet the eastern section of the railway now in course of construction from the Boundary district into the Similkameen country. While there is now comparatively little importance placed on the completion of this railway by mine owners in south-west Kootenay and the Boundary, other railways affording them transportation facilities, the completion of the through line will materially assist in the opening up of mining camps in the Similkameen known to have surface showings indicating the occurrence of large mineral deposits, beside ensuring the further development, to a productive stage, of a number of mining properties upon which extensive prospecting work has already been done. Further, the coal measures of the northern Similkameen and Nicola country will be made accessible by the construction of the V. V. & E. railway and the Canadian Pacific Railway Co's branch line from its main line at Spence's Bridge southward to Nicola. The provision of railway transportation for the Similkameen and Nicola districts will contribute to a largely increased mineral production in British Columbia so soon as the numerous mining camps that will be benefited thereby shall have had time to carry out the requisite development work. At present there is only one productive mine throughout the large areas the new railway will tap, viz., the Nickel Plate, near Hedley, owned by the Yale Mining Co., Ltd., which mine has an abundance of gold-bearing ore running in large quantity \$10 to \$15 per ton, and which is being treated at the Daly Reduction Co's 40-stamp mill at Hedley. Other mines in which much work has been done are the Sunset, on which the B. C. Copper Co., of New York, has had some 30 men engaged in underground prospecting, with good results; a big group in Voigt's camp with an extensive surface showing stripped and some underground work done, and another group at Olalla, which Mr. W. C. McDougall has been prospecting for several years.

The United States Geological Survey's report on "Cement Production in the United States" shows that it increased from 335,500 barrels worth \$139,050 in 1890, to more than 22,000,000 barrels worth \$27,000,000 in 1903.

THE CANADIAN GEOLOGICAL SURVEY AND ITS WORK IN THE WEST.

FROM Dr. Robert Bell, acting director of the Geological Survey Department of Canada, who lately spent a few days in Victoria on his return from a brief visit to Dawson and other places in Yukon territory, some particulars were obtained by the MINING RECORD relative to the field work done this year in western Canada by a number of the officials of the Survey.

The following is a summary of the work of members of the department, commencing with that done in Alberta and proceeding westwards:

In Manitoba and the North-West Territories, chiefly in Saskatchewan and Alberta, Dr. Robert Chalmers, whose special line is superficial or surface geology, obtained much data relative to clays, sand, boulders, glacial phenomena, etc. He worked westwards to the neighbourhood of Canmore.

In Alberta Mr. Theophile Denis made exhaustive enquiries concerning coal mining and obtained statistics relating to the development and progress of the coal mining industry in that part of the Dominion. Lethbridge, Galt, Canmore, Anthracite, Bankhead, and other coal mining localities along the railways of the Canadian Pacific Railway Co., and up the Cascade river, were visited. The data obtained will be used as part of a bulletin in course of preparation having regard to coal in general throughout the Dominion. This will contain accounts of the occurrence of coal in various parts, descriptions of coal mines, etc. Much work has previously been done in the maritime provinces for the same purposes, it being the intention to make the bulletin comprehensive and full.

Mr. Frank Johnston, who has been a member of the Survey for a number of years but only latterly taking up field work, was engaged in the Edmonton district, where his work had particular reference to coal, petroleum, natural gas, etc.

Mr. D. D. Cairnes worked in country on the east side of the Rocky Mountains, from the main line of Canadian Pacific railway south to its Crow's Nest Pass line. He commenced at Morley, and working southward, obtained much information regarding the general geology, in preparation for a geological map of this part of the country.

Mr. D. B. Dowling continued the examinations he began in 1903 in the coal-fields of the Rocky mountains, working this year in British Columbia west of the summit of the range and south of the C. P. R. main line as far as he was able to go this year. He is one of the special coal geologists of the Survey, and in the course of his examinations of the Rocky mountain coal-fields has made important discoveries and worked out the geological structure of the region, thus doing work of the greatest importance in connection with the discovery, following up, and working of coal seams.

Mr. R. W. Brock was engaged in making a structural survey of a part of Rossland camp, in which he was assisted by Mr. W. H. Boyd and Mr. A. G.

Young. The Centre Star and War Eagle mines were closely examined, and considerable progress was made towards obtaining sufficient data for the preparation of the map to be issued in connection with this work.

Dr. H. S. Poole and Dr. R. W. Ellis, two specialists in coal geology, the former having had as well a long experience as a coal mine operator, were both employed in coast coal-fields, the former on Vancouver Island and the latter on Graham Island of the Queen Charlotte group. Dr. Poole found his work the more difficult since there was an unwillingness on the part of the companies owning the large operative coal mines of the island to freely place at his disposal much of the valuable data they had acquired in the course of years of working of their mines. However, he was able to gather a deal of information, which will probably be supplemented next season by the results of further work.

Dr. Ellis examined both the coast and interior of Graham island, but the absence of roads and trails and the limited nature of the prospecting done in the heavily timbered and hilly country of the island rendered much effective work almost impossible. Here, too, there was an unwillingness on the part of owners of coal lands to greatly facilitate the work of the geologist. Late in the season Dr. Ellis added to work he did last year in Nicola valley where he examined the coal measures and looked into the occurrences of copper in that region. Mr. Robert A. A. Johnston also gave attention to copper in that locality and his report on Aspen Grove camp appeared in the Summary Report of the Geological Survey for 1904.

Mr. R. G. McConnell was engaged in the early part of the season in the south-western part of Yukon territory, where he had the assistance of Mr. F. H. Maclaren. The region covered included Alsek river, Klhane and the St. Elias range. Mr. Maclaren made topographical surveys of roads and natural features of the country, while Mr. McConnell attended particularly to its geology. Late in the season Mr. McConnell visited Atlin and Windy Arm, where he examined the mineral occurrences—silver and gold—chiefly those on the Conrad groups of claims, concerning which the *MINING RECORD* this month publishes some information elsewhere. At Atlin Mr. McConnell looked into the matter of dredging for gold.

Farther north, Mr. Joseph Keele continued his investigations in the Stewart river country, working around its northern head waters. His labours included the examination of placer mining methods followed along tributary creeks.

Mr. Chas. Camsell, assisted by Mr. Frank Camsell, undertook and accomplished very arduous work in the exploration and survey of what is practically a continuation of Peel river, just west of the delta of Mackenzie river. He left Ottawa in March, reached Dawson in plenty of time to go north over the ice before the opening of navigation. He went up Stewart river, crossed over the divide between that river and Peel river waters by a route heretofore untraveled, and worked thence almost to the Arctic ocean. Returning, he went by the route from Fort McPherson, Rat river, Bell river and the Porcupine to Fort

Yukon at the junction of the Porcupine with the Yukon. Thence he proceeded up river by a St. Michaels-Dawson steamer to Dawson, and came south by the usual route.

Dr. Bell's visit to the Klondike district was one of inspection. While in the north at the request of Hon. Frank Oliver, minister of the interior, he enquired particularly into the occurrences of coal throughout Yukon territory. He brought back with him for analysis good samples of coal from all the principal occurrences that had been worked, and obtained as much information as was possible for him to get respecting others. After his return from Dawson he spent about a week at Vancouver and Victoria and then proceeded homewards, visiting the Boundary and parts of West and East Kootenay *en route*.

In addition to the general appropriation of \$60,000 for the work of the Geological Survey, Dr. Bell secured an additional vote of \$19,000 for work this year in British Columbia and Yukon, thus enabling him to give the west attention to an extent more in keeping with its importance from the standpoint of development of its enormous resources in economic minerals. A similar sum has been voted for next year's work, so that the west will benefit accordingly from the additional work the Survey will then do. It is gratifying to find the Dominion government thus responding to the representations of the director of the Survey in recognition of the needs of this province and Yukon.

The recent report of an important strike of ore having been made in the west drift at the 500-ft. level of the Ymir mine has been amply confirmed, according to the *Ymir Herald*. Where first met with the ore showed only a narrow streak, but it is stated to have since widened to 6 ft. of solid ore of shipping grade. In addition, the west drift at the 1,000-ft. level is described as looking promising. The net values recovered in September, when 1,580 tons were milled, amounted to \$7,767, or \$4.92 per ton, which was the best return obtained for several months. Latest information published concerning the mine is that the higher grade ore encountered last month at the 500-ft. level is believed to contain better average values than was at first regarded as probable. Good ore is also being taken from the east drifts on the 600- and 700-ft. levels. The ore is of a character suitable for milling, so is being reduced at the company's stamp mill and cyanide mill and not being shipped as crude ore to the smelter. A Californian mining engineer, Mr. Robert Gilman Brown, of San Francisco, has examined the mine and reported on the property, advising the best plan of development under the changed conditions brought about by recent discoveries of new ore bodies of value. Mr. Oliver Wethered, one of the directors of the Ymir Gold Mines, Ltd., lately arrived from London, England, to confer with the manager, Mr. E. M. Hand. It is understood that a plan for the economic working of the mine will shortly be determined upon and that extensive development will follow.

BRITANNIA SMELTING CO.'S SMELTING
WORKS AT CROFTON, VANCOUVER,
ISLAND, B. C.

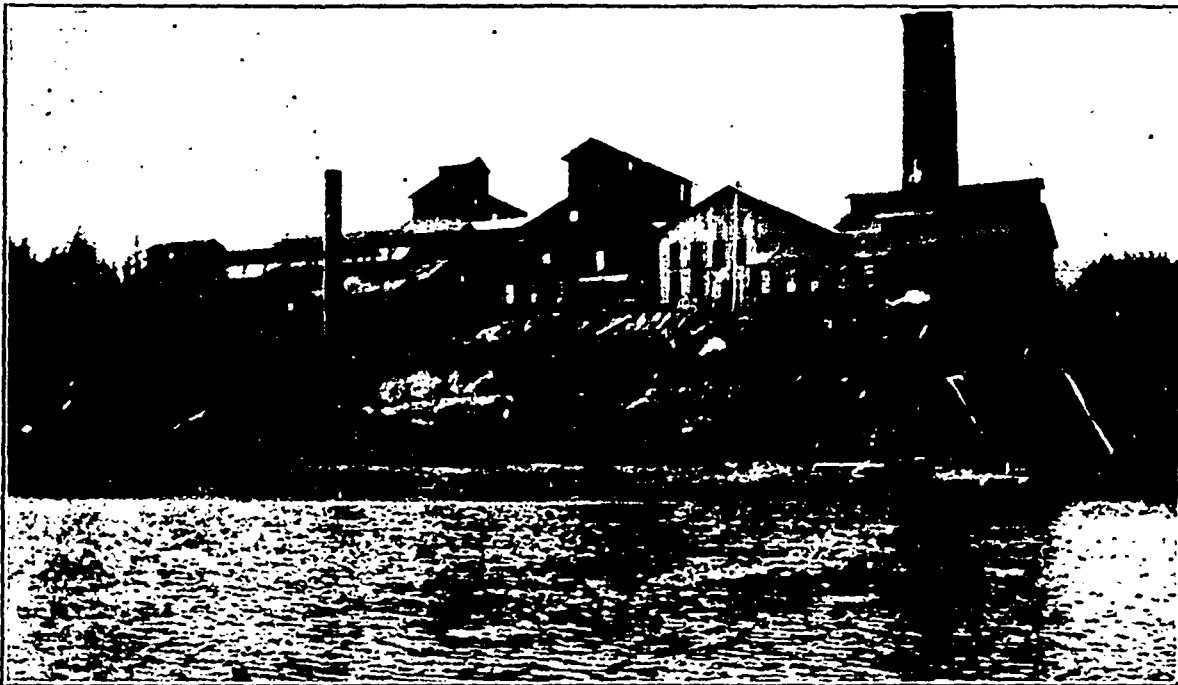
(By E. Jacobs.)

THE Britannia Smelting Co.'s smelting works are situated at Crofton, on the east coast of Vancouver Island, British Columbia, and are distant from the city of Victoria about 50 miles, whether by rail or water. They were erected in 1901-2 by the Northwestern Smelting & Refining Co., of which Mr. James Breen was president and general manager, and Mr. Herman C. Bellinger assistant manager and metallurgist in charge. Messrs. Breen and Bellinger had previously been actively engaged in smelting

out to a sufficient depth of water to admit of the discharge at the dock thus provided of ores from any part of the Pacific, northward as far as Alaska, and southward from even South American shipping points.

When the town of Crofton was platted, which was about the time the erection of the smelter was commenced, a smelter site, embracing an area of some 40 acres adjoining the town on the east and south, was reserved. On part of this site the works were erected. The accompanying plan, which includes additions made recently by the Britannia Smelting Co., will serve to convey a fair idea of the area they cover.

In accordance with the original plan of making the Lenora and other Mount Sicker mines the main source of the ore supply, the railway trackage facili-

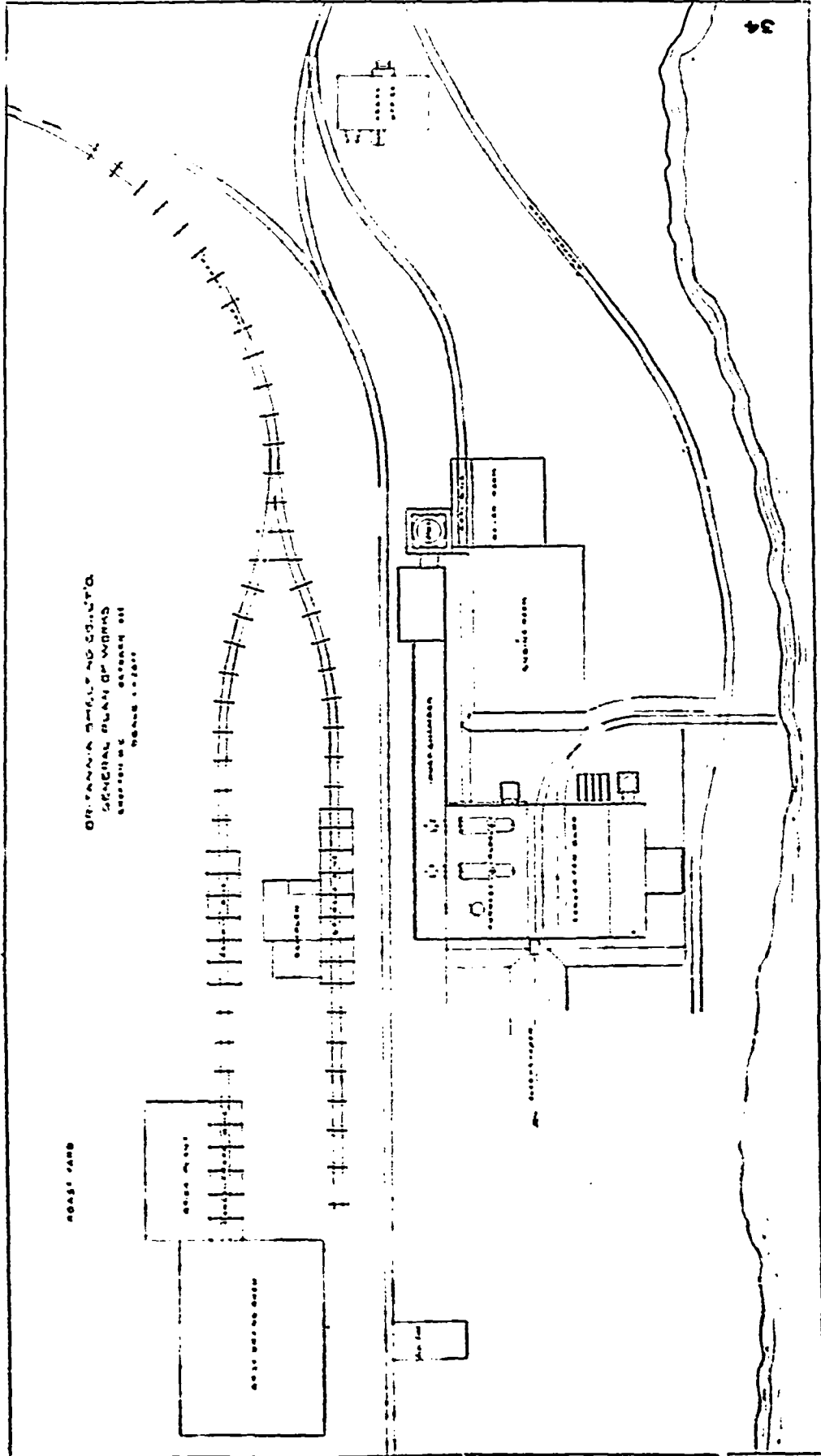


Britannia Smelting Co's Smelter.—View of Works from Osborne Bay.

British Columbia ores, having erected and operated smelters at Trail, B.C., and Northport, Washington, U.S.A., respectively, the former in 1895-6 for the British Columbia Smelting & Refining Co., organised and controlled by Mr. F. August Heinze, and the latter in 1897 for a company formed by leading shareholders in what was then the Le Roi Gold Mining Co.

The smelter at Crofton was built primarily for the reduction of the ore of the Lenora mine, at Mount Sicker, to connect which mine with the smelter a narrow-gauge railway $8\frac{1}{2}$ miles in length was constructed and was equipped with two Shay geared steam locomotives, bottom-dumping ore cars, etc. As the purchase and treatment of custom ores was also included in the plan of operations of the company a wharf was built from a point near the works

ties provided were with a view to accommodating a larger tonnage from landward than from the sea. Conditions are now changed, though, the Britannia mines, situated off Howe sound, on the mainland coast, and distant some 60 miles by water from the smelting works, being looked to for the present main supply of ore, while it is expected that next year mines in south-eastern Alaska will substantially supplement the tonnage obtainable from the nearer source. Further, coal and coke come by water from Vancouver Island collieries, higher up the coast, railway connection between the collieries and the smelting works not yet having been made. The importance of having convenient dock arrangements and unloading appliances, together with ample trackage to facilitate the conveyance of ore from dock to smelter is therefore self evident.



BRITANNIA SMELTING CO. LTD.
 GENERAL PLAN OF WORKS
 SHOWING THE ARRANGEMENT OF
 ROAST JAR

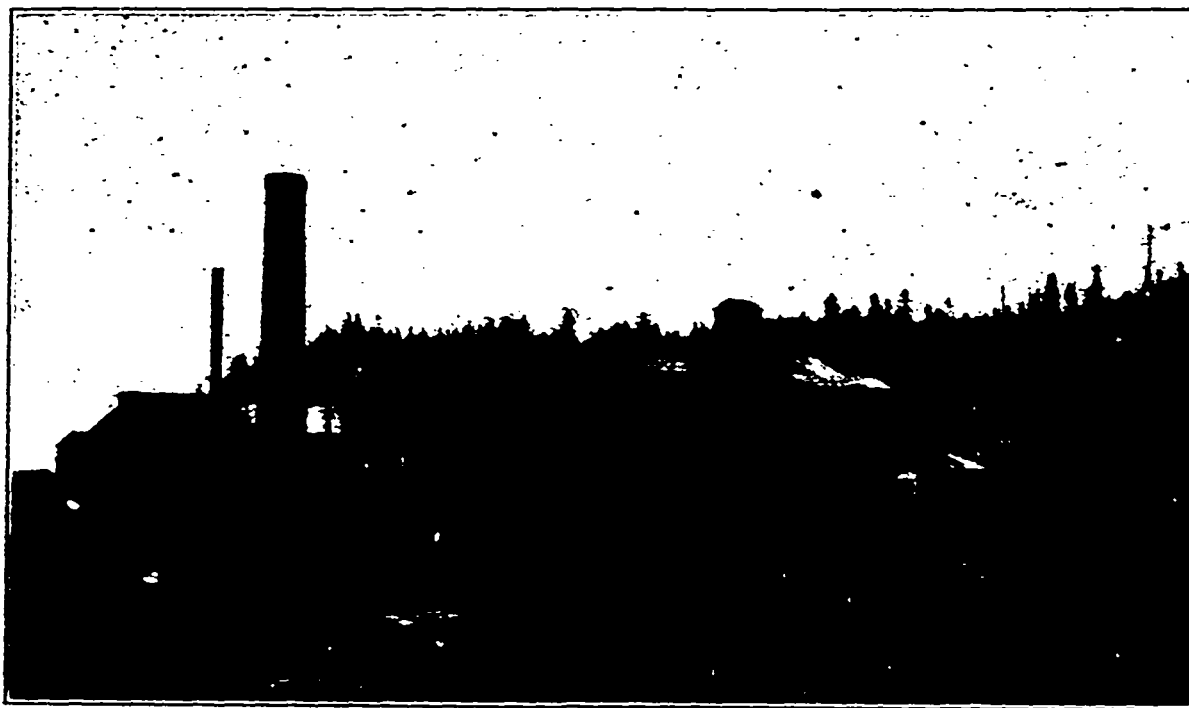
Britannia Smelting Co's Smelter.—General Plan.

The wharf or dock is about 750 ft. in length, with a depth where vessels are unloaded of 21 ft. at low water. Ore and concentrates from the Britannia mines are loaded into railway cars on scows or barges at Britannia beach, the place of shipment, and transfer arrangements admit of these cars being hauled on to the wharf at Crofton and thence up inclined trestles and over the bins into which their contents are dumped. Fuel and heavy stores are similarly landed, and outward carload shipments of blister copper consigned to a refinery are with equal convenience transferred from wharf to barge. On the dock are three bunkers, each having a holding capacity of 200 tons, and into these ore not arriving in railway cars is hoisted by a 9-h.p. double-drum hoisting engine equal to unloading 30 tons per hr.

shipping track on the lower side, below the level of the converter room floor.

There are 14 ore bins, arranged in two parallel rows, six receiving bins on one side of the sample mill and eight storage bins on the other. Each bin has a holding capacity of 300 tons. The trestle on the higher side of the mill has just been extended over four new bins, each with a capacity of 300 tons, built for holding concentrates. Between the ends of the receiving and concentrate bins, respectively, there is a space of about 40 ft., left for future additions to bins. All bins are provided with suitable discharge gates.

The sample mill building is framed with 12 by 12 in. lumber, double boarded outside, and it is roofed with Paraffine Paint Co.'s "Malthoid," which



Britannia Smelting Co's Smelter.—View Showing Railway up Incline Trestle to Ore Bins.

The tracks between the dock and the ore bins have lately been re-laid, the light rails previously in use having been replaced by 56-lb. steel; the grade from the 60-ton railway track scales up the incline to the receiving bins has been reduced, and other track improvements have been effected. The company's steam locomotive, made by the Rome Locomotive Machine Works, of Rome, New York, was formerly in use on the Manhattan elevated railway. It is in excellent condition and is very serviceable for smelter purposes.

The arrangement of the railway tracks at the works is shown on the general plan herewith. There are two ore tracks, one over each row of bins; a coke track on the upper side of the main buildings, on a level with the furnace charging floor; and a copper

has been found a serviceable and satisfactory roofing. The dimensions of the main part of the building are 26 by 32 ft. and 84 ft high. The machinery and plant in the mill include two 10 by 20 Blake rock-crushers, a pair of Davis 12 by 18 crushing rolls, a Constand automatic sampler, Coolidge sampler, two elevators—one rubber and one canvas belt—with 16 by 6 in. cups, and one with 8 by 4 in. on a rubber belt, and in the sample room, three grinders, bucking boards, steam coils for drying samples, etc. The Coolidge sampler will shortly be removed and two Snyder automatic samplers be installed instead. A Jenckes Machines Works 45-h.p. slide valve steam engine has been used to supply motive power, but a Westinghouse 45-kw. direct current generator is being installed for this purpose, with the steam engine left

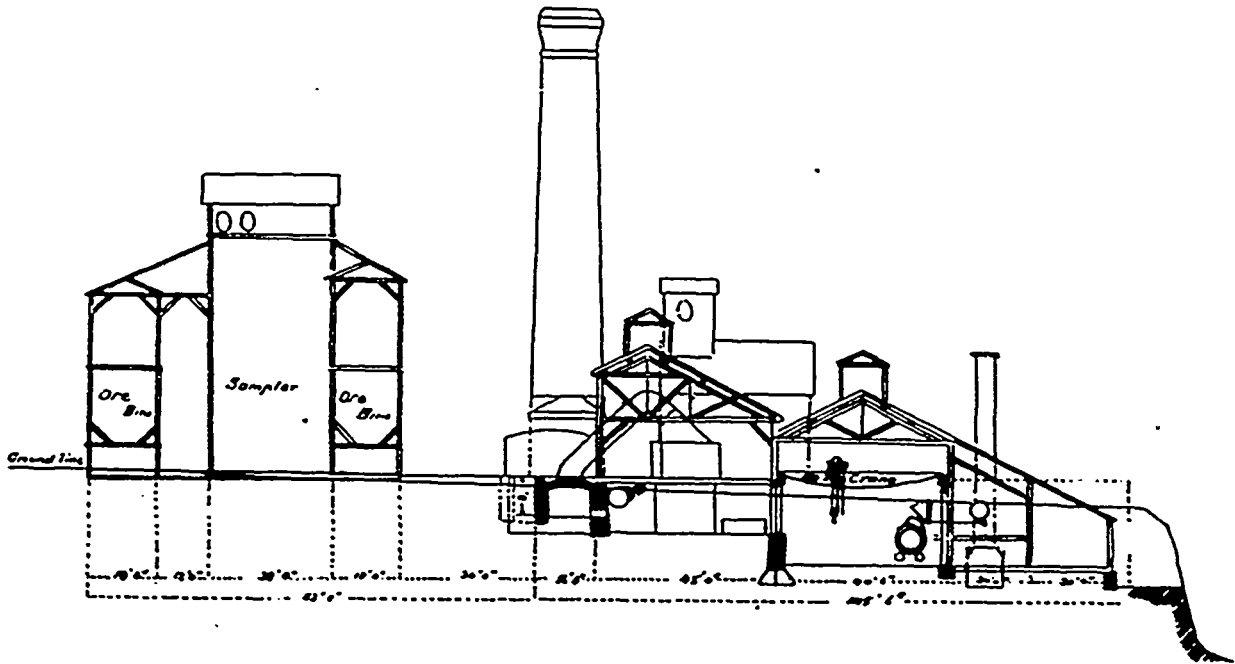
in position for use in case of need. A swinging spout admits of the sampled ore being shot into any of the storage bins for delivery to the furnaces, or into a separate bin for tramping to the roast yard.

Beyond the sample mill is the brick-making plant, a recent addition, the installation of which is nearly completed. This comprises a Chambers (Philadelphia) No. 7 brick machine, described as one of the largest made, and having a capacity of 60,000 to 70,000 bricks per day; two Scott's patent elevating brick cars, to take the trays of bricks off the racks without other handling; and all requisite accessories. The dimensions of the building housing this plant are 72 by 35 ft., and of the adjoining dry shed, 104 by 78 ft. Both structures are constructed of similar material to that of the sample mill building. In the dry shed, overhead in the gable, are four sets of steam coils, in all about 5,000 ft. of 1-in. iron pipe encased

ties of which will be received regularly from the concentrating mill at the Britannia mines, raw ore fines, slue dust, etc.

The roast yard is adjacent to the ore bins, brick-making plant, etc. The method of burning ore here is that usually employed at smelters, the roast piles being built up about temporary trestles. The removal of the roast yard a short distance south of its present location is planned, so that men working about the furnaces and converters may not be troubled by the sulphurous fumes from the roast heaps when the wind blows from the landward side of the works.

The coke track is between the storage bins and the furnace building. The dust chamber, which is below the level of this space, is 200 ft. long, 10 ft. wide and 12 ft. high, with an expansion chamber 24 by 40 ft. and 20 ft. high; it is connected with a circular brick smoke stack 120 ft. high and 12 ft. in diameter, in-



Elevation of Britannia Smelting Co's Smelting Works.

in a wooden box; these will heat the air, which will be drawn between and over them by a No. 6 Sturtevant fan, operated by a 10-h.p. electric motor, and be discharged into a 12-in. galvanised iron main. Six-inch branch pipes, perforated every 18 in. with $\frac{3}{8}$ -in. holes, running the full length of the tracks, will distribute hot air under and among the bricks. There will be 18 car tracks in the dry shed with room for the tiers of bricks on trays between the tracks. Steam for the coils will be supplied by a 100-h.p. boiler, installed in a building, 18 by 35 ft., erected at a lower level. From the dry shed part of the bricks will be transferred to the roast yard, for roasting in heaps or kilns—as found most advantageous—with raw ore, and part to the furnaces, the charging floor of which is on the same level as that of the dry shed, for smelting without roasting. The material to be made into bricks will be concentrate, large quan-

ties of which will be received regularly from the concentrating mill at the Britannia mines, raw ore fines, slue dust, etc.

The furnace building is 73 ft. long by 45 ft. wide, the charging floor being on a level with the roof of the dust chamber, and within 50 ft. of the nearest of the storage bins. There are in this building three furnaces, the smallest being a 65-ton cupola for remelting matte and the two larger a water-jacketed stack with a capacity of about 350 tons a day and a Garretson furnace of 200 tons capacity. The last-mentioned is designed to effect both smelting and converting in one operation, but it does not yet appear to have overcome all the difficulties to continuous success in this direction, consequently it is used for ordinary smelting. The former is 42 in. wide by 160 in. long, inside dimensions at tuyeres of which there are nine on each side of 6 in. diameter. The

furnaces are charged by hand. The slag, which is elevated by a bucket elevator to secure more storage, is granulated, for which purpose and for the water jackets there is an abundant supply of water, brought from a lake distant two miles from, and at an elevation about 400 ft. higher than, the smelter. There are several large side-dumping slag pots, for use in dumping the slag hot when there shall be any interruption in water granulation. The furnace floor is about 14 ft. lower than the level of the charging floor, and the floor level of the converter building eight feet lower still. Some 17,000 yd. of material were excavated in order to obtain the advantage of transferring matte from settlers to converters by gravity.

The converter building adjoins the furnace building on the east. Its dimensions are 73 ft. by 65 ft. exclusive of the room occupied by silica and clay bins,

and a room for the conversion of the converter building, 20 by 25 ft., immediately behind the converting stand, accommodates the blister copper moulds which are drawn backwards and forwards by a rack and pinion operated by hydraulic power (as is also the elevator from the converter floor), and for a scale on which the copper is weighed before being loaded on the railway cars for shipment.

The silica and clay used in relining the converter shells is tamped in with a pneumatic tamper run by a small air compressor.

The power house and boiler room are immediately north of the furnace and converter buildings. The engine room is 50 by 60 ft. and adjoining blower room 40 by 60 ft. The power engine is an Allis-Chalmers Corliss valve engine, 18 by 36 by 42; this drives two Connersville blowers (one a No. 8 running 125 rev. per min. and the other a No. 5 at 165 rev.



Britannia Smelting Co's Smelter.—Molten Matte Flowing Down Launder From Settler to Converter.

pug mill and re-lining conveniences, elevator, and floor for matte moulds when the converters are not in operation. The converter plant consists of one converting stand, equipped with four shells of the trough type, 84 in. in diameter and 126 in. long. The converters are tilted by power supplied by a hydraulic accumulator. The converter building is so constructed that an electric travelling crane may be put in at any time; for the present the converter shells are moved from the converting stand to the relining platform on hydraulic trucks by blocks and steel cable. The molten matte runs from the settlers to the converters in a launder. The fumes from the converters pass through a steel flue at the back of the stand and thence into a chamber with water spray by which the copper dust is precipitated before the fumes escape, by either a separate smoke stack or through the big dust chamber and the main stack. An eastern exten-

per min., both connected to a main blast pipe of 54 in. diameter) and a 110-kw. Westinghouse direct current generator for all outside machines. The blowing engine, which provides the blast for the converters, is 16 by 36 by 42 and has a capacity of 9,000 cu. ft. of air per min. at 15 lb. pressure.

Other plant and machinery includes a 1,000-h.p. jet condenser, Cochran feed water heater and purifier, 45-h.p. Westinghouse engine and electric light machine for about 500 lights, providing for all electric lighting about the works independently of the operation of the main power engine, Smith-Vaile and Stilwell-Bierce compound duplex pump, etc.

In the boiler house, the dimensions of which are 40 by 48 ft., are three horizontal return tubular boilers each 100 h.p., with foundations prepared for a fourth should this be required at any time.

The machine shop is equipped with power tools,

including lathes, planer, drill press, bolt-cutting and pipe-threading machines, all run by an electric motor, and all necessary hand tools. Blacksmith's and carpenter's shops are also furnished with all tools needed for renewal and repair work.

The assay office and laboratory building is about 400 ft. north from the main smelter buildings. This is a commodious structure, and comprises large furnace room, chemical laboratory, balance room, assayer's office, store room, etc.

The smelter offices are in a separate building, with general office, manager's room, strong room, and living rooms for those of the staff who live on the premises. The manager's private residence is situated 300 to 400 yards from the works, on a site giving a fine view of Osborne bay and the waters and islands beyond.

The Britannia Smelting Co., Ltd., is a recent incorporation, having a capital of \$625,000, divided into 25,000 shares of \$25 each. Mr. Geo. H. Robinson,

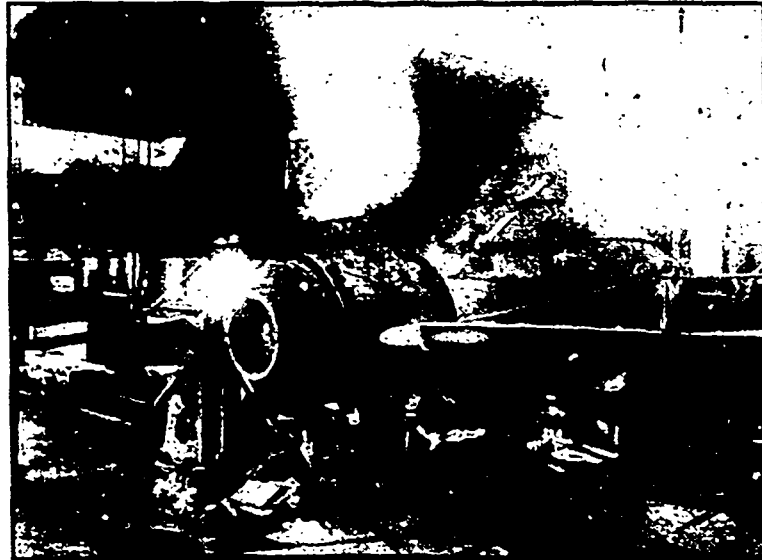
gical skill and business capacity of its manager will materially assist in establishing its enterprise on a permanent and profitable basis.

THE KLUANE MINING DISTRICT.

(By R. G. McConnell.*)

THE Kluane mining district, in the south-western portion of Yukon territory, is situated along the north-eastern slopes of the St. Elias range, in the vicinity of Kluane lake. It includes creeks such as Bullion and Burwash, draining the north-eastern slopes of this range, and Ruby and Fourth of July, which traverse and obtain their auriferous supplies from the bordering ranges on the north.

Indians reported the presence of gold, on streams tributary to the Alsek, early in the summer of 1903, and on July 4 of that year Discovery claim, on Fourth of July creek, was staked by Dawson Charlie, a well-



Britannia Smelting Co's Smelter.—Converting Matte to Blister Copper.

late of Butte, Montana, is president of the company, and Hon. Edgar Dewdney, of Victoria, vice-president. The executive staff consists of Mr. Thos. Kiddie, manager; Mr. H. C. Bellinger, consulting engineer; Mr. L. E. Gooding, assayer and chemist, and Mr. W. H. Yost, master mechanic.

The company is preparing to do an extensive smelting business, and in order to ensure the continuous operation of its works is providing for regular and sufficient supplies of ores from properties controlled by those also largely interested in its affairs. It will, as well, be an active competitor for custom ores, whether from Vancouver or Texada islands, mainland coast mines, Yukon Territory, or Alaska. The important additions and improvements to its works now approaching completion will increase its facilities for treating ores to advantage, and the known metallur-

known Indian from Caribou Crossing. Two days later Discovery claim on Ruby creek was staked by W. H. Weisdepp, and discoveries on other creeks in the vicinity quickly followed. In the same season coarse gold was found on a number of the smaller streams draining the north-eastern slopes of the St. Elias range. Bullion creek, a tributary of Slims river, was staked on September 28 by a party of miners consisting of Messrs. Altamose, Ater, Smith and Bones, members of the same party staked discoveries on Sheep creek, near the head of Kluane lake, in October, and on Burwash and Arch creeks in May, 1904. The former flows into the Kluane river a short distance below Kluane lake and the

*Summary Report of the Geological Survey Department of Canada for the Calendar Year 1904.

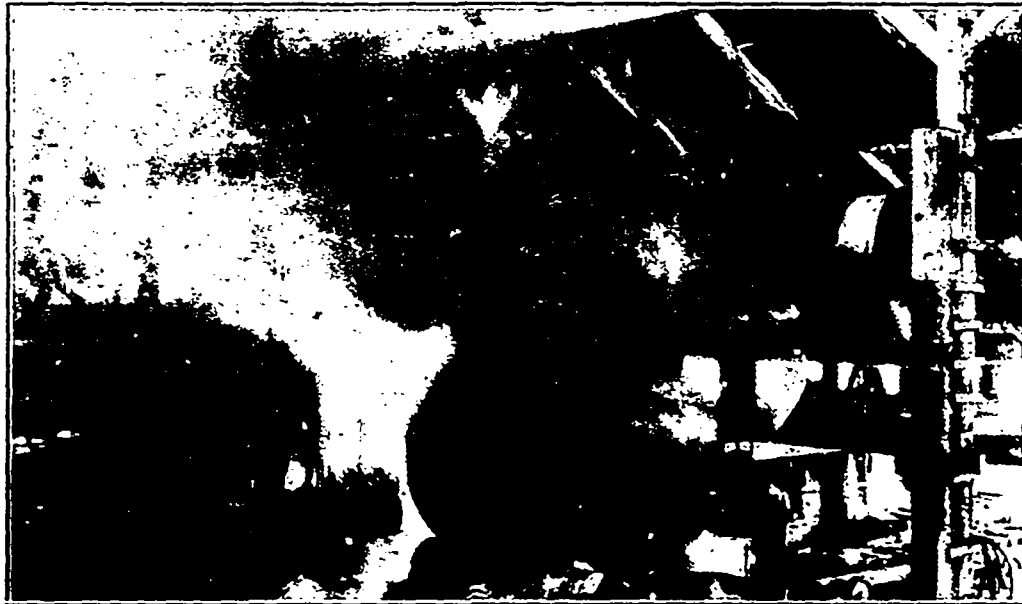
latter into the Donjek river. All the streams draining this portion of the St. Elias range are tributary to White river. Besides the streams mentioned, discoveries have been staked on Kimberly, Telluride, Canada, Vulcan and other streams of the St. Elias range, and on McKinley, Dixie, Marshall, Gladstone and other streams draining the Ruby range. The area of coarse gold discovery extends along the base of the St. Elias range for a distance of more than 75 miles, and has a maximum width of about 30 miles.

The district is reached by wagon road from Whitehorse, the terminus of the Whitehorse railway. The road from Whitehorse follows a rolling plain bordering the left bank of the Lewes river to the crossing of the Takhini river, from which point a wide, continuous valley, occupied successively by the

Brooks' route is published by him in the twenty-first annual report of the United States Geological Survey for 1899-1900.

The district is varied in its topographic features; it includes a portion of the St. Elias range and extends north-eastward across the Shawkak valley into the banking ridges and mountain groups.

The St. Elias range is exceedingly rugged in character. Viewed from the hills on the north it presents a complex of sharp, broken crest lines irregular in direction and rising in places into bold, rocky projections, some of which reach a height of over 10,000 ft. above the sea. The numerous small streams which drain the northern slopes of the range in the vicinity of Kluane lake occupy deep, rock-walled valleys, scarcely wide enough in places to permit the passage of the streams. The larger drain-



Britannia Smelting Co's Smelter.—Copper Converter in Operation. Moulds for Blister Copper in Lower Right Hand Corner.

Takhini river, the Dezadeash river, Bear creek and Christmas creek, extends through to Kluane lake. Between Bear creek and Christmas creek a summit about 900 ft. in height is crossed. The road from Whitehorse to Kluane lake has a total length of 143 miles. The Takhini river is navigable for light draught steamers, and the haulage of freight can be reduced about 50 miles by bringing it up this river on boats to Mendenhall landing, the point at which the road leaves it.

Previous explorations in the district are limited to the expedition of Messrs. W. J. Peters and A. H. Brooks, of the United States Geological Survey, in 1899 from Pyramid harbour by way of Kluane lake to Eagle city, on the Yukon, and the topographic work of Mr. J. J. McArthur, Department of the Interior, Canada, in 1900. A report on the principal features of the geology and topography of Mr.

age channels, on the other hand, such as Duke and Slims river, possess large valleys and are bordered by wide flats, which extend back into the range for many miles. The central part of the St. Elias range is covered with almost continuous snow fields, pierced in places by dark rocky points; smaller snow fields survive the summer on all the principal mountain groups and ridges. Glaciers occur at the heads of all the principal streams. The great Kaskawulsh glacier, the largest in the district visited, descends from the central neve, and has a length of more than 20 miles. Two large rivers issue close together from beneath this glacier, the Kaskawulsh, one of the main branches of the Alsek, and Slims river, one of the sources of the Yukon.

The country stretching northward and eastward from the St. Elias range is characterized by broad interlocking valleys enclosing mountain groups and

ridges usually from 3,000 to 5,000 ft. in height. The valleys are much older than the present drainage system. They have a width of from two to five miles or more, are flat-bottomed, and are floored with glacial deposits. The rivers which occupy them at present flow in narrow secondary valleys seldom excavated to sufficient depth to reach bed-rock.

The great Shakwak valley at the foot of the St. Elias range is an important topographic feature. Its origin is unknown. It is now occupied by a number of different streams and lakes and is crossed transversely by the valley of the Dezadeash. Kluane lake, a large sheet of water 40 miles long and three miles wide, with two arms, one 27 miles in length, is situated in this depression. North-east of the upper end of Kluane lake are the Kluane hills, a worn ridge with an elevation of about 5,000 ft. above the sea. These hills are bordered on the north by the wide

the mountains, by the Kaskawulsh river, heading in the Kaskawulsh glacier, the two streams forming the Alsek river. Jarvis river, like the Dezadeash, also enters the St. Elias range from the lower region bordering it on the north. It is tributary to the Kaskawulsh river and drains the southern slopes of the Ruby range and a portion of the Kluane hills. The White river drainage system is represented by Slims river, the principal feeder of Kluane lake, and by a number of other and smaller streams flowing from the north and south into Kluane lake and its outlet, Kluane river. Slims river heads in the same glacier as the Kaskawulsh river, and the two streams occupy portions of a wide, continuous valley connecting the White river and Alsek drainage systems inside the mountains.

The Alsek river has twice been dammed in comparatively recent times, probably by the extension of



Britannia Smelting Co's Smelter.—In Engine Room. Blowing Engine in Foreground.

valley of Upper Jarvis river, Kloo lake and Cultus creek, beyond which the country rises again into the Ruby range. Farther to the south a prominent elevated mass is enclosed by the Shakwak valley, Dezadeash lake and the great bow which the Dezadeash river makes to the east. The name Dezadeash mountain is proposed for these elevations. The summits of these mountains and the Ruby range reach elevations of about 7,000 ft. above the sea. They probably represent erosion remnants of an old low level plain, since elevated some thousands of feet and partly destroyed.

The drainage of the district flows partly north by way of White river to the Yukon and partly south by the Alsek to the Pacific. Dezadeash river heads in Dezadeash lake, and after making a great bend to the east, turns westward towards the St. Elias, and through it to the sea. It is joined, after entering

glaciers across its valley, and long deep lakes were produced which extended far up the valleys of the Dezadeash and Kaskawulsh rivers. Fresh lake beaches, cut in loose talus slopes and still covered in places with drift wood, line the valley of the Dezadeash to the point where it enters the St. Elias range up to an elevation of 150 ft. above the present water level; older, more worn beaches occur up to an elevation of 300 ft. The older beaches are covered with the ordinary forest growth of the region, and probably date back some hundreds of years, while the younger ones support only a few young spruces, seldom exceeding three inches in diameter, and groves of willows, small aspen and balsam poplar. The upper limit of the young beaches is plainly marked all along the valley of the Dezadeash, up to a point about midway between Marshall river and Canyon river, by this sudden change in the forest

growth. Judging from the character of the beaches themselves, the undecayed driftwood, the young vegetation and the stories current among the Indians, it is probable that the lake which produced these beaches existed less than a hundred years ago.

The forest trees of the district consist only of the white and black spruces, the aspen, the balsam poplar and an occasional birch. As elsewhere in the Yukon territory, the white spruce is the most important tree. Considerable groves exist along the lower part of Slims river, on Kluane lake, on Silver creek and other places, but the district, as a whole, cannot be considered well wooded, and the supply of timber suitable for mining and building purposes is limited. The tree line in the St. Elias range has an altitude of about 4,200 ft. above the sea, and the bordering ranges of about 4,700 ft. The upper portion of most of the auriferous streams rises above the timber line

and Kloo lake into the Ruby range. The eastern boundary of the formation crosses the Dezadeash valley at Aishihik river. The Kluane schists have not been followed south of the Dezadeash valley, but must extend a considerable distance in this direction as they cross the valley in a band fully 20 miles wide. They were traced northward to a point near the lower end of Kluane lake, where they are replaced by gray granites and green schists.

The wide Shakwak valley, at the base of the St. Elias range, is floored with gravel, and the junction between the Kluane schists and the rocks forming the St. Elias range was only seen in one section. North of the point at which Jarvis river enters the St. Elias range, micaceous schists, which are referred to the Kluane series, occur at the base of the range underlying less altered dark and green slaty rocks and schists. They were not found in the interior of



Britannia Smelting Co's Smelter.—General Offices at Crofton.

and much difficulty is experienced in obtaining the fuel and lumber required.

GENERAL GEOLOGY.

The district reported on includes two distinct geological provinces, namely, the St. Elias range and the flanking ridges and hills which border it on the north.

The country lying along the northern base of the St. Elias range is underlaid by a series of dark gray quartz-mica schists resembling in colour, composition and degree of alteration the argillaceous members of the Nasina series as developed along the Yukon river. These schists will be referred to as the Kluane schists.

The Kluane schists outcrop over a considerable area: they occur all along the Kluane hills which border the northern shore of Kluane lake and they extend eastward across the valley of the Jarvis river

and Kloo lake into the Ruby range. The eastern boundary of the formation crosses the Dezadeash valley at Aishihik river. The Kluane schists have not been followed south of the Dezadeash valley, but must extend a considerable distance in this direction as they cross the valley in a band fully 20 miles wide. They were traced northward to a point near the lower end of Kluane lake, where they are replaced by gray granites and green schists.

The general strike of the Kluane schists is W.N. W. and is approximately parallel to the direction of the St. Elias range. The strike is very regular except near intrusive masses. The dip of the schists, both in the Kluane hills and in the southern slope of the Ruby range is N.N.E. or away from the St. Elias range at angles of from 30 to 60 degrees. Near the eastern limit the influence of a great granite mass east of Aishihik river is felt; the dips become steeper and, in places, the beds are overturned. The schist, in the single exposure found along the base of the St. Elias range, dips to the south under the range or in the opposite direction to the inclination of the beds in the Kluane hills, the first foot-hill range to the north. The intervening valley has probably

been excavated along the crest of a wide anticline.

The Kluane schists consist almost entirely of a great series of well foliated quartz-mica schists, varying somewhat in colour and degree of alteration, but very homogeneous throughout. Like the Nasina series they are ancient clastics, partially and, in places, entirely, recrystallized. They differ from the Nasina series in the absence of quartzite and limestone bands. Mineralogically they consist essentially of lines and small lenticular areas of quartz and feldspar grains separated by curving lines of biotite and a white mica. A specimen from an exposure north of Jarvis river, where it enters the St. Elias range, contained, in addition to the usual minerals, numerous grains of glaucophane and epidote.

The Kluane schists, with the possible exception of a band of granite gneisses, which borders them on the north, are the oldest rocks in the district. They are pierced in several places by granite areas resembling the coast range granites, and probably belong to the same period.

The geology of the small portion of the St. Elias range hurriedly examined during the past season is exceedingly complicated and is, as yet, imperfectly understood. The bedded rocks are broken at frequent intervals by intrusions of various kinds, and the sequence of the formations differed in all the valleys ascended. It was found possible to discriminate four great series of rocks, none of which are probably older than Upper Palaeozoic. North of Jarvis river the Kluane schists are overlaid at the foot of the range by several thousand feet of green schists interbanded with dark shaly beds. These are probably the oldest rocks in the portion of the range examined. They have a wide distribution, being found on the lower part of Kaskawulsh river, on Slims river, on Bullion creek, and along the foot of the range on Burwash creek and Duke river.

The green schists of this series differ greatly in the degree of alteration they have undergone. In a few places they are completely altered into glossy chloritic schists, while in many of the sections their fragmental origin is still evident in hand specimens.

The green schist series is overlaid by alternating bands of limestone, green schists and dark slaty rocks passing in places into a hard cherty variety. A few fragments of corals collected on Bullion creek indicate a carboniferous age for this group. The green schists of this series are similar in appearance to those in the underlying group. The limestone, when unaltered, occurs as a hard, dark, compact rock, but in most instances it has been partially or wholly recrystallized into a gray granular variety, and in extreme cases has been altered into a snow-white, even-grained marble. A wide band of limestone at the head of Sheep creek has been shattered and crushed into a rock difficult to distinguish from an agglomerate. The crushed limestone often carries iron, and, when weathered, displays bright red colours.

The mountains bordering the Dezadeash river, from the point where it enters the St. Elias range to its

junction with the Kaskawulsh, a distance of seven miles, are built almost entirely of a great series of tuffaceous beds which are probably younger than the schists of the preceding group. These beds form a definite group and will be referred to as the Dezadeash series. They have a thickness of fully 10,000 ft. They occur both in heavy beds, usually gray, and in thin alternating dark and grayish bands, the former hard, compact and occasionally cherty, the latter coarse, granular and soft. The lowest beds of the series occur along the base of the outer range, where they are altered into hard flags, and, in places, are almost schistose. The higher beds, except where pierced by a couple of intrusive masses, show only slight traces of alteration and are often soft and friable. The tuffs of the Dezadeash series are replaced, ascending the Kaskawulsh river, by green schists. The character of the contact was not ascertained.

The fourth subdivision of the rocks of the St. Elias range largely consists, like the preceding one, of beds of tuffaceous origin, but includes gray sandstones, grits, conglomerates, dark shales and occasional lignite seams. Two areas of these rocks occur in the portion of the range examined, one on Kimberly and Telluride creeks, two tributaries of Jarvis river, and the other at the head of Sheep creek. The Sheep creek beds are less indurated than those on Kimberly creek, include a larger proportion of tuffs and occur in brightly coloured alternating green, red and brown bands.

The rocks of this group are very similar to the lignite-bearing beds in the vicinity of Dawson, which have been referred by Dr. Knowlton, of the United States Geological Survey, on the evidence of fossil plants, to the Eocene. They are strongly folded and have participated in the principal mountain-making movements which produced the range.

A great variety of massive igneous rocks occurs in the St. Elias range. The specimens collected have not yet been examined in detail, and only brief descriptions can be given here.

Granite.—A small area of gray medium-grained granite cutting limestones and green schists occurs at the south end of Kluane lake. Large areas of granite must occur in the interior of the range, a large proportion of the material brought down by the Kaskawulsh glacier consisting of granite pebbles and boulders.

Diorite.—Areas of diorite occur at the mouth of Vulcan creek, on the lower part of Bullion and Sheep creeks, on the Dezadeash river, and at the upper canyon on Burwash creek. Diorite pebbles were also found in the wash of a number of streams heading in high peaks which were not visited. The diorites vary from a quartz diorite consisting essentially of hornblende, biotite, labradorite and quartz to a gabbroic or diabasic variety in which quartz is absent and the hornblende has the appearance of being derived from augite.

It is interesting to note that the Italian expedition which ascended Mt. St. Elias in 1897 under the direc-

tion of H.R.H. the Duc d'Abruzzi found the summit of the mountain to consist of diorite, and diorite probably occurs in many of the higher peaks of the range.

Pyroxenite.—A large, coarse-grained, intrusive mass consisting mainly of augite and iron ore cuts the Dezadeash series of the St. Elias range on the Dezadeash river.

Diabase.—This rock occurs at the canyon on Sheep creek and also at the head of Kluane lake.

Dunite.—A small area of dunite was found on Burwash creek. The olivine of this rock is partly altered to serpentine.

Andesite.—Andesites occur principally in connection with the lignite-bearing tertiary areas. A vesicular variety of this rock outcropping on Telluride creek was found to contain small quantities of bitumen.

Rhyolite.—Light-coloured rhyolite rocks occur in small areas on Kimberly and Bullion creeks.

Effusive volcanic rocks.—Large areas covered with successive sheets of lava of various kinds occur in the interior of the St. Elias range. The largest of these, in the district examined, commences near the junction of the Dezadeash and Kaskawulsh rivers, and extends southward for many miles. It has not been outlined, but must cover several hundred square miles. A second large area crosses Duke river valley near the upper forks.

The lava sheets are level or incline at low angles, and are evidently younger than the main mountain-making movements. They are, however, of considerable age, being traversed by wide valleys and having been worn into ridges and peaks closely resembling those in other portions of the range.

The varieties of the effusive rocks collected include dark diabases, gray andesites, white rhyolitic-looking rocks, and red, black and gray vesicular lavas. Indurated tuffs and agglomerates occur with the effusives.

Very little is known in regard to the structure of the St. Elias range. The general strike of the bedded rocks is nearly magnetic east and west, or parallel to the trend of the range. Local deviations from this direction, due to the numerous intrusive masses, are, however, frequent. The beds are steeply tilted, but are seldom, so far as observed, overturned or broken; they dip in both directions. No evidence of great over-thrust faulting, such as obtains in the Rocky mountain range, was noticed. The effect of over-thrust faulting is to reverse the normal sequence of the beds and to place older formations above more recent ones. For instance, in the Rocky mountains the palæozoic limestones of the front ranges often rest on Cretaceous beds. In the St. Elias range, on the other hand, the bordering plains and ridges are underlain by old schists, while the mountains are built of much younger rocks. It is noteworthy that, notwithstanding the strongly folded condition of the beds in the St. Elias range, the old Kluane schists are nowhere brought to the surface. It is possible that the upheaval of the range and the folding of the beds

are due in large measure to the repeated invasions of the district by igneous rocks and not to great general earth movements due to compression, such as produced the Rockies. Normal faulting probably occurred along the base of the range.

All the lowlands of the districts reported on were buried beneath ice during the glacial period, but there is no evidence that the higher ranges were overridden. The ice poured down from the St. Elias range, the main gathering ground, through every opening in the outer ridges. It moved down northward-sloping valleys, like those of Bullion creek and Slims river, and up southward-sloping valleys, like those of Jarvis river and the Dezadeash. It flooded the great Shakwak valley at the foot of the range to a depth, in places, of probably 3,000 ft., and streamed eastward up the broad valley of the Dezadeash to the low Dezadeash-Tahkini divide, and then down the latter valley to the Lewes. Smaller streams flowed up the steep valleys, incising the southward slope of the Ruby range, and, in some instances, as at the head of Lake creek, crossed this range and descended into the valley of the Aishihik.

The Kluane hills, with an elevation of, approximately, 2,650 ft. above Kluane lake, and 5,150 ft. above the sea, were completely covered with ice, as shown by the presence of rounded foreign boulders and pebbles on the highest points. Ruby range was glaciated up to an elevation of about 5,200 ft. above the sea. Below this point the contours are rounded and foreign drift material is always present. Above it the topographic angles are sharper and the slopes and summits are strewn with angular frost-riven fragments derived from the underlying schists.

The deep wide valleys traversing the region north of the St. Elias range are bottomed everywhere with glacial deposits, principally boulder-clays and silts, to a depth, in places, of several hundred feet. The boulder-clay is usually interbanded with stratified gravel beds. It is confined to the valley flats and bordering terraces, and does not occur on the summits and upper slopes of the ridges.

The boulder-clay is almost always overlaid by heavy beds of white silt and is occasionally interbanded with it. These white silts are precisely similar to the fine glacial material from the Kaskawulsh glacier now being carried away by Slims river and deposited in the upper end of Kluane lake and the lower sluggish part of the river; there is little doubt that they originated in the same way. Kluane lake will eventually, if the present conditions be maintained, become filled up and will be replaced by a silt plain similar to those bordering portions of the upper Lewes, the McMillan, and most of the other rivers draining the glaciated highlands surrounding the Yukon plateau.

The glaciers of the St. Elias range are now receding, but not very rapidly. Undisturbed morainic groups occur in front of the Kaskawulsh glacier for at least half a mile, and long lateral moraines, heading in glaciers, border some of the tributaries of Telluride creek. Reasons have already been given for

believing that a long lake lately covered the valley of the Dezadeash from a point below its junction with the Kaskawulsh nearly up to the Aishihik river. This lake must have been produced by an ice dam across the valley of the Alsek, and indicates a pronounced advance of the glaciers of the range less than a century ago.

ECONOMIC GEOLOGY.

Placer gold has been found in the district in two groups of creeks, one heading in the outer ridges of the St. Elias range, and the other in the Ruby range, situated between Jarvis river and Aishihik river. Ruby creek, Fourth of July creek and McKinley creek are the most important creeks so far discovered in the latter group, and of these Ruby creek is the only one which has produced any considerable quantity of gold.

Ruby Creek.—Ruby creek heads in the summit of Ruby range and flows southward, emptying into the Jarvis river after a course of about nine miles measured along the valley. It is a steep mountain stream with a large volume of water in spring and early summer, but gradually dwindling in size as the snows in the upper regions disappear, and in late summer the flow is reduced to a couple of hundred miners' inches or less. In its lower reaches Ruby creek has its course across the wide drift-filled valley of Jarvis river, and its valley is shallow and cut in boulder clay. In the upper mountain portion it occupies a great narrow-bottomed depression from 3,000 to 4,000 ft. in depth cut out of the old schists of the Kluane series.

The valley of Ruby creek is floored in the lower part with boulder clay and other drift deposits, and in the central portion with a shallow covering of stream gravels and boulders. In the upper portion the grade is so steep—in places exceeding 400 ft. to the mile—that the gravel is often washed away and the bed-rock exposed.

Mining on Ruby creek during the 1904 season was practically confined to the central portion, extending from claim No. 22 above Discovery to the mouth of Little Ruby creek at claim No. 34 above Discovery, a distance of about three-quarters of a mile. The wash in this portion consists mainly of flat schist pebbles and angular slabs of the same material, with occasional large granite boulders often several feet in diameter, and a few quartz pebbles and boulders. It is shallow, seldom exceeding 10 ft. in depth on the claims now being worked, but is irregular in this respect, owing to the rough hummocky character of the bed rock surface on which it rests. Some sluicing was done during the past season on most of the claims between No. 28 above and No. 34 above, and on some of them pay was reported, but no particularly rich gravel was discovered, and the total yield did not exceed a few thousand dollars.

The gold, which is of local origin and is derived from the quartz veins cutting the Kluane schists, is coarse, rough and occasionally crystalline; it is more irregular in size than the Klondike gold, but nuggets have been found weighing nearly half an ounce.

The portion of Ruby' creek at present being mined cannot produce any large quantity of gold; the body of gravels is small and has not proved high grade. Further down the valley the conditions are different, and it is possible that considerable bodies of workable gravels may exist under the boulder clay. Several attempts have been made to sink to bed-rock, but without success. Two shafts, one on claim No. 15 above, and the other on Discovery claim, have been sunk to depths of 70 ft. and 40 ft. respectively, without reaching bed-rock. There is, of course, no certainty of finding gold under the boulder clay, as the stream gravels may have been swept away during the glacial period, but the chances of important discoveries are favourable and seem to warrant the expense of a deep shaft. Drifts across the valley from the foot of the shaft would be necessary for a fair test, for it is unlikely that the present stream follows the exact course of the pre-glacial one. The valley is, however, narrow and the deviation cannot be great.

There is little chance of finding pay-gravels in the Ruby creek valley below the point at which the stream leaves the mountains, the present course of Ruby creek across the wide valley of Jarvis river being probably entirely different from the pre-glacial one.

Fourth of July Creek.—Fourth of July creek is practically a continuation of Jarvis river. It is a much larger stream than Ruby creek, its flowage in early summer amounting to several thousand miners' inches, and it differs from the latter in dividing up, after entering the mountains, into several branches. It has cut a great valley back into the Ruby range much larger than the Ruby creek valley, and the various branches also occupy great rounded depressions sunk deep into the southern slope of the range.

The gravels in Fourth of July creek are similar to those in Ruby creek. The valley is floored with boulder clay up to a point about three-quarters of a mile below the mouth of Snyder creek, where it disappears. Farther up, the wash consists of coarse angular and sub-angular fragments of schist with some quartz and occasional boulders of granite. Above Snyder creek, the wash is shallow and bed-rock is often exposed. The proportion of quartz-pebbles and boulders in the wash is greater than in the Ruby creek gravels.

Fourth of July creek cuts the schists of the Kluane series through its entire course. The granite boulders were brought into the valley by ice, probably from the south, as the movement of the main ice sheet of the glacial period was northward, or up-stream.

Fourth of July creek and all its tributaries have been staked nearly to their heads, but so far very little effective prospecting work has been done. Colours of gold occur all along the creek: on claim No. 62 above, encouraging prospects are reported from the surface gravels. On claim No. 54 above, a shaft 28 ft. in depth has been sunk and pay-gravels are reported to have been found resting on boulder clay. That so small an amount of work has been done is largely due to the excessive cost of mining in this remote

region. Freight rates will probably be greatly reduced during the coming season and it is expected that the creek will receive a more thorough test. A deep shaft, to test the gravels under the boulder clay in the lower part of the valley, but well inside the mountains, is desirable.

McKinley Creek.—McKinley creek, like Ruby creek and Fourth of July, has been staked almost to its head, but very little prospecting has been done on it and no pay-gravels have been discovered. It is a large stream, about equal in size to Fourth of July creek; it enters Jarvis river a few miles above Kloo iake. A large tributary, known as Dixie creek, joins it a couple of miles above its mouth. McKinley creek occupies a wide, basin-shaped valley running for the greater part of its length parallel to the general trend of the Ruby range. Its grade in the longitudinal portion of the valley is low, but after bending to the south to join Jarvis river it falls rapidly and, in places, has cut a small canyon in a granite area which it crosses.

Boulder clay and other glacial deposits extend up McKinley creek for several miles. The depths to bed-rock along the greater portion of the valley must be considerable, and the great width of the valley will necessarily render prospecting for pre-glacial auriferous gravels a difficult and expensive undertaking.

Besides the streams mentioned, coarse gold has been found in the vicinity on Gladstone creek and some of its tributaries, on Marshall creek, a tributary of the Dezadeash, and on Printers creek, a small steep stream tributary to Cultus creek.

AURIFEROUS STREAMS OF THE ST. ELIAS RANGE.

Nearly all the streams flowing from the St. Elias range, in the district examined, carry coarse gold. Considerable work, mostly of a prospecting character, was done during the past season on Bullion, Sheep, Burwash and Kimberly creeks.

Bullion Creek.—Bullion creek is a typical St. Elias range stream. It heads in small glaciers at the summit of the range separating Slims river and Kluane lake from Duke river, and empties into Slims river after a course of about 10 miles. It is a large, swift-flowing stream, very variable in its flow, but carrying under ordinary conditions about 2,000 miners' inches of water. Its grade is steep, averaging over 200 ft. to the mile, and in flood it assumes a torrential character.

The valley of Bullion creek is a huge steep-sided gorge, narrow, but widening somewhat towards its mouth and bottomed with bare gravel flats. Midway in its course Bullion creek forces a passage for half a mile through a deep canyon so narrow that at a short distance it looks like a cleft in the rocks. This remarkable natural feature is due to a change in the course of the stream at the end of the glacial period. During that period the old valley was filled with boulder clay and other glacial deposits to a depth of 1,000 ft. After the ice receded the stream began re-excavating its old channel and has succeeded in cutting through the glacial deposits, and in the lower part of the valley has also cut some distance into the

bed-rock beneath. At the canyon the stream was forced to the north by the wash brought down by Metalline creek, which comes in at this point from the south, and in place of clearing out its old channel, as in other portions of the valley, it has sunk a new channel through limestone.

The rocks displayed along Bullion creek valley are exceedingly varied in character. They include green and dark schists, dark slates, gray limestones often weathering red and yellow, white marbles, diorites and a light coloured eruptive rock, probably a rhyolite. Bullion creek valley, as stated above, was filled with glacial wash during the glacial period to a depth of 1,000 ft. The stream has not succeeded in completely cleaning out its old valley, and narrow bands of boulder clay and glacial gravels still cling to the steep slopes on both sides.

Boulder creek valley is bottomed all along, except in the canyon, with a layer of loose gravel, usually from 6 to 10 ft. in thickness. Near the mouth of the valley the depth to bed-rock is somewhat greater. The gravels are coarse and are intermingled with numerous granite boulders, some of huge size. No granite outcrops along the valley, and the boulders must, therefore, have been brought by ice from the interior of the range.

Claims on Bullion creek were being worked or prospected at the time of my visit at intervals from No. 31 above down into the fifties below. The discoverers of the creek are reported to have cleaned up 40 oz., mostly in very coarse gold, as the result of a few days work in some shallow ground at the foot of the canyon. The promise afforded by this find has not been borne out by subsequent experience on the creek. The gravels have been prospected at intervals all along the valley. They carry gold throughout, but have seldom, if ever, proved rich enough to pay wages under conditions at present prevailing in the camp. The distribution of the gold is very irregular. Bunches of gravel carrying good values occur on most of the claims prospected, but the general average yield is low, and seldom exceeds, according to the information obtained, \$3 to \$5 a day per shovel.

While very little pick and shovel dirt has so far been found on Bullion creek, it is probable that the gravels along the central part of the creek, at least, are rich enough to be hydraulic. A company, under the name of The Bullion Hydraulic Company, was formed during the past season to take over most of the ground below the canyon and work it by this method. The conditions are favourable, on the whole, as the valley has a good grade and water is abundant, but some trouble will probably be experienced in removing the large boulders and in disposing of the tailings. The experiment is important, as, if successful, it will lead to similar undertakings on other creeks in the district.

The only prominent benches on Bullion creek are the narrow flats marking the upper limits of the boulder clay. Some of the gravels with the boulder clay are reported to be auriferous, but have not been worked.

Bullion creek gold is coarse, and is worn much smoother than Ruby creek gold. It occurs mostly in flattened pellets, often of considerable bulk. Some fine gold is also present. Nuggets up to an ounce in weight have been found. The grade is high, averaging about \$18 per ounce. Copper nuggets are often found with the gold in the concentrates.

Sheep Creek.—Sheep creek, in many respects, is a duplicate of Bullion creek, but is a smaller stream. It heads with Congdon creek, and follows a course nearly parallel with Bullion creek to its junction with Slims river. It is a steep creek, the grade exceeding 300 ft. to the mile. The lower part of the valley has the usual gorge-like character of the smaller valleys of the St. Elias range, and at one point contracts into a rocky canyon, but the upper part traverses an area of soft rocks and opens out into a considerable basin.

The rocks cut by the valley in its lower reaches are similar to those on Bullion creek. In the upper part the valley enters a Tertiary area, and tufts, sandstones, shales, conglomerates and occasional lignite seams are exposed.

Very few claims were being worked on Sheep creek during the past season, and only one, No. 53 above, reported pay values.

Burwash Creek.—Burwash creek is situated near the lower end of Kluane lake. It heads in the St. Elias range, but has most of its course across an elevated plain which borders the range from Kluane lake to the Donjek river. It heads in glaciers, and in ordinary circumstances is a swift mountain stream from 15 to 20 ft. in width, but, like all glacial streams, its daily and seasonable flow is very variable, depending on the strength of the sun, and in times of flood it becomes a raging torrent. Its grade is less than that of Bullion creek, amounting in the central part of the valley to about 125 ft. per mile.

Burwash creek has cut a deep, trough-like depression in the lower part of the upland across which it flows, and in two places its valley contracts into narrow, rock-walled canyons difficult to penetrate except in low water.

The rocks outcropping along Burwash valley are extraordinarily varied. The varieties noticed, in a distance of about eight miles along the central portion of the valley, included bands of green, striped and dark schists, slates and shales, intruded at frequent intervals by diorite, andesite, rhyolite, diabase and dunite. In addition to these, a copper-stained amygdaloid occurs in the lower canyon. Quartz veins are rare, and few quartz pebbles occur in the wash.

Coarse gold occurs along Burwash creek from the foot of the lower canyon up stream for a distance of eight miles or more, but no very rich ground has so far been found. The miners were greatly hampered during the past season by the excessive cost of supplies, and most of them were obliged to stop work even before the short season ended. On this account very few, if any, claims were fully prospected, and on most of them only useless assessment work was

done. Good prospects, and in some instances small amounts of gold, were obtained from several claims, and it is expected that considerable work will be done on the creek during the 1905 season. The gravels are shallow, are usually rather coarse, and contain numerous large boulders difficult to move. They are not frozen, and seepage water occasions considerable trouble.

A number of narrow, rock-cut benches supporting beds of gravel occur along Burwash valley at different heights above the creek, but usually low. The prospects from a number of these were considered very satisfactory, and, on several, pay gravels were reported and some mining was being done.

Burwash creek gold differs from that of Bullion creek in being much flatter. Most of the larger grains have been worn into smooth thin plates, and bulky nuggets are rare. The largest reported was valued at \$3.

Smaller Creeks.—Some prospecting was done during the past season on Kimberly, Telluride and Canyon creeks. The last was not visited by the writer. Kimberly creek is a tributary of Jarvis river, from the south-east. It is a steep, swift, glacial stream bordered below with bare gravel flats, but inclosed in a narrow, steep-sided valley above. The gravels in the narrow part of the valley are shallow, loose and coarse. Gold to the value of \$100 was reported to have been taken out of claim No. 14 above as the result of a few days' work. No work was being done on this claim at the time of my visit. Some work was in progress on the claim immediately below, but no pay gravels had been found. Good prospects were reported on Discovery claim and preparations were being made for sluicing. The result of the season's operations is not known. Telluride creek enters Jarvis river immediately opposite Kimberly creek, and is similar to it in general character. No mining has been done on this creek and very little prospecting.

Production of Gold.—The total production of gold in the Kluane mining district probably did not exceed \$20,000 during the 1904 season. The small production cannot be considered satisfactory, but it must be borne in mind that mining in the district is still in its initial stages and that only a few claims in the whole district were worked during the season, and these only for short periods. Also, while there was a considerable mining population in the district, most of the miners spent the summer, or a large part of it, in doing assessment work, most of it useless, on several claims, instead of fully testing one claim. Supplies could only be obtained in the district at prices prohibitive, so far as most of the miners were concerned; the freight rates alone from Whitehorse to Kluane lake amounted to 30 cents per pound, and to Burwash creek to more than 40 cents. Conditions during the coming summer will be more favourable; some of the claims are now roughly equipped and it is expected that, as a result of the construction of a government road into the district, freight rates to

Kluane lake will be reduced to about 10 cents a pound.

The discovery of coarse gold in so many creeks distributed over such a wide area is a fact of considerable importance even in the unlikely event of no large bodies of gravel rich enough to work by ordinary placer mining being found; portions of some of the creeks, at least, are certain, sooner or later, to be worked by more economical methods.

Other Minerals.—Galena occurs in small quantities in the wash on Bullion creek, but was not found in place.

Native copper is found with the gold on Bullion, Sheep, Kimberly, Burwash and, in fact, on nearly all the creeks in this portion of the St. Elias range on which any mining has been done. It occurs in rounded nuggets and slabs, the largest seen weighing a pound and a half, but is nowhere very abundant. A quartz pebble enclosing native copper was found on Bullion creek, indicating a vein-origin for a portion at least of the mineral. No native copper has, so far, been found *in situ* in the district. Copper pyrites occurs in crushed zones on Telluride creek, impregnating a green, amygdaloidal rock in Burwash creek canyon and in small veins on Bullion creek. None of the occurrences seen are of commercial value. A belt of copper-bearing rocks appears to follow the St. Elias range north-east to the International boundary and beyond. It has only been roughly prospected so far, but now that access to the region has become much easier will probably receive more attention.

The lignite-bearing beds on upper Sheep creek, previously mentioned, enclose several lignite seams, one of which measured over 4 ft. in thickness. The lignite is of excellent quality and burns freely in an ordinary Yukon box stove. There is no wood along the upper portions of the creek, and lignite is used by the miners for fuel. Lignite also occurs on Kimberly creek, but is not well exposed.

THE NEW SILVER DISTRICT, ONTARIO.

MINING in Ontario has received an impetus from remarkable discoveries of nickel, cobalt, arsenic and silver ores along the line of the Temiskaming and Northern Ontario railway, south of the township of Bucke. It is about two years since attention was first drawn to the occurrence of rich silver ores near Lake Temiskaming; since then official reports of the new district have been published by the Ontario Bureau of Mines, while the provincial press has provided the public with sensational, if not always accurate, information concerning the development and production of a number of mining properties since opened up at and around what is now known as Cobalt. Dr. W. L. Goodwin, director of the School of Mining, Kingston, Ontario, has contributed to the current quarter's number of *Queen's Quarterly* (published at Queen's University, Kingston), an article on "The New Silver District," as follows:—

It is not often that the construction of a railway brings to light a rich mineral deposit. The builders of the Canadian Pacific stumbled upon our nickel-copper ores, but did not know what they had found. The railway usually follows rather than precedes or accompanies mineral exploration. The prospector in nearly every case must work far away from the lines of transportation. He must sooner or later carry in his canoe or on his back everything necessary to his calling. He is a true pioneer. When the successful Arctic expedition finally reaches the North Pole they will probably find there those chippings of rock which show where the prospector's hammer has fallen. They may even find that the long sought Pole has been converted into a discovery post! Timber is scarce up North! Yes, the prospector is a man for whom untrodden wilds have a peculiar fascination, not only because they are untrodden, but because their wildness may give to him the precious stores never before looked upon by an appreciative eye. Too often, indeed, he chases a will-o'-the-wisp. His search may be long and still unrewarded. And, such are the peculiar chances of mineral discovery, one who is not looking for minerals may stumble upon something of great value, just as a man may find a purse or a roll of bills. So the blacksmith La Rose, sharpening drills on the right of way of the Temiskaming and Northern Ontario railway, stumbled upon the niccolite when, so it is said, he went to pick up his hammer which he had thrown at a rabbit. But the discovery was sure to have been made in a short time, even if there had been no La Rose and no rabbit. The beautiful coppery mineral was within a few feet of the railway, and large pieces of native silver were lying around on the surface in a way which made the first discovery child's play. The recognition of the value of the discovery was almost immediate. The director of the Bureau of Mines, Mr. Thomas W. Gibson, was shown a piece of the niccolite and suspected its value. He was confirmed in his opinion by the provincial mineralogist, Professor W. G. Miller, and by Professor Nicol, of the School of Mining. Thus it came about that two years ago next November Professors Nicol and Miller made the first informal exploration of the district, which they reached by the branch of the C.P.R. from Mattawa to Temiskaming and the steamer Meteor from that point to Haileybury on Lake Temiskaming. A walk of five miles southward from this point brought them to what is now the La Rose or Timmins mine. The same route is still followed by many who go into the district, but the T. & N. O. R. now carries them from Haileybury to Cobalt, the name first suggested by Professor Miller for the mining town. A second route to Cobalt, and the one usually taken, is by the T. & N. O. R. from North Bay. A run of 103 miles through a hilly country, diversified by numerous lakes and rivers, brings us to Cobalt, on the shore of Cobalt lake. Many of the richest deposits are grouped about this lake. The town plot occupies the western shore. There were in July about a dozen log houses and as many frame buildings, occupied partly as

shops and partly as dwellings. Numerous tents completed the town, but the sounds of the hammer and saw were heard day and night, and now there are at least a hundred buildings there. The population of the Cobalt district is a good example of a self-governing community. Disorder is almost unknown. There were no policemen until lately, when one was sent from Toronto. There may be a few thieves and other kinds of people we could do without, but the atmosphere is one of respect for the moral law.

As at once pointed out by Professor Miller, the great richness of the district is in its silver; but there are also large values in ores of nickel, cobalt and arsenic. The valuable metal, bismuth (worth \$2.10 a lb.), is also found, but no allowance is made for it by buyers of the ores. The silver is found native, sometimes in very large masses. Pieces of "float," weighing several hundred pounds, about half silver, have been found near some of the larger veins. The loose dirt near the veins may be rich in silver. At the La Rose mine they have been sacking what looked like ordinary black soil. It is worth \$250 a ton. Large slabs of pure silver are taken out of the veins, so that the mine managers are sometimes at a loss to know what to do with such obvious wealth until it can be shipped. I have seen valises full of silver lying in an open tent. Silver is worth about \$9.50 a lb. A good packer might carry off about \$1,000 worth of it if he found it with comparatively little rock.

In addition to the native silver there is in some of the veins a good deal of argentite, or silver sulphide, carrying more than 87 per cent. of silver. As it is black and often mixed with dark decomposed rock, it may be overlooked, and doubtless in some cases has escaped notice.

The arsenides of nickel and cobalt are valuable constituents of these deposits, and in most cases they accompany the silver. In a few instances they have been found without silver. These minerals (niccolite, smaltite, chloanthite, etc.) contain three valuable constituents, nickel, cobalt and arsenic. Nickel is used principally for nickel plating and for hardening steel (Harveyizing). It is at present sold in large lots at from 40 to 47 cents per lb. The value of cobalt, a metal closely resembling nickel, depends on the beautiful blue colour of its glass, made by melting together quartz, the oxide of cobalt, and carbonate of potash. This glass called smalt, forms when ground, the fine colour known as smalt blue*. The metal itself is used very little. The market value of the oxide is \$2.50 per lb. Much of the oxide is used in colouring enamels and porcelain. The arsenic is extracted mostly as the oxide (white arsenic) which is worth 3½ cents per lb.

The minerals are found in the Huronian slate and conglomerate in veins ranging from 14 in. to less than an inch in width.* These veins dip nearly vertically, and some of them have been traced for several hundred feet on the surface. In some cases the silver

can be seen filling the vein in solid masses several inches wide, but it is usually mixed with more or less calcite, together with the cobalt and nickel minerals. On and near the surface these latter often decompose, giving a pink rust (cobalt bloom) or a green coating (nickel bloom).

A very narrow vein may be profitably mined. When ore is worth, say \$1,000 a ton, it will pay to take out many tons of waste rock with every ton of ore. If we allow a weight of 300 lb. for a cubic foot of ore, then for a 2-in. vein a piece one ft. deep and six ft. long, will weigh 300 lb., or a ton for every 40 ft. of length. If such a vein is mined for 100 ft. in length and 100 ft. in depth it will yield 250 tons of ore. Allowing an average value of \$500 a ton (for the first six months of 1905 the average was \$768 a ton), the total would be worth \$125,000.** Carloads of ore have been shipped which brought \$1,500 a ton and even more. It thus appears that we have here a mineral deposit which in richness and availability closely resembles those gold diggings which at intervals have caused such feverish rushes. But Luna shines with a cold light. Her devotees in Cobalt have kept cool from the first.

The permanence of these mines has been questioned. Even if they peter out at a depth of 100 ft. or so, they will have yielded enormously. The La Rose vein is still strong at that depth. Mining was practically begun last spring, very little ore having been taken out before. Since then ore has been raised to the value of something like \$2,000,000. It is variously estimated at from \$1,250,000 to \$2,500,000. Government returns show the value of ore shipped up to June 30, to be \$684,819. But the veins are very numerous, and new ones are being discovered constantly on the properties which have been worked for some time. A 40-acre lot cannot be considered to be completely prospected until it is either stripped or systematically trenched all over. As the veins run somewhat uniformly, such systematic trenching is possible, and has actually been employed in some cases to locate a first discovery. It can thus be hoped that a considerable number of veins remain to be discovered on the claims already taken up and shown to contain the valuable minerals. These claims are nearly all included in a block about three miles square around Cobalt. But there are some promising finds outside this block; and a large amount of prospecting remains to be done before the possibilities are exhausted.

One pleasant feature of this rich mineral discovery is that so many young Canadians have by discovery or purchase become owners of these valuable deposits. Since Professor Miller's first informal report was made, in November, 1903, prospectors have been

*In a few cases the veins extend into the diabase, and even into the Keewatin, but with our present information the Huronian must be considered the mineral-bearing rocks.

**In addition about 3,000 to 5,000 tons of rock would be taken out. If we allow \$5 a ton for the cost of mining, the profit is obviously very large.

*So often used in old paintings. It is the purest and most beautiful of all the fast blues.

fully alive to the value of their finds, and have therefore in a great many cases preferred to work their own claims. The ready sale of the rich ore soon brings in capital to go on with. A carload (say 20 tons) may bring \$10,000 or \$20,000.*** It is a poor man's mining district, and in that respect resembles placer deposits of gold.

But it differs from these in producing, in addition to the silver, minerals which are the foundation of numerous and important industries. An ordinary gold mining camp is always a mining camp, and nothing more; but where nickel, cobalt, bismuth, and arsenic are mined, metallurgical, chemical, and a great variety of other manufactures may be gathered around. Smelting is the first step toward this, and possibly the only one which should be taken until the permanence of the mines is assured. The separation of the constituents of these ores into their final products is a very complex and difficult problem, but a first separation into silver and a nickel-cobalt speiss might be devised simple enough to warrant the erection of a plant in Cobalt or some other convenient place. This would enable mine owners to get reasonable returns for all the main constituents of the ores. The rates at which sales are now made have given rise to some dissatisfaction. But buyers claim that the demand for cobalt is so limited, only about 150 tons of the oxide being used every year, that they are unable to dispose of the large quantities now being produced in Ontario without knocking the bottom out of the market. At the very worst, however, the price of cobalt will not go below that of nickel, as it can be used for most of the purposes for which nickel is used. As an ornamental metal cobalt is the more beautiful, and has been tried with good results in Germany. It resembles nickel in its hardening effect on steel. There will always be a market for our cobalt, nickel and arsenic. Several companies have been formed to smelt and refine these ores, and it is stated that the works now being erected by the Canadian Copper Co. at Copper Cliff to treat the gold-bearing arsenic ores of the Temagami district may also be prepared to handle cobalt ores. The presence of those ores in Ontario has stimulated research, and a process will doubtless soon appear for the solution of this, in some respects, new problem in metallurgy. It will be to our advantage to have the separation and refining carried to a completion in Ontario. The mining of these ores cannot be compared with ordinary mining. The great concentration of values reduces the cost so that, in the case of veins of any considerable width, it is very small in proportion to the value of the ore raised. If the ore is simply sold out of the country, the industries of the country are little benefitted. Labour has not very much to show in return for this valuable raw material. The case is still worse when the ownership is outside of Canada. In that case the returns to the country in wages are small, and the silver goes to enrich aliens. It is true that the aliens may have paid a large price for the

property, but it is also true that they may have acquired it for very little. But while we may rather regret to see the citizens of another land carrying off our treasure, we must remember that there is a generous communism in such matters. Many of the forty-niners who filled their pockets from the California placers were Canadians.

DEEP DIAMOND DRILLING.

PROSPECTING by means of the diamond drill has already been employed in several of the larger mines in British Columbia and its effectiveness has been repeatedly demonstrated. In some cases the mining companies directly concerned have purchased and operated their own drill plant; in others contracts for certain specified drilling have been entered into with contractors for this class of work, such as the Diamond Drill Contracting Co., of Spokane, Washington, which has complete plants available for drilling in the Rossland, Boundary, Nicola-Coutlee, and other mining sections of British Columbia and elsewhere.

The extent to which the diamond drill is employed in some countries is not sufficiently realised, otherwise it would be freely used in this province. As showing the importance attached to its work in South Africa, the following, from the *Los Angeles Mining Review*, may be read with interest:

"More than 300 diamond drills are being operated in South Africa, many of which have a rated capacity of from 4,000 to 5,000 ft. These drills are now being used in larger measure than at any previous time in the Transvaal, to prove the existence and position of ore bodies, and so successfully have they been used that holes have been bottomed in ore at depths of from 4,500 to 5,000 ft.

"The drilling work is, as a rule, let by the mining companies to contractors. The latter furnish the equipment and expert drillers, delivering the cores to the companies for whom the work is done. It is a matter of some interest to note, as learned from a Johannesburg report, that American contractors have attained the greatest depths and have broken all drilling records. In one case cited, Mr. James Tobin completed a bore hole at Doornkloof 16 miles west of Radfontein, to a depth of 5,560 ft. The hole was sunk for the purpose of proving the main reef series. The particulars about this are that the deflection was very slight; to a depth of 3,200 ft. an N. drill was used; a P drill was then used putting the hole to the required depth of 5,560 ft. The total load of the rods was nearly 16 tons, the entire load being handled by the engine without difficulty. The mining time on this hole was 14 months, making an average of 400 ft. per month.

"That record was broken by a hole put down near Springs, east of Johannesburg, which was sunk to a depth of 5,582 ft."

***Some rich carloads were sold for as high as \$35,000.

THE CONRAD MINING PROPERTIES AT WINDY ARM, YUKON TERRITORY.

DURING the last three months much has been published concerning the new mining district at Windy Arm, in Yukon territory, on the northern boundary of British Columbia, a little north of the Atlin district. For a time the statements made con-



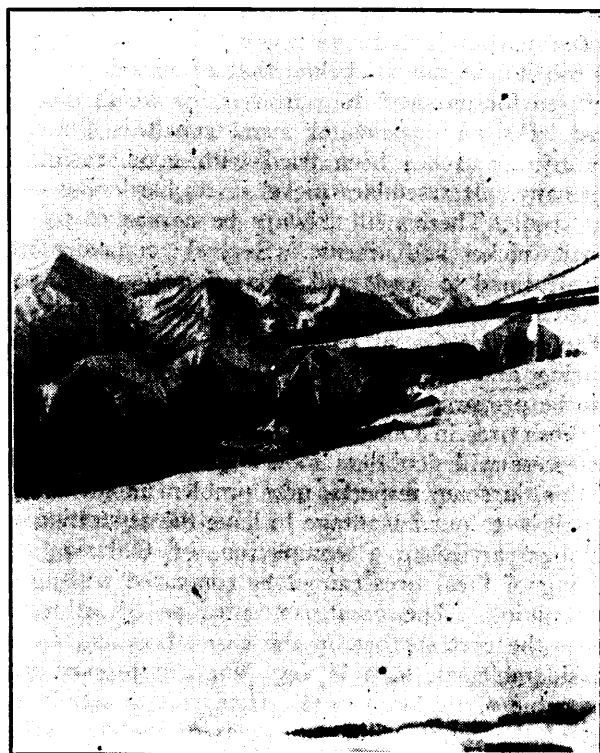
Mr. J. H. Conrad's First Camp.—Near the Glacier in March.

cerning the mineral riches of this locality were generally regarded as simply "newspaper talk," too sensational to be given much credence. It appears, though, that the district is one of great promise, and already a considerable expenditure of money has been made to provide facilities for the shipment of ore. The winter season having come on, it will not be practicable to do much work above ground for several months. Advantage is to be taken of the winter to haul in material for construction work to be undertaken next spring. Meanwhile underground development, with as many men employed as can be accommodated, will be continued, so that there will not be an entire suspension of operations throughout the winter. It will be well, though, to here note that there is little chance of men finding employment for the winter months, those engaged in opening up the new properties having already found it necessary to largely reduce their working forces, owing to their not having winter quarters for more than the few men they are keeping on. Situated at a comparatively high altitude, the camp is subject to weather conditions that make it imperative men shall be well housed in winter, so only hardship can be the experience of any who go in to the district in the winter without first making provision for sufficient protection against frost and snow.

Windy Arm, like many another mining camp, has its story of romance. A few weeks ago there was published in a Washington newspaper a story from Lewiston, Idaho, to the effect that two years ago a Portland, Oregon, man made the acquaintance of a northern miner named Ira Petty who owned several

valuable mineral claims at Windy Arm, and who was willing to give a bond on a nine-tenths interest for \$100,000, but under no consideration would he sell the remaining one-tenth. The Portland man induced three Lewiston men to join him in the venture and these four put up \$5,000, half as a payment on the bond and the remainder for development work. Later one of the four went to Windy Arm to examine the property after work had been done on it. His report was so discouraging that his associates refused to find more money to proceed with such a supposedly doubtful enterprise. The foreman in charge begged to be supplied with money to pay for sacks for ore and he would then soon ship enough to pay all the indebtedness incurred in doing the work to date, but the Lewiston men had had more than enough of it, and all they now wanted was to find "another sucker" to let them out without loss. This want was soon supplied, for Mr. J. H. Conrad, who had been to see the property, took the bond off their hands, reimbursed them the amount they were out, and made them "Just about as happy as a big sunflower." Rather more than a year later—within the last two months—they were railing at the hard luck that had caused them to part with a property of which they had just read the following newspaper report:

"Tunnels run or shafts sunk in a dozen or more places on the Conrad Consolidated, Conrad Bonanza



Mr. J. H. Conrad's First Camp.—Near the Glacier in Summer.

and J. H. Conrad groups of mines in the mountains adjacent to Little Windy Arm have demonstrated beyond the shadow of a doubt that there lies the richest

and most extensive body of silver and gold ore ever discovered on the American continent.

"The various Conrad groups comprise 17 claims, on each of which the ore vein is from 8 to 14 ft. wide and assays all the way from \$50 to \$3,000 per ton, principally in silver. At present no ore is being mined that assays less than \$600 per ton.

"To date more work has been done on the Montana mine than on the others. There a tunnel has penetrated the mountain a distance of 240 ft., all of which tunnel, excepting the first few feet, runs through ore going from \$2,000 to \$3,000 to the ton. Already

320 acres of land on the beach for tram terminals, mill sites, wharfrage, and for such other uses as their business may demand, and there a tented village is already springing up under the name of Conrad City."

Probably the foregoing account of the size of the veins and the value of the ore requires a considerable discount to bring it down to actual facts, but it is quoted as suggesting what it is possible for some men to lose and others gain as the result of the retention or loss of the spirit of enterprise that sometimes leads to fortunes being made out of ventures in new mining districts. Leaving the romantic aspect of the early



Entrance to Tunnel on Montana Claim.—Length of Tunnel in October, 360 ft.

from 600 to 800 tons of ore are on the Montana dump. It is now being sacked and packed out by mule train to the steamboat landing, a distance of four miles, for shipment to smelters.

"To convey the ore from the claims to the beach an aerial tramway will be constructed and for the purpose of surveying and constructing this tram B. M. Riblet of Spokane, Wash., the greatest aerial tramway constructor on the continent, is expected to arrive in a few days.

"Messrs. Conrad and Singer, for the mining company, have secured by purchase from the government

history of the discoveries at Windy Arm out of the question, the *MINING RECORD* is able to state that it has received Mr. J. H. Conrad's personal unqualified assurance that the following statements, made by himself to a newspaper interviewer, are reliable:

"The Windy Arm mining district has a known width of $3\frac{1}{2}$ miles and a length of 7 miles, in porphyry formation. How much larger it is no one knows as yet, as prospectors continue to find that it extends on both sides—to the south-east and north-west.

"There were during last summer about 100 mineral

claims located in the district by prospectors. These claims were readily sold to mining men on the ground with ready cash to pay for them. There was one prospector I know of who sold his claim, or rather 80 per cent of it, for \$105,000. He retained a 20 per cent paid up interest. In my opinion this was only a small part of what his property is worth.

"The veins in this district are true fissure veins, and they cut the formation in a true course regardless of dykes or other intersections. As evidence of this, on the Conrad Consolidated group we have partly

westerly direction and others in a northerly and southerly. You can walk along these veins for miles and find the same class of ore in one place as in another. In this respect this camp is unlike any other I have ever been in; the ore, instead of showing in shoots, is continuous for miles.

"In most of the veins from 80 to 90 per cent of the values is in silver. There are in the camp, though, two veins in which gold is known to pre-ponderate.

"The mineral discoveries in this district are, I consider, of greater importance than any others yet made



In Montana Canyon. -Camp on Mountain Hero Claim. Tunnel Driven Under Glacier in Background cut Vein at 240 ft. from Portal.

developed the Montana claim by tunnels and open cuts for a distance of more than mile. Latterly our object was to find the vein in what is known as Montana canyon, about half a mile away from where it had already been opened up by a tunnel. In the canyon a cross-cut tunnel was driven through a glacial moraine; at 240 ft. within a few feet of the line the surveyor had staked showing where we might expect to encounter it, the tunnel entered the vein.

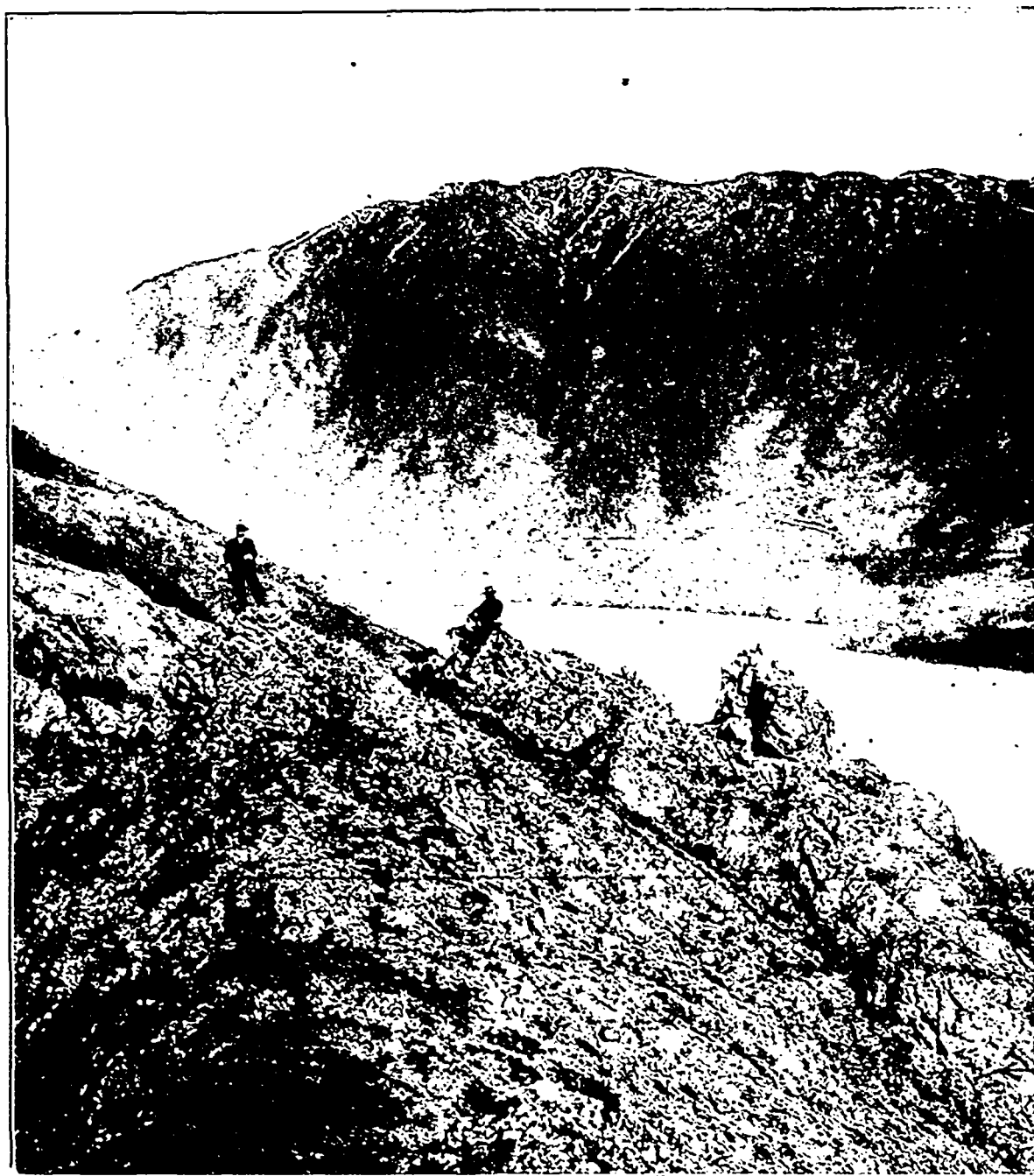
"This particular vein is no exception to the rule that applies in that camp. There are many veins showing on the surface, some running in an easterly and

in the north. There will, I believe, be a rush of prospectors to the Windy Arm country next spring. Without a doubt the big population of Yukon territory will in the near future be in this district."

It was further ascertained from Mr. Conrad that in all some 2,000 ft. of underground work have been done on five claims, beside much surface prospecting by trenching, prospect holes, etc. A tunnel on the Montana was, when Mr. Conrad left camp, in about 300 ft. practically all in ore. At that distance the face was at a depth from the surface of about 150 ft. The general character of the ore is quartz. Some veins

carry galena, but it is not thought much lead will be met with in the ore. The cross-cut tunnel above-mentioned, in which the Montana vein has been cut half a mile away, is on the Mountain Hero. The depth from the surface to the face of this tunnel,

in the season for him to form any opinion from surface indications, for snow had already covered the ground before he reached the district. He found, though, that the veins opened by tunnels had well defined walls and appeared to be true fissure veins. As-



Surveying for Riblet Aerial Tramway from Mine down to Windy Arm of Tagish Lake.

where it cuts the vein under the glacier is about 625 ft.

Mr. W. Fleet Robertson, provincial mineralogist for British Columbia, who paid a hurried visit to the camp this month, has expressed himself as agreeably surprised with the promising nature of the mineral occurrences he saw underground there. It was too late

say returns from samples of ore he took at random and which were assayed in the provincial government assay office at Victoria, were as under:

Description of Sample.	Gold, Oz. per ton.	Silver, Oz. per ton.
1—Galena ..	0.68	442.6
2—Quartz. . .	0.38	113.2

Contained antimony.

3—Crushed
sample. . 0.88 163.2 Contained antimony.

Although the Windy Arm camp, so far as yet known to extend, is in Yukon territory, it is only two to three miles north, and so is near enough to the northern boundary of British Columbia to make it not unlikely similar discoveries of mineral may be made in the province. Mr. Robertson will, therefore, under instructions from the minister of mines for the province, prepare a bulletin on the camp. Necessarily this will be only a general statement, for it was not practicable in the two days he spent in the camp to obtain data for a detailed report on its geology and mineralogy, apart from the fact that the only rock exposures visible at the time were those in the two tunnels above-mentioned.

Mr. R. G. McConnell, of the Geological Survey Department of Canada, spent a short time in the camp, at the close of his season's work in the Kluane district and just before his departure for Ottawa, so it is probable he will prepare for the department a report of what he saw there.

The accompanying illustrations will convey a good idea of the nature of the country in which the new mining camp is situated. Of the larger ones, one shows the entrance to the tunnel on the Montana claim, another gives a view of the canyon in which the Mountain Hero claim is located, with, in the background, the glacier under which the tunnel was driven to cut the vein at a distance of half a mile from the tunnel on the Montana. The third view is of the country over which the aerial tramway now passes from the mine to the waters of Windy Arm below. This tramway is nearly 20,000 ft. between



Sinking Prospect Holes Along Course of Montana Vein.

terminals. Of the small views, one shows the glacier in the canyon under which the 260-ft. tunnel has been driven to the Montana vein; another illustrates the work of sinking prospect holes through the moraine deposits covering the rock surface and hiding the vein; the remaining views show the first camp at the edge of a glacier, towards the close of winter, and the same camp in summer.

Three syndicates are operating as many groups of the claims generally known as the Conrad properties, and Mr. Conrad is largely interested in all of them. One of these is American and others are Canadian. Extensive development and equipment operations are



Near View of Glacier Under Which Montana Vein was cut by Tunnel on Mountain Hero Claim.

planned for next season; meanwhile good progress has been or is being made. Telephone communication has already been established with the mining camps, and telegraph facilities exist at Conrad City. Surveys have been made for a branch line from the Whitehorse & Yukon railway; additional aerial tramways are to be constructed, and transportation matters generally will be much improved next season. The question of the building of concentrating mills or putting in a smelting plant will have attention as soon as production matters shall be sufficiently advanced; and generally an enterprising policy will be followed so that the mines may be made profitable as soon as practicable.

The rich silver-cobalt ores being mined in what is now known as Cobalt camp, situated in the Temiskaming district of northern Ontario, are attracting much notice. Owners of mining properties there, though, find difficulty in disposing of the ore to full advantage. In this connection the *Toronto Globe* states that: "Cobalt has the ore, lots of it, and wonderfully rich, but the owners are not receiving what it is worth. The trouble lies in the reduction of the ore to its various metallic constituents. This is the question of the hour in the Cobalt camp."

MEMENTOES OF VISIT OF AMERICAN INSTITUTE OF MINING ENGINEERS.

SINCE the return to New York of those who had charge of the general arrangements for the British Columbia meeting and excursion to Yukon territory, which constituted the 1905 annual outing of members of the A. I. M. E. and their relatives and friends, many of those who contributed to the pleasure and entertainment of the visitors have received evidence of appreciation of their efforts. The task of writing individual letters to every one who was



known to have in any way assisted in this direction was no light one, yet it was performed in so generous a spirit that no one was overlooked—at least, none were knowingly omitted from the list of those who received kindly and courteous acknowledgment of their part in the general endeavour to promote the comfort and pleasure of the visitors.

During recent weeks those who were especially prominent in making the visit of the A. I. M. E. a success have received mementoes that they value highly, more from the happy memories they recall than from the intrinsic worth of the gifts, though the latter is not small. Mr. W. Fleet Robertson, provincial mineralogist, who was executive chairman of the reception committee at Victoria, B.C.; Mr. W. M. Brewer, the honorary secretary, and Capt. John Irving, who accompanied the excursionists on their visit to the Yukon, were among those who were thus honoured by the members of the visiting party. The accompanying illustration will give an idea of the nature of the gift to Mr. Robertson. It is a ribbon fob with pendant of Yukon gold, having on one side the adjoined flags of Great Britain and the United States in coloured enamel, and on the other side the initials of the recipient in *alto relievo* surmounted by the official badge of the American Institute of Mining Engineers. The letter received with it was as follows:

99 John Street, New York,
September 27, 1905.

William Fleet Robertson, Esq., Provincial Mineralogist, Victoria, British Columbia.

My dear Mr. Robertson,—I am asked by the members of the British Columbia and Yukon party who owe so much of their pleasure to your advice and thoughtful attention, to send you a little memento.

We have selfishly chosen to send something that can be worn by you, with the hope that you will carry it and thus insure a constant memory of the friendships made last July.

Very truly yours,

THEO. DWIGHT.

Mr. Brewer received the following letter:

99 John Street, New York,
September 27th, 1905.

William M. Brewer, Esq., Victoria, British Columbia.

My dear Mr. Brewer,—Appreciating the arduous work and the time you devoted to further our comfort and pleasure; and that your efforts went so far to make the British Columbia Meeting and Yukon Excursion an unqualified success, I am sending you, on behalf of the party, a little memento.

Trusting that you will carry it, and thus insure your not forgetting the many friends you made last July, I am

Yours very truly,

THEO. DWIGHT.

Capt. Irving received a letter in similarly pleasing terms, and a memento of a design particularly pleasing to a nautical man.

ALASKA COPPER CO'S SMELTER, IN KETCHIKAN DISTRICT.

FROM Ketchikan, south-east Alaska, comes the report that the smelter lately completed at Coppermount is now running, and is treating about 250 tons of ore per diem. The Ketchikan *Mining Journal* says that the smelter has been built and is owned by the Alaska Copper Co., which has mines at Coppermount. The power used in the smelter is generated by Pelton waterwheels of 600 h.p. capacity. The water for operating the wheels is taken from lake Mellen, which is situated in the hills at the back of Coppermount.

In the smelter ore bins there is already a consid-

erable quantity of ore awaiting treatment. From the time the ore leaves the mines until it reaches the smelter furnace, it is handled by gravity. A railway, 1,400 ft. in length, constructed along the ridge of Copper mountain, conveys the ore from the mine to the upper terminal of the aerial tramway which delivers it into the ore bins above the smelter. From the bins it passes through chutes to the furnace. At present the ore—chiefly a green carbonate of copper—is taken from the Indiana claim, the ore body occurring on which has been stripped for more than 250 ft. Some 150 men are employed at mines and smelter.

Beside owning mines at Coppermount, the company has leased the Rush and Brown property, at Kasaan bay, whence shipments of ore are being made to the smelter.

Mr. H. W. Mellen is president and manager; Mr. J. Cuthbert Welch, general superintendent; Mr. D. D. Stewart, mine foreman, and Mr. C. W. Fuller, smelter foreman and chemist. The head office of the Alaska Copper Co. is in Seattle, Washington.

The following additional information is from Stevens' *Copper Handbook*, 1904: "Lands, 18 patented claims, area 360 acres, also 18 patented mill-sites, area 80 acres, giving 1¼ miles frontage on Copper harbour, a land-locked haven with deep water. Lands are on Copper mountain, rising to a height of 3,600 ft. directly from the harbour. Property is estimated to carry 20,000,000 ft. of marketable timber, and has excellent water-power, partially developed by a 22-ft. steel pipe line of 1,900 ft. from Reynolds creek to the power plant, where there are two water-wheels of 300 h.p., total available power being estimated at 2,800 h.p. Lands show three veins, of which the Brooklyn is 10 to 30 ft. wide, showing chalcopryite assaying 3 to 34 per cent copper. The New York vein is a contact between porphyry and limestone, 10 to 60 ft. wide and 500 tons of selected ore therefrom gave smelter returns of 16.9 to 29.06 per cent copper, being the richest copper ore ever produced on the Pacific coast. The principal vein is the Indiana, in limestone near a granite intrusion, with extreme width of 280 ft., showing an average of about 5 per cent copper and \$2 gold per ton, with occasional assays running up to 25 per cent copper and \$6 gold per ton. Has a 150-ft. shaft, with tunnels of 200 ft., 430 ft. and 500 ft., showing oxide and carbonate ores, with a little native copper near surface, and sulphides at depth on the New York vein. Mining is planned to be done mainly by tunnel, giving cheap extraction. Surface plant includes hoists, air-compressor and necessary mine buildings and dwellings."

THE CANADIAN METAL CO. AND ITS ZINC ENTERPRISE.

FROM the *Frank Paper* it is learned that the zinc smelter of the Canadian Metal Co., under construction at Frank, south-west Alberta, and now nearing completion, is destined to be of much greater importance to the mining industry of the Canadian west than has heretofore been considered probable.

The reason is that with the plant now about ready for operation, the volume of business in sight is so large that the company has decided to increase the capacity of the works to more than double that originally planned. This decision was announced by the general manager, Mr. J. C. Fernau, on his return to Frank from British Columbia where he had been for some time completing negotiations for the acquisition by his company, of the Pilot Bay smelter and the Blue Bell mine, in addition to the mines previously acquired at Ainsworth. While in the Kootenay Mr. Fernau was joined by Messrs. Edward Riondel and O. Liegeart, the French capitalists who are largely interested in this enterprise, and a conference was held. It was recognized that with the ore the company will produce from its own mines and the large volume of custom business Mr. Fernau has received assurances of from other Kootenay mines, the capacity of the initial plant would be entirely inadequate. The decision to enlarge was therefore reached and Mr. Fernau and his associates proceeded to Frank, and instructions for the intended enlargement were issued the day of their arrival there. The clearing of the ground for the additional plant is now in progress and within a few days the laying of the foundation will be under way.

The plans for the enlargement of the smelter provide for the extension of the main building 200 ft. on the west end and 120 ft. on the east end, which will give the main building a total length of 670 ft. This will give room for seven more furnaces or a total capacity of 3,000 retorts, and six more roasters or a total of ten. It will considerably more than double the capacity of the present plant. The enlargement will involve the construction of another big flue, like the one already built which runs nearly 3,000 ft. up the mountain, and the mountain top will be crowned by two steel stacks instead of one. The construction of the addition to the works will be in all respects similar to that now being completed, viz., of stone, brick and steel.

The Pilot Bay smelter is to be renovated and refitted for concentrating and will have a magnetic separator for enriching zinc ores containing too much iron. It will also operate a lead stack and roasting furnaces and the bulk of the lead ores will be treated there, only enough being brought to Frank to supply the amount required to mix with the zinc ashes.

The Canadian Metal Co. will operate mines of its own which will supply a large portion of the ore for its Frank smelter. With the acquisition of the Pilot Bay smelter, it will have a plant with a water haul for all crude ores. The plant will concentrate the crude ores for shipment to the smelter at Frank, for final treatment, thus reducing to a minimum, the freight charge. The company will operate its own colliery, by reason of which, coal will be delivered immediately from the coal mine into the works at a cost no greater than if it had natural gas for fuel.

While the mines of the company will furnish a considerable portion of the ore to be treated by the smelter, the plant was built in the first instance for the treatment of custom ores and that intention will be

adhered to. The plant will be so complete that the company will buy ores of any description except copper. The original plans contemplated the employment of about 75 men when the plant should be in operation; the enlarged establishment will afford employment to something like 200 men when it shall be in full operation. The importance this will be to the mining industry of the west is obvious.

The expenditure of money entailed by the construction of the works at Frank will total something over \$700,000.

ONTARIO'S MINERAL WEALTH.

RETURNS made to the Bureau of Mines of Ontario show that the output of the metalliferous mines and works of that province for the first six months of 1905 was as follows:

	Quantity.	Value.
Gold, oz.	2,930	\$ 25,093
Silver, oz.	1,128,212	595,974
Nickel, tons.	4,671	1,638,040
Copper, tons	2,256	335,637
Cobalt, tons.	65	80,560
Iron ore, tons	113,583	274,224
Pig iron, tons	116,794	1,510,197
Steel, tons.	64,527	2,070,003

Total. \$6,529,728

Of this practically all the silver, all the cobalt, and 32 tons of the nickel were produced from the newly-opened mines of Coleman township, in the Temiskaming district. Nearly all the iron ore was raised from the Helen mine at Michipicoten, and the larger portion of the steel was made at the Algoma Steel Works, Saulte Ste. Marie. There were five iron blast furnaces in operation during the half year, one each at Hamilton, Midland and Deseronto, and two at Sault Ste. Marie.

It may be interesting to give the yield of the silver-cobalt mines of Coleman separately:

	Quantity.	Value.
Silver, oz.	1,121,762	\$592,749
Cobalt, tons	65	80,560
Nickel, tons	32	8,987
Arsenic, tons.	281	2,583

Total. \$684,879

The quantity of ore shipped from these deposits during the half year was 891 tons, so that the average value realized for the ore as shipped was \$768.66 per ton. The average contents of the shipments were 31 per cent arsenic, 3.6 per cent nickel, 7.3 per cent cobalt, and 1,257 oz. of silver per ton.

The price offered by the ore buyers for cobalt has fallen from 65 cents to 35 cents per lb., and whereas the nickel and arsenic contents of the ore were at first paid for at 12 cents and one-half cent per lb., respectively, nothing at all is now allowed for these constituents. The price paid for the silver is 90 per cent of the current value of fine silver.

The output for the half year shows an increase in nearly every branch of metalliferous mining, and is decidedly in advance of that for any previous six months.

(Note.—The foregoing figures have been taken from the *Toronto Globe*. In the absence of explanation it is difficult to determine why the gold is calculated at an average value of only about \$8.56½ per oz., and copper at about 7.4 cents per lb.—Editor MINING RECORD.)

PATENT OFFICE REPORT.

Mr. Rowland Brittan, patent attorney, of Vancouver, B.C., sends the following report on patents issued to British Columbians during the past month:

Arthur E. Evans and Fortuna Caron, of Beaton, B.C., are the inventors of a tree felling device. The device which is designed to save the time and labour usually spent in cutting notches and securing foot boards where large trees are to be felled, consists of a light plate to the corners of which are secured dog spikes by which the plate may be rapidly and safely fastened to the trunk of a tree. On the plate is a socket in which the foot board is pivotally mounted so that it may be swung round and set to any desired angle. A simple and efficient release is provided by which the position of the board may be changed when desired by the foot of the tree-feller without the necessity of his getting down off the board. The foot board has been well tried by practical loggers and has given general satisfaction.

A. N. Johnson and E. Hewitt of Vancouver are the inventors of what they have named the "Champion" reversible digger, scraper and conveyor, on which a Canadian patent has recently been granted. This conveyor, which is of that class operated by wire rope tackle over the area on which it is worked, consists of strongly braced sides between which is pivotally mounted a reversible scraper scoop which can be thrown to either end so as to be operative as a scraper in either direction during both forward and backward movement. Across one end of the body of the bucket a series of disc cutters is pivotally mounted and across the other end a frame of cultivator teeth, either of which may be thrown into action as required to cut up the turf or loosen the earth in advance of the scoop, which collects it within the bucket and it is conveyed to either end of the wire rope haul. The box or frame of the scraper is mounted about its mid-length on a pair of wheels and as the haul is connected to the same position, the conveyor will with facility adapt itself to irregularities of the ground over which it is drawn. The wire rope haulage tackle is especially arranged to permit of the traverse of the scraper over a given area and the feature of being able to operate in either direction must lessen materially the cost of working, as there is practically no dead haul. It is applicable for road grading or surface excavating of any kind whether for foundations, irrigation, placer mining or for any purpose wherein a cheap and expeditious handling over large areas is required, and should commend itself to contractors, and municipal or civic boards.

Tests of a new hydraulic mining machine have lately been made in one of the collieries of the Dominion Coal Co., Nova Scotia. The machine contains a row of telescopic pistons at one end, and a small pump at the other. After the coal is undercut the machine is operated parallel with and near the roof. The action of the pump forces water along a tube, where it comes in contact with the pistons. There it penetrates the coal seam in a downward direction, and as pressure increases the coal begins to fall to the floor. The use of the machine does away with explosives, and in addition to being economical in operation, is said to produce the coal with the least possible breakage.

COMPANY MEETINGS AND REPORTS.

DALY REDUCTION CO., LTD.

The annual meeting of the shareholders in the Daly Reduction Co., Ltd., was held at Hedley, Similkameen, B.C., on October 4th. No particulars of the business done have been made public—other than the names of the directors elected and officers appointed. The directors are Messrs Marcus Daly and J. C. Lalor, New York; C. A. Crawford, Anaconda, Mont.; J. G. Morony, Grand Falls, Mont., and A. J. Campbell, Butte, Mont. The officers appointed are: President and treasurer, J. C. Lalor; vice-president, Marcus Daly; secretary, C. A. Crawford; assistant secretary, A. J. Campbell. Mr. R. B. Lamb has been appointed general manager and superintendent. Mr. Lamb is an Australian by birth, and, says the *Hedley Gazette*, having spent all his life in the mining and reduction business, in Australia and in the United States, is eminently qualified to take hold of the concern. Under his management the company look for a record for economical extraction, and there is good reason to believe that they will not look in vain. During the past few days he has been taking his bearings and re-organizing his forces.

That important improvements in the plant are contemplated is quite evident, but what these will consist of remains to be seen.

The Daly Reduction Co. is incorporated under the Companies' Act, British Columbia, and owns all the plant used in the reduction of the ores of the Nickel Plate mine, including mill, power-house, flume, tramways (both gravity and electric), ore bins, etc.—in fact all to the mouth of the Nickel Plate mine tunnels. The mine and other mineral claims belong to the Yale Mining Co., incorporated under the laws of the State of Montana and registered in British Columbia as an extra-provincial company, which company is at present under the management of Mr. M. K. Rodgers.

GRANBY CONSOLIDATED MINING, SMELTING & POWER CO., LTD.

The adjourned annual meeting of the Granby Consolidated Mining, Smelting & Power Co. was held at the company's New York office on October 17. The report submitted was as follows: "Although a large tonnage of ore was treated, the production of copper bullion during the year shows a slight falling off, due entirely to the fact that no outside matte was purchased for treatment. Nevertheless, the profit—\$712,649.26—is considerably larger than last year, owing partly to great economies introduced during the year and partly to better average prices for metals. It is especially interesting to note that by far the larger proportion of the profits were earned during the last few months of the fiscal year.

"In March last the new line of the Great Northern Railway Co., connecting the smelter at Grand Forks with the mines at Phoenix, was completed, and since that time ore shipments have been received by both the Canadian Pacific and Great Northern railways.

"In Phoenix camp the company has, during the year, materially increased its holdings by acquiring there, by purchase, the Monarch group, the Marshall group and the Missing Link, and, after July 1, the Gold Drop group of claims, all adjoining the mining properties of the company in Phoenix camp. These acquisitions will facilitate the working of the mines owned by the company in the past, and, with the ore reserves on hand, will satisfy the largely increased demand of the smelter for raw material for a long time to come.

"It was decided last winter to add two blast furnaces to the six then in existence; thus increasing the smelting plant at Grand Forks to eight blast furnaces, and it was hoped that they would be in commission by midsummer of the current year. A number of unforeseen contingencies, however, caused considerable delay, consequently no benefit was derived during the last fiscal year from the operation of the two additional furnaces.

"These extensions and improvements necessitated a large outlay of money. It was found necessary to widen the tunnels, equip the same with an electric locomotive haulage system and provide new 10-ton steel ore cars. Besides, a new

crushing plant had to be erected and new ore bins installed, in order to facilitate the shipment of ore over the Great Northern railway. At the smelter, in addition to the new furnaces, a new blowing engine and accessory machinery, as well as new ore bins had to be erected. The method of handling the slag from the blast furnaces was changed, as also the method of charging the furnaces, both of which are now in operation and have materially lessened costs. These improvements entailed an outlay of about \$350,000 in the past year, and additional sums will be required during the current fiscal year.

"The mines, at which development work is constantly pushed, look well; the quantity of ore blocked out is largely in excess of that in sight last year. The smelting works, thanks to the improvements recently introduced, are in a high state of efficiency. The company is entirely free from debt and in addition to a large cash balance on hand, has further available assets in the shape of blister copper in transit from the smelter to the refining works."

Audited accounts for the year ended June 30, 1905, were presented. The statement of assets and liabilities is as under:

Assets.

Cost of land, real estate, machinery, buildings dwellings and equipment	\$14,451,565.39
Stocks, bonds and bills receivable	45,545.17
Cash, copper in transit and on hand, less advances	584,113.35
Fuel and store supplies	158,346.83
	<hr/>
	\$15,239,570.74

Liabilities.

Capital stock	\$15,000,000.00
Less—In the treasury	1,500,000.00
	<hr/>
Total issued stock	\$13,500,000.00
Accounts payable, current for month	184,490.27
Dividends collected on liquidator shares	205.20
Surplus	1,554,875.27
	<hr/>
	\$15,239,570.74

The following is a summary of the year's business:

Production.

The total production of metals was as follows:

	1904.	1905.	Decrease.
Copper, lb.	16,024,415	14,237,622	1,786,793
Silver, oz.	275,960	212,180	63,780
Gold, oz.	54,231	42,884	11,347

Copper sold at an average price of \$0.1436 per lb.; silver at \$0.5830 per oz., and gold at \$20. These prices were net after deduction of all expenses. The total amount realised equalled \$2,749,145.02.

Costs.

Working expenses at mines and smelter, freight, refining, selling and general expenses	\$1,797,964.35
Foreign ores purchased	238,531.41
	<hr/>
	\$2,036,495.76

Surplus.

Net profits for year ending June 30, 1905	\$ 712,649.26
Surplus from previous year (corrected)	842,226.01
	<hr/>
Net surplus June 30, 1905	\$1,554,875.27

Capital Expenditure.

Expenditure in new construction, equipment at mines, smelter and converter plants, etc	\$ 343,974.28
For additional mining properties	142,603.53
	<hr/>
	\$ 486,577.81

Other Particulars.

All development work, renewals and repairs have been charged to working expenses.

Mine development, 5,200 lin. ft; diamond drill development, 3,148 lin. ft.

Granby ore smelted, 550,738 dry tons; foreign ore smelted, 39,382 dry tons; total 590,120 tons.

Directors and Officers.

The directors were all re-elected. The board consists of Messrs. Geo. F. Baker, Jr., (First National Bank), Geo. Crawford Clark (Clark, Dodge & Co.), Arthur C. James (Phelps, Dodge & Co.), Jacob Langeloth (president American Metal Co., Ltd.), Geo. Martin Luther (secretary Nichols Chemical Co.), William H. Nichols (president General Chemical Co.), John Stanton (president Wolverine Copper Mining Co.), and Payne Whitney, all of New York; H. L. Higginson (Lee, Higginson & Co.), Boston; W. H. Robinson (manager Eastern Townships Bank), Granby, Quebec, and Jay P. Graves and A. L. White, Spokane, Washington. The officers were re-appointed, as follows: J. Langeloth, president; Jay P. Graves, vice-president and general manager; Northrup Fowler, secretary, and Geo. W. Wooster, treasurer. Mr. A. B. W. Hodges continues as general superintendent, and Mr. O. B. Smith, Jr., as mine superintendent.

PROVIDENCE MINING CO., LTD.

The third annual meeting of the Providence Mining Co., Ltd., was held at Greenwood, Boundary district, B.C., on 24th inst.

The report of the managing director reviewed the work done since he placed Mr. P. J. Dermody in charge of the mine, and stated that though the ore was practically exhausted, so far as work had been done, when the change was made, the mine had since been placed on a permanent paying basis. New plant and machinery had been installed, and 657 tons of ore had been produced, this realising \$61,919.54. The cost of the mining averaged \$19.83 per ton, and that of hauling, assaying, freight and treatment \$10.71. The report closed with an expression of opinion that the past year's development in the mine warrants the company in installing additional machinery for the further economic and expeditious working of the mine, and that sufficient treasury stock should be sold to pay for installing the necessary machinery and equipment.

The statements of accounts were as under:

Assets.

Providence mine	\$142,500.00
Development	33,610.71
Buildings and bins	608.00
Furniture and fixtures.....	60.00
Plant and tools	9,700.00
Inventory—	
Explosives.....	\$ 75.50
Mine supplies	85.50
Fuel.....	250.00
	411.00
Diamond claim.....	8,000.00
Suspense act.—	
Jeffery claim.....	259.10
Litigation expenses.....	257.05
	516.15
Ore act.—	
In transit, 30 tons at \$160.....	4,800.00
On hand, 30 tons at \$30	900.00
	5,700.00
I. H. Hallett, trust act.	82.04
Canadian Smelting Works	1,689.76
Bank of Commerce	5,099.01
	207,976.67

Liabilities.

Capital stock—	
Authorized	\$200,000.00

Subscribed and paid	\$158,500.00
Sundry creditors—	
Payroll, September.....	3,517.12
Accounts	3,663.31
	7,180.43
	\$165,680.43
Profit and loss	42,296.24
	\$207,976.67

Profit and Loss Account No. 1.

Dr.	
Ore account—	
Mining.....	\$13,028.69
Hauling.....	543.52
Assaying	259.30
Smelting.....	6,237.99
	\$20,069.50
Expense account—	
Special	\$ 708.75
Office	76.50
Chicago office	35.90
General	596.04
	1,417.19
Salaries.....	789.50
Interest and discount	168.92
Taxes	1,147.86
Depreciation account.—	
Development.....	\$11,203.56
Buildings	67.36
Providence mine	7,500.00
Plant and tools.....	511.04
Furniture and fixtures	9.85
	19,291.81
	\$42,884.78
Balance Profit and Loss act. No. 2	19,034.76
	\$61,919.54

Cr.

Ore account.....	\$61,919.54
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Profit and Loss Account No. 2.

Oct. 1, 1904, balance.....	\$23,261.48
Balance from Profit and Loss account No. 1, being net gain for the year ending Sept. 30th, 1905.....	19,034.76
	\$42,296.24

Superintendent's Report.—The mine superintendent submitted a condensed report of the work done under his supervision from the time he took charge on November 1, 1904, to September 30, 1905, as follows:

"I found the mine in very poor shape, all available ore was on the 300-ft. level, and was 43 ft. long, 12 ft. high and 6 in. in thickness. This ore I stoped out and shipped.

"I started cross-cutting at several places on the surface of the claim, and did much work thereon, working until snow fell, and succeeded in finding ore on the surface south of the entrance of what is now called No. 2 tunnel (the 300-ft. level). I stripped the wash off and opened the vein up for 100 ft., stoping down for 12 ft., the vein being about 8 in. in thickness. This ore I shipped.

After demonstrating that this ore was continuous on the surface, I started a drift on the No. 4 (200-ft. level), from the point where the previous work had ceased, and running south passed through the dyke, which was about 20 ft. in thickness, and immediately encountered ore.

I examined the north drift of the No. 4 level and drove this for about 25 ft., but found no ore. There was a break. I ran three upraises, about 60 ft., but without good results.

"To date I have drifted on the 200-ft. level 347 ft., cross-cut 20 ft., sunk 12 ft., and raised 30 ft.

"On the 300-ft. level I have drifted south 300 ft. (this drift is about 14 ft. high), raised 20 ft., drifted north 42 ft., and made three raises of 30 ft. each.

"I have sunk the main shaft 75 ft. and cross-cut to the ore 120 ft. I have drifted on the 400-ft. level 286 ft., 1.4 ft. high, sunk a winze 26 ft., raised 100 ft., and widened drift 150 ft. I also timbered and put in chutes on the 200-ft. level 130 ft., timbered and put in sill floor and chutes on the 300-ft. level 185 ft., and timbered and put in chutes on the 400-ft. level 190 ft.

"In addition to this I did a considerable amount of surface work, including cuts. The following is a memo of the cost of the above work:

580 ft. drifting at \$24	\$13,920.00
955 ft. drifts and tunnels at \$12	11,460.00
160 ft. open cut at \$6.....	960.00
313 ft. open cut at \$1	313.00
1200 ft. ditch at \$1	1,200.00
75 ft. shaft at \$20.....	1,500.00
12 ft. shaft at \$20.....	240.00
	\$29,593.00

"During this period I mined 657 tons of ore at an average cost per ton of \$19.83.

"In addition during the year the mine buildings have been improved and an up-to-date plant, including an 80-h.p. boiler, 7-drill air compressor and 1,200 ft. of piping for water supply, has been installed.

"The mine at the present time is in much better condition than when I first took charge and will bear inspection by the board.

"I would respectfully recommend the board to take up the question of installing a complete electric plant, as the present supply of wood is becoming very limited; also a shaft house, drying room and office building. I estimate that these improvements would cost in the neighbourhood of \$30,000.

"In conclusion, I would point out that, owing to friction in the directorate of the company, the mine was practically running only seven months of the eleven months covered by this report."

The reports and statements of accounts were adopted. The election of directors and appointment of officers resulted as follows. President, Mark F. Madden; vice-president, D. B. Scully; secretary-treasurer, J. B. Heeney; H. J. Fitzgerald, Franklin Rudolph, Judge Hildreth, and Dr. Byrnes, all of Chicago; and W. S. Macy, of Phoenix, B. C.

TYEE COPPER CO., LTD.

The following information has been taken from the report of the Tyee Copper Co., Ltd., for the year ended April 30, 1905:

Development has failed to reveal any extension in depth of the present ore-body, the bottom of which has been found just below the 200-ft. level. Its lateral extent too has been ascertained, and of unworked ore only 250 ft. remains between the east boundary and the easternmost point of the mine; to the west, the vein pinches out, passing out of Tyee territory. The amounts, and the cost per foot, of development were as follows:

	Amount Done.	Cost per ft.
Drifting.....	776 ft.	\$ 6.72
Cross-cutting	1,215 ft.	6.38
Raising.....	252 ft.	10.29
Sinking	352 ft.	30.23
Station cutting	123 ft.	27.83
Re-opening caved drifts	658 ft.	8.48

The shaft has now reached 760 ft. and is still in green sand. The manager, however, is of the opinion, entertained by other authorities, that further ore-bodies will be found with depth.

From the stopes on the 100-ft. level 22,640 tons of ore were

removed during the year, and 27,104 tons from other parts of the mine. All but two stopes were exhausted. In the west stope, about 3,000 tons remain, but so close to the surface as to render removal impossible until later; No. 6 stope shows a width of 20 ft. at a point 60 ft. above the first level and is advancing into new ground. In all other parts of the mine, about 14,000 tons of ore remain untouched. Until new ore bodies are found, extraction will be reduced to 2,000 tons per month, which, however, is sufficient to earn a profit. Dividends have been suspended, awaiting the same contingency.

The Tyee ore had the following composition:

Copper	4.08%
Iron	10.49%
Zinc	7.36%
Silica	13.48%
Barium sulphate	37.63%
Lime	2.04%
Alumina	7.01%
Manganese	Trace.
Sulphur, as sulphides	15.65%
Silver.....	2.67 oz.
Gold	0.131 oz.

The cost of extracting and shipping ore was less during the year than at any previous time. It consisted of the following items, in dollars per ton:

	Cost per Ton.
Stoping and hoisting	\$1.156
Ore dressing.....	0.040
Proportion for development	0.425
Retimbering old workings	0.034
Fuel	0.048
Freight and hauling	0.059
Transporting to E. & N. Ry. (aerial tramway).....	0.119
General charges	0.189

Total costs..... \$2.070

The ore received by the company's smelter at Ladysmith comprised 49,744 tons (wet) or 48,826 tons (dry) of Tyee ore, of which 11 per cent. was bricked, and 6,963 tons of custom ore and concentrates, the whole quantity of ore smelted (including some on hand at the beginning of the year) being 57,681 tons. In addition, 1,928 tons of custom ore was used as flux.

Roasting was continued as in the previous year. Of the total smelter charge, 65.24 per cent was roasted, the rest having been smelted raw. The sulphur as sulphides, remaining in the roasted ore, averaged 6.32 per cent for the lump ore and 4.84 per cent for the ore and bricks. Of the 37,633 tons of roasted ore, 14.7 per cent was made into bricks. The smelting furnace was in blast 245 days and treated 14,183 tons of Tyee raw ore, 32,100 tons of Tyee roasted ore, 5,533 tons of roasted bricks, and 7,344 tons of custom ore, a total of 59,160 tons of ore, besides 1,816 tons of flux, 1,588 tons of flue dust, and 891 tons of slag and concentrates. Of coke, 7,359 tons were consumed, being in the ratio of 1 of coke to 8.63 of charge, as against 1 to 9.45 in the previous year. The ratio of concentration was 10.97 of ore into 1 of matte.

A three-months' trial on one tuyere of the furnace was made of heating the blast on the principal of a long passage through tubes of comparatively low temperature, instead of a short passage through highly-heated stoves, and the satisfactory results attained led to the installation of blast heating apparatus based on the data thus acquired. An average assay of slag from the dump was 0.41 per cent copper, 0.14 oz. silver and a trace of gold. The flue dust carried 2.46 per cent copper, 2.51 oz. silver and 0.09 oz. gold.

The smelter shipped 5,390 tons of matte, of the value (less refining charge only) of \$825,950, an average analysis of which was 43.27 per cent copper, 31.62 oz. silver and 1.85 oz. gold, besides 7.21 per cent barium sulphide and 13.41 per cent zinc sulphide. This was equivalent to a yield of 4.04 per cent copper, 2.95 oz. silver and 0.182 oz. gold, a total value of \$14.32 per ton of ore smelted. A permanent samp-

ling mill was erected on the east side of the roasted ore bins, and was started on January 1, 1905.

Sales of matte, and other resources brought in £169,986. Expenses included purchase of ores, etc., £23,243; mining, £37,337; smelting, £32,564; London office, £1,919; Canadian revenue taxes, £2,119; loss of exchange, £1,194; leaving a balance of £71,610 on the year's operations. Two dividends, totalling £27,000, were declared; one-fifth of the total expenditure to date for development was written off, as was also £19,698 for depreciation of properties and plant. Income tax absorbed £3,729 and "commission" to subscribers for second issue of stock took £6,400, leaving a surplus of £28,307 (including £14,350 from previous year) to be carried forward.

COMPANY CABLES AND NOTES

CABLES.

U. S. A.

Alaska Mexican.—September: 120-stamp mill 30½ days, 20,700 tons ore; estimated realisable value of bullion, \$30,428. Saved 395 tons sulphurets; estimated realisable value, \$28,159. Working expenses, \$35,201.

Alaska United.—September: Ready Bullion claim: 120-stamp mill 30½ days, 19,880 tons; estimated realisable value of bullion \$27,729. Saved 390 tons sulphurets; estimated realisable value, \$13,045. Working expenses, \$29,440.

Alaska Treadwell.—September: 240 stamps, 30½ days; 300 stamps, 29½ days, 85,568 tons; estimated realisable value of bullion, \$88,008. Saved 1,680 tons sulphurets; estimated realisable value of same, \$77,432. Working expenses, \$83,054.

British Columbia.

Le Roi.—September: Shipments amount to 8,150 tons (to Northport smelter, 6,965 tons; to Trail Smelting Works, 1,185 tons), containing 3,079 oz. gold, 3,050 oz. silver and 172,850 lb. copper. Estimated profit on this ore, after deducting cost of mining, smelting, realisation and depreciation, \$17,000. Expenditure on development work during the month, \$10,000. Shipments to Northport smelter will cease October 15th.

Le Roi No. 2.—September: Shipped 1,087 tons. The net receipts are \$19,412, being payment for 1,026 tons shipped, and \$1,963, being payment for 68 tons concentrates shipped; in all \$21,375, inclusive of \$2,818 for 250 tons from the dump.

Tyce.—September: Smelter ran 11 days; smelted—Tyce ore, 1,919 tons; custom ore, 294 tons; total, 2,213 tons. Matte produced from same, 271 tons. Gross value of contents (copper, silver and gold), after deducting costs of refining and purchase of custom ore, \$35,019.24.

Tyce.—Cablegram from general manager (Mr. Clermont Livingston) reports that the present depth of the main shaft is 905 ft., and that there is no change in the character of the rock from the 800-ft. level. The board has given instructions to continue sinking to the 1,000-ft. level for the present.

Ymir.—September: 20 stamps, 29 days, 1,580 tons, producing 305 oz. bullion; estimated realisable value, \$3,137; concentrates, 115 tons shipped; estimated value, \$3,500; cyanide plant, 1,140 tons of tailings, producing bullion having estimated gross value of \$1,130; sundry revenue, \$266; total, \$8,033. Working expenses, \$8,466. Loss, \$433. Expended on development, \$1,446.

Ymir.—Cablegram from the mine manager:—Crosscut to the hanging wall level No. 7, fine body of ore; the average width is 10 ft.; average assay of ore is \$9. (Office note—This important ore body has been struck 230 ft. east from the shaft, 200 ft. below the discovery (5 ft. wide, \$20) in level No. 5, which is 240 ft. west from the shaft. Operating costs amount to about \$5 per ton on the present output, exclusive of development, but this figure can be appreciably reduced on a larger output.)

DIVIDENDS.

Alaska Mexican.—Dividend of \$0.30; total, \$54,000; payable October 28.

Alaska Treadwell.—Dividend of \$1; total, \$200,000; payable October 28.

Le Roi No. 2.—Interim dividend of 1s. per share, payable October 30.

Lucky Jim.—A Nelson despatch, of October 17, says. The Lucky Jim mine at Bear Lake, Slocan district, paid its eighth dividend here yesterday, the amount now distributed being \$84,000. The dividend yesterday was \$24,000. The ore from this mine is practically zinc. Work was commenced in July, 1904, and the shipped ore has averaged 54 per cent zinc. The property is not incorporated, but is owned by John Wolverton, one-eighth, and G. W. Hughes, seven-eighths.

St. Eugene.—Dividend of \$0.2; total, \$04,040; payable October 30. Total paid to date, \$338,080.

NOTES.

Hall Mining & Smelting.—The favourable outlook for mining in Kootenay is showing itself in the fact that Hall Mining & Smelting Co. shares have risen from 1s. 6d. to 3s. 6d.

Le Roi.—Notice is given that John H. McKenzie of Rossland, B.C., mining engineer, has been appointed the attorney of the Le Roi Mining Co., Ltd., and that the appointment of Anthony John McMillan as attorney of said company has been revoked.

Beatrice Mines, Ltd.—The office of this company, of which Mr. Frank F. Fullmer is manager, has been removed from Beaton to Camborne, Fish river, Northern Lardeau.

The Daly Reduction Co. is applying for a record of 5,000 in. of water from the Similkameen river. Substantial additions to the number of stamps, concentrating tables, etc., at its mill at Hedley are under consideration by the management.

Le Roi No. 2.—The secretary has issued the following circular:—"An arrangement has been come to between ourselves and the board of the Le Roi Co., by which permission has been obtained, subject to detailed arrangement at the mines, to explore our property from their deep levels, which should lead to a considerable saving to us both in time and money. Shipments to the smelter have now been resumed on the customary scale. Early in the year a new stope was opened up on the 500-ft. level, which gave good values, though the quantity in sight was not great; it is satisfactory to state that lately a continuation of this ore body has been proved by the diamond drill in a westerly direction on the same level, carrying high values."

St. Eugene.—During September the mine shipped 2,500 tons of ore and concentrates to the Trail and Nelson smelters. Owing to the shaft house having been destroyed by fire, the mine has had to stop shipping until new buildings shall have been erected and machinery installed.

Another mining company has been organized in Moyie, says the *Leader*. It is made up of the owners of a group of claims adjoining the Aurora property on the west side of Moyie lake. The claims are the Durango, Kruger, Dorothy, Toronto, Roberts, Elmer Fraction and Ruth Fraction. Mr. D. J. Elmer is the promoter. Messrs. J. A. Harvey and Frank Guindon and some people in Illinois are interested. The plan now outlined is to drive a 1,000-ft. cross-cut tunnel through the claims, which will prospect them thoroughly. Winter quarters and actual work will be begun as quickly as possible.

LAY OVER FOR PLACER MINING CLAIMS.

Notice has been gazetted that all placer mining claims legally held in the undermentioned mining divisions are laid over until the respective dates shown below:

Until May 1, 1906: Ashcroft, Clinton, Greenwood, Kamloops, Lillooet, Similkameen, Trail Creek and Vernon.

Until May 31, 1906: Arrow Lake and Nelson.

Until June 1, 1906: Cariboo, Fort Steele, Illecillewaet, Lardeau, North-east Kootenay, Revelstoke, Skeena and Trout Lake.

Until June 15, 1906: Atlin.

Until July 2, 1906: Liard, Stikine and Teslin Lake.

COAL NOTES.

The Coleman Miners' Union have completed arrangements for the erection of a first class modern hospital in the Blairmore district, South-west Alberta.

The contract for building nine new houses for the West Canadian Collieries Co. at its Bellevue colliery, near Frank, has been completed.

The new yards at the Crow's Nest Pass Co's Coal creek colliery are nearing completion. The scales are in their new position and the box car loader is about ready for use.

At the mines of the International Coal & Coke Co., at Coleman, an output of some 900 tons of coal per day is being maintained. The company is giving employment to about 300 men, a large part of whom are engaged in development work.

The Enderby Coal Mines, Ltd., has a gang of men at work developing the property. A tunnel is being driven somewhat lower down the hill than the old one, where it is expected to strike the coal seam to much better advantage. The company has decided to spend a large amount in development work this winter and is very sanguine as to results.

The amount of the payrolls at the Crow's Nest Pass Coal Co's three collieries for the month of September was as follows: Coal Creek, \$70,300; Michel, \$42,530; Carbonado, \$17,302.80; total, \$130,142.20. The output of coal for the month was: Coal Creek, 38,278 tons; Michel, 23,049 tons; Carbonado, 8,159 tons; total, 71,486 tons.

For some time past Mr. J. C. Drewry has been devoting a deal of his attention to the development of a coal property he owns in Alberta. It is located six miles east of Frank, just within Crow's Nest Pass. Two seams of coal have been opened up, and when the spur now being built by the C. P. R. shall be completed regular shipments will be commenced. There are five seams of coal on the property. One is a 9-ft. seam of excellent domestic coal, another is 12 ft. in width and is a fine steaming coal. It is from the latter seam that shipments will be made at the outset. The St. Eugene mine will take a carload a day.

Drilling on the coal lands of the Vermilion Forks Mining & Development Co. at Princeton has resulted in the encountering at a depth of about 300 ft. of a 4-ft. seam of good coal. Drilling is being continued in the expectation that another seam will be met with some 40 ft. deeper.

The Hillcrest Coal & Coke Co., of which Mr. C. P. Hill is manager, is opening up a new coal property a little south of Frank, south-west Alberta, at the end of Turtle Mountain. The property on the east is directly opposite Bellevue and about two and a half miles from that point on the other side of the C. P. R. track. Mr. Hill intends putting a railway up to Hillcrest, probably next spring, and should have no great engineering difficulties to complete it. The grade, from previous surveys, is about 20 per cent all through. Hillcrest is situated in a little valley between the end of the Turtle and the next range. There prospecting in three different seams was done all last summer. The seams are 10, 12 and 15 ft. in thickness.

The strike of the miners of the Western Fuel Co., operating coal mines at Nanaimo, Vancouver Island, was "called off" by the miners on Saturday night, September 30. A week previously Mr. W. L. Mackenzie King, deputy Minister of Labour, arrived from Ottawa to endeavour to bring about a settlement of the difficulties between the miners and the company. His coming had not been requested by either party, but he came under the provisions of the Conciliation Act, which, though not compulsory, provides for the friendly intervention by the Dominion government in labour troubles. After several lengthy conferences with the miners and the management of the company, separately and jointly, a committee of five was appointed by the men to arrange matters with the manager of the company, who was stated to have persisted in positively declining to negotiate with either the Western Federation of Miners or the United Mine Workers of America, both of which have branches at Nanaimo, though ready at any time to discuss the differences with the men

themselves. The ballot taken resulted in 239 voting in favour of acceptance of the settlement conditionally arranged by the committee and 93 against it. The strike, which had lasted over four months, was, therefore, declared to be at an end. The settlement is announced to be in the nature of a compromise, each side giving and taking so as to arrive at a mutually satisfactory understanding. A working agreement for two years is stated to have been signed. Many of the miners employed in the Western Fuel Co's mines at the time of the strike have left Nanaimo, some of them finding employment in the Wellington Coal Co's collieries at either Extension or Cumberland, and others seeking employment elsewhere.

The Norwegian collier *Titania* has cleared from Nanaimo with a cargo of 5,000 tons of coal, the first foreign shipment since the industrial trouble, which began on June 1. It is the intention of the colliery company to put on its regular fleet of colliers between Nanaimo and San Francisco, and within the next month or six weeks the coal shipments from that port will be as large as, if not larger than, for some years back. At the mines everything is running like clock-work and the coal output is being daily increased. On one day recently the Brechin mine yielded some 500 odd tons, a remarkable showing for a mine that has been in operation less than a month. No. 1 mine, while it is not yet fully opened up, is hoisting nearly 600 tons a day. This will be increased daily as new places shall be opened up. It is predicted that the big mine will shortly have a daily output of nearly 1,000 tons per day. There are very few if any idle miners in the city, and if the colliery company continues its rapid rate of development there will be work for many outsiders in the near future.

Mr. W. J. Harrison's (San Francisco) circular of October 11 says: "Since our last, there has not been a coal arrival from Australia. There are 23 vessels listed to load coal at Newcastle, New South Wales, with a carrying capacity of about 50,000 tons, included in this list are three steamers, with a carrying capacity of about 15,000 tons. The arrivals of colonial coal for the month of September, 1904, were 15,982 tons; for the month of September, the present year, only 5,280. Deliveries of British Columbia last month were over 18,000 tons. The total deliveries of coal from all sources this year for September show a shrinkage of 19,000 tons, against the coal arrivals of the same period for 1904. There is a perceptible shrinkage of all grades of coal in the yards here; still, the wholesale prices remain unchanged, as early relief is expected from the British Columbia collieries as soon as future freight engagements can be arranged. There is but one vessel due from Newcastle, but the three steamer cargoes should be received here early next year. The strike in British Columbia, that has been in progress for the last four months, has been amicably arranged, and work will be re-commenced at an early date. Duration of the agreement will be for two years, and the minimum rate of wages to the miners appears to be a very generous one. All collieries which have been affected by the strike just ended belong to the Western Fuel Co. here, which has absolute control over all British Columbia coal products coming to this market. Producers of fuel oil are endeavouring to establish a better rate for their products; it is very doubtful if they will be successful.

MACHINERY AND CONSTRUCTION NOTES.

The *Canadian Electrical News*, states that the Canadian Westinghouse Co., of Hamilton, Ontario, will supply two 5,000,000-gal. pumping engines for the city of Toronto. The amount of that company's tender is given as \$88,411.

At the Canadian Smelting Works, Trail, the capacity of the electrolytic lead refinery has been increased by the construction of more electrolytic depositing tanks and the provision of the necessary complementary plant to increase the output capacity of the refinery to 50 tons of pig lead per day.

It is announced that the Vancouver Power Co. will still further increase the capacity of its plant at Lake Beau-

tiful, near Vancouver, B. C., by the addition of another 1,500-kw. unit and by the construction of another pipe line. A Pelton water wheel, operating at 225 rev. per min., under 390-ft. head, will also be installed.

The Canadian Westinghouse Co. is supplying and installing all the necessary electrical apparatus for the new General Hospital at Vancouver, B.C. The equipment includes one 50-kw. 125-volt compound wound direct current engine type generator, one 25-kw. 125-volt compound wound direct current engine type generator; one 11 by 12 direct connected Ideal engine, and one 9 by 10 direct connected Ideal engine, beside switchboards, etc. This plant will generate electricity sufficient for 1,500 16-c.p. lamps.

The Granby Consolidated Mining, Smelting & Power Co., Ltd., has completed the installation of two 48 by 210-in. water-jacketed blast furnaces at its copper smelting works at Grand Forks, Boundary district. These are fitted with 24 tuyeres on each side, this being double the number generally used and of half the customary area. They are the largest blast furnaces in British Columbia, and together with the six 44 by 160-in. furnaces previously in operation, give these works a daily treatment capacity of 2,500 to 3,000 tons of ore per diem. In the new smokestack at these works 458,000 bricks were used. The work of building took 32 days, with an average of four brick-layers. The exact height is 150 ft. 11 in. The inside diameter is 12 ft. 8 in., and the outside diameter 10 ft. at the base, tapering up to 15 ft. 4 in.

The construction of the steel trestle, to take the place of the wood trestle destroyed by fire last March, at the Crow's Nest Pass Coal Co's Coal creek colliery, and its equipment with modern tipples and other coal-handling appliances, is about completed, and a preliminary run of the new plant has been made. This permanent steel structure is to supply Nos. 1, 5 and 9 mines, on the north side of Coal creek, and Nos. 2 and 3, on the south side. It is approximately 900 ft. in length. Present provision is for an output capacity of about 4,000 tons daily, but the structure is designed for an eventual extension to 8,000 tons per day. The estimate of cost of construction and equipment when the contract was let to Heyl & Patterson, Incorporated, of Pittsburg, Pa., last April, was about \$200,000.

Construction of the double, high tension, electric power transmission line the West Kootenay Power & Light Co., Ltd., is building from its hydro-electric power house at Bonnington Falls, near Nelson, British Columbia, to Grand Forks, Phoenix, and Greenwood, in the Boundary district, to supply electric power to smelters and mines, is being expeditiously proceeded with. An order for copper cable for this line was placed last summer; it was for about 728,000 lb. of cable about half an inch in diameter and containing six B. and S. wires wound about a jute centre. The line will be 70 to 80 miles in length and the current will be transmitted at a voltage of 60,000 volts. A sub-station, 50 by 54 ft. with walls 40 ft. high, for stepping the current down, is in course of erection at Phoenix, where are situated the Granby Co's big mines. It is probable power will be available for the Granby Co's smelter, at Grand Forks in November but the line will not be completed to Greenwood until about February next.

Mr. T. A. Dickson and his gang of ten men, who have been at work on the Yukon river at a point known as Hellgate, improving the steamer channel by driving piles and building a breakwater, have completed their labours and returned to Whitehorse. They constructed between 1,000 and 1,200 ft. of work, and very materially bettered navigation at that particular point.

TRADE NOTES AND CATALOGUES.

Canadian Westinghouse Co's Circular No. 1121, Westinghouse Type G Enclosed Switch, and No. 1123, Westinghouse Prepayment Wattmeters, have been received, also Instruction Book No. 5057, (second edition) Instructions for the Installation and Care of Westinghouse Type B Self-contained Integrating Wattmeter for Three-Wire Single-Phase Circuits 7200-16000 Alternations.

From the Denver Fire Clay Co. has been received its illustrated and priced catalogue of assayers' and chemists' supplies.

The Jeffrey Manufacturing Co., of Columbus, Ohio, U.S.A., sends its Bulletin No. 10, Jeffrey Electric Mine Locomotives. This bulletin is artistically printed, and freely illustrated with well finished representations of many styles of electric mine locomotives and their component parts. Accompanying tables give full particulars and power of the various locomotives, and much other useful information of particular interest to mine owners and others to whom electric transportation is a subject of importance.

"Westinghouse Railway Apparatus" is the title of Special Publication No. 7030 lately issued by the Canadian Westinghouse Co., of Hamilton, Ont. This gives particulars of Westinghouse Direct-Current Railway Motors, Single-Phase Alternating-Current Motors, Generators, Westinghouse Systems of Control, Baldwin-Westinghouse Electric Locomotives, etc. The text is illustrated on every page, the subjects ranging from an interior view of the power house of the Manhattan division of the Inter-Borough Rapid Co., with eight 5,000-kw. generators showing, down to repair parts.

The Westinghouse Electric and Manufacturing Co., of Pittsburg, Pennsylvania, U.S.A., has forwarded its Special Publication No. 7038 "Westinghouse Rotary Converters," which gives particulars of their characteristics, and construction, with instructions for their erection, operation and care. Diagrams and half-tones serve to make clear the information contained in this serviceable publication. A storage battery folder, entitled "Westinghouse Storage Batteries for Railway Signal Service," is another publication just to hand. This is the first folder on this subject issued by the Westinghouse Machine Co., and it serves as an announcement of a new and important branch of its business.

The West Kootenay Power & Light Co. has awarded a contract to a Rossland, B. C., firm for the supply of 111 tons of pins for use in the insulation of the high tension pole lines in course of construction between the power station at Bonnington Falls, Kootenay river, and the Boundary district. The length of each pin will be 24 in., and the diameter 1 1/4 in.

AMERICAN MINING CONGRESS.

The following addresses have been arranged for, so far, to be given at the meeting of the American Mining Congress to be held at El Paso, Texas, on November 14, proximo:—

Mr. E. Lyman White, Colorado State Commissioner of Mines, on "Mine Drainage Districts."

Dr. Wm. E. Phillips, of Texas, on "Quicksilver Deposits of the Terlingua District, Brewster County, Texas."

Mr. F. A. Jones, of Albuquerque, on "The Mineral Resources of New Mexico."

Mr. W. J. Thomas, chemist of the Bingham Mining & Smelting Co., Utah, on "Damages Arising From Smelter Fumes, etc."

Mr. Wm. M. Porter, of Chicago, on "An Eastern Exhibit of Minerals and Mining Machinery, etc."

Hon. Marcus A. Smith, of Arizona, on "A National Department of Mines and Mining."

Prof. Chas. J. Norwood, director of the Kentucky State Geological Survey (not yet advised of subject).

A number of miscellaneous addresses will, as well, be made by prominent persons, who are interested in the mining industry.

Mr. Eugene Coste, of Toronto, has returned from a protracted trip, during which he examined the region north of Sudbury, Ontario, in connection with iron and nickel prospects, and investigated the oil-field to the east of Edmonton, Alberta. He stated that in the latter locality there was much difficulty in making tests on account of the depth of the drift covering the deposits.

BOOKS, ETC., RECEIVED.

Mines Branch of Department of the Interior, Canada.—
Asbestos—its Occurrence, Exploitation and Uses. By Fritz Cirkel, M.E. Pages, 159, illustrated by plates showing asbestos quarries, manufacturing plants and machinery, etc., and by maps and diagrams.

Mica—its Occurrence, Exploitation and Uses. By Fritz Cirkel, M.E. Pages, 132; illustrated by diagrams and a map.

Province of Ontario.—Ninth Annual Report of the Commissioner of Highways, Ontario. By A. W. Campbell, Commissioner of Highways. Pages, 175; with illustrations showing road construction, well-kept roads, etc., and tables exhibiting expenditures on road construction and maintenance.

American Institute of Mining Engineers, New York.—Bimonthly Bulletin (September) of the Institute. Containing (1) Institute announcements, and (2) technical papers and discussions, etc., (illustrated).

California State Mining Bureau.—
 Bulletin No. 39, showing by counties the mineral production of California for the year 1904.

Bulletin No. 40, showing the mineral production of California for 18 years.

Map of California, showing the approximate location of the copper deposits of the state.

All published under the direction of Louis E. Aubury, state mineralogist, from whom copies are obtainable at a small charge.

Engineering and Mining Journal, New York.—Pyrite Smelting. A discussion, edited by T. A. Rickard. Pages, 310.

United States Geological Survey.—
 Report of Progress of Stream Measurements for 1904 Parts X and XII.

Underground Waters of Salt River Valley, Arizona. By Willis Thomas Lee. Pages, 188; illustrated by half-tones, maps and diagrams.

Observations on the Ground Waters of Rio Grande Valley. By Charles S. Slichter. Pages, 79; illustrated by half-tones, diagrams and maps.

Experiments on Steel-Concrete Pipes on a Working Scale. By John H. Quimton. Pages, 58, illustrated by half-tones and diagrams.

Preliminary List of Deep Borings in the United States. Second Edition, with Additions. By N. H. Darton. Pages, 175.

Mineral Resources of the Elders Ridge Quadrangle, Pennsylvania. By Ralph W. Stone. Pages 79; illustrated by half-tones, sections and maps.

Paleontology of the Malone Jurassic Formation of Texas. By Francis Whittemore Cragin. With Stratigraphic notes on Malone Mountain and the surrounding region near Sierra Blanca, Texas. By T. W. Stanton. Pages, 170; illustrated by numerous plates, showing fossils, etc.

Bibliography and Index of North America Geology, Paleontology, Petrology, and Mineralogy for 1904. By Fred Boughton Weeks. Pages, 218.

Mosses Forminifera from the Monterey Shale of California, with a few Species from the Tejon Formation. By Rufus M. Bagg, Jr. Pages, 77; illustrated by numerous half-tones.

Contributions to the Hydrology of Eastern United States, 1905. By Myron L. Fuller, Geologist in charge. Pages, 210; illustrated with maps, half-tones, etc.

Geology of the Tonopah Mining District, Nevada. By Josiah Edward Spurr. Pages, 287; profusely illustrated by half-tones, maps and diagrams.

Geology of the Central Copper River Region, Alaska. By Walter C. Mendenhall. Pages, 125; with several maps and a number of excellent half-tone views.

ORE PRODUCTION IN SEPTEMBER.

The Phoenix Pioneer gives the following as the statistics of tonnage of ore from the various shipping mines of the Boundary district for the month of September, as nearly as they could be ascertained. The total of over 66,000 tons is somewhat larger than during the month of August, as in that month the Granby smelter was blown out to admit of connecting up the two new furnaces:

	Tons.
Granby mines	52,650
Mother Lode	13,036
Emma	340
Oro Denoro	70
Providence	70
Last Chance	20
E. P. U.	20
Don Pedro	20
Crescent	30
Skylark	40
Helen	80
Mavis	20
Total	66,396

Production of Rossland mines during four weeks ended September 30 was, according to figures taken from the Rossland Miner, as follows:

	Tons.
Le Roi	8,340
" (milled)	840
Centre Star	8,670
War Eagle	5,550
Le Roi No. 2	1,020
" (milled)	600
Jumbo	1,000
Crown Point	240
Spitzee	100
Cascade Bonanza	60
Gopher	30
Total	26,450

According to the Nelson Daily News the September receipts of lead-bearing ores at the Hall Mining & Smelting Co's smelter, Nelson, together with their lead contents, were as follows:

From Mine	Ore, Lb.	Lead, Lb.
St. Eugene	2,098,896	1,313,527
Krao	524,627	42,622
Molly Gibson	302,419	24,574
Ymir	274,319	32,588
Arlington (Slocan)	243,088	11,489
Arlington (Eric)	216,907	8,625
Queen	118,963	692
Ruth	87,600	21,974
California	85,714	43,010
Cork	80,098	35,883
Black Warrior	63,347	48,967
Payne	59,714	33,904
Rambler Cariboo	48,379	22,303
Fifteen others	466,822	147,234
Total	4,670,893	1,788,292

The Western Australian government has taken steps to reduce the amount of labour carried on in the gold mines on Sunday.

The first organization of coal miners in the United States was in 1861, by some miners who came from England and settled in the Bellevue district of Illinois.

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MONTHLY AVERAGE PRICES OF METALS.
(From The Engineering and Mining Journal, New York.)

SILVER.

Month.	New York		London.	
	1904	1905	1904	1905
January.....	57.055	60.690	26.423	27.930
February.....	57.592	61.023	26.665	29.047
March.....	56.741	58.046	26.164	26.794
April.....	54.202	56.000	24.974	26.103
May.....	55.430	57.832	25.578	26.664
June.....	55.673	58.428	25.644	26.910
July.....	58.095	58.915	26.760	27.163
August.....	57.806	60.250	26.591	27.822
September.....	57.120	61.635	26.349	28.528
October.....	57.923	.....	26.760	.....
November.....	58.453	.....	26.932	.....
December.....	60.563	.....	27.930	.....
Year.....	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER IN NEW YORK.

Month.	Electrolytic		Lake.	
	1904	1905	1904	1905
January.....	12.410	15.068	12.553	15.128
February.....	12.063	15.011	12.245	15.136
March.....	12.299	15.125	12.531	15.250
April.....	12.923	14.920	13.120	15.045
May.....	12.758	14.627	13.000	14.820
June.....	12.269	14.673	12.399	14.813
July.....	12.380	14.888	12.605	15.005
August.....	12.343	15.664	12.465	15.725
September.....	12.485	15.965	12.620	15.978
October.....	12.993	.....	13.118	.....
November.....	14.281	.....	14.456	.....
December.....	14.661	.....	14.849	.....
Year.....	12.823	.....	12.990	.....

Prices are in cents per pound. Electrolytic quotations are for cakes ingots and wire bars; cathodes are usually 0.25c. lower.

COPPER IN LONDON.

Month.	1904	1905	Month.	1904	1905
January.....	57.500	68.222	July.....	57.256	66.887
February.....	56.500	67.963	August.....	56.952	69.830
March.....	57.321	68.174	September.....	57.645	69.667
April.....	58.247	67.017	October.....	60.012	.....
May.....	57.321	64.875	November.....	65.085	.....
June.....	56.336	65.651	December.....	66.384	.....
Av., year.....	.....	.....	Av., year.....	59.657	.....

Prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904	1905	Month.	1904	1905
January.....	28.845	29.825	July.....	26.573	31.760
February.....	28.087	29.262	August.....	27.012	32.866
March.....	28.317	29.523	September.....	27.750	32.095
April.....	28.122	30.525	October.....	28.596	.....
May.....	27.718	30.049	November.....	29.185	.....
June.....	26.325	30.329	December.....	29.286	.....
Av., year.....	.....	.....	Av., year.....	27.956	.....

LEAD IN NEW YORK.

Month.	1904	1905	Month.	1904	1905
January.....	4.347	4.552	July.....	4.192	4.524
February.....	4.375	4.450	August.....	4.111	4.665
March.....	4.475	4.470	September.....	4.200	4.550
April.....	4.475	4.500	October.....	4.200	.....
May.....	4.423	4.500	November.....	4.200	.....
June.....	4.496	4.500	December.....	4.600	.....
Av., year.....	.....	.....	Av., year.....	4.309	.....

SPELTER.

Month.	New York		St. Louis		L'ed'a
	1904	1905	1904	1905	
January.....	4.863	6.190	4.673	6.032	25.063
February.....	4.916	6.132	4.717	5.989	24.594
March.....	5.057	6.067	4.841	5.917	23.825
April.....	5.219	5.817	5.038	5.667	23.813
May.....	5.031	5.434	4.853	5.254	23.594
June.....	4.760	5.190	4.596	5.040	23.375
July.....	4.573	5.396	4.723	5.247	23.828
August.....	4.866	5.706	4.716	5.556	24.675
September.....	5.046	5.887	4.896	5.737	26.375
October.....	5.181	.....	5.033	.....	.....
November.....	5.513	.....	5.363	.....	.....
December.....	5.872	.....	5.720	.....	.....
Year.....	5.100	.....	4.931	.....	.....

MINING MEN AND MATTERS.

Mr. Donald G. Forbes lately examined several mining properties in north-east Kootenay.

Mr. W. S. Keith, well known in the Boundary district, has resigned as superintendent of the Takilma smelter, Takilma, Oregon, U.S.A.

Mr. Wm. M. Brewer returned to Victoria on 9th inst. from an ore-buying trip to south-east Alaska in the interests of the Tye Copper Co., Ltd.

Mr. Roscoe R. Leslie, formerly superintendent of the Le Roi mine, Rosland, and now assistant manager of the Creston-Colorado Mining Co., Torres, Sonora, Mexico, lately returned to British Columbia on a visit.

Mr. R. R. Bruce, manager of the Paradise and Delphine mines, in the Windermere mining division, north-east Kootenay, has returned from a trip to Skagway and mining camps beyond there.

Mr. F. E. Wright, of the United States Geological Survey, who with his brother, Mr. C. W. Wright, has been engaged in geological work in south-eastern Alaska, has concluded his field work for this year and returned to Washington, D.C.

Mr. Jas. Breen, formerly president and manager of the Northwestern Smelting & Refining Co., Crofton, Vancouver Island, but now of Spokane, Washington, was a recent visitor to Victoria and Vancouver.

Mr. Geo. Coffee, manager for the Klondike Gold Fields Mining Co., lately came down from Dawson en route to his home in California. During the winter he will visit London, England.

Mr. Jas. McEvoy, of Fernie, B.C., chief geologist for the Crow's Nest Pass Coal Co., has been examining coal measures in the Nicola and Similkameen districts. He was accompanied by Mr. O. L. Spencer.

Mr. Howard W. DuBois, who early in the current year was continuing his investigations into the prospects for the production of platinum in the Cariboo district of British Columbia, has returned to Philadelphia, Pa., from a visit to Klondike.

Mr. H. B. Wright, of Fernie, East Kootenay, chief engineer for the Crow's Nest Pass Coal Co., has been away on a short holiday vacation. During his temporary absence his assistant, Mr. H. Frechette, had charge of the company's engineering department.

Mr. A. H. Gracey, manager of the Eva Gold Mines, Ltd., at Camborne, in the Fish river section of northern Lardeau, has relinquished the management of the Oyster-Criterion, in the same neighbourhood, of which he for a time also had charge.

Major Joly de Lotbiniere, civil and electrical engineer, who has been engaged for some time in India supervising the installation of several large hydro-electric plants, is in Victoria, visiting his father, Sir Henri Joly de Lotbiniere, lieutenant-governor of the province.

Mr. Wm. Griffith, mining engineer and geologist, of Scranton, Pa., who lately returned from Alaska, was a visitor this month to Nanaimo, Vancouver Island, where are situated the collieries of the Western Fuel Co., of San Francisco.

Mr. George White-Fraser is down from Portland canal, at the head of which he spent the summer in charge of a party of 11 men, one of several parties engaged on the work of marking out the boundary line between Canada and the Alaskan territory of the United States.

Mr. R. G. McConnell and his assistant, Mr. F. H. MacIaren, of the Geological Survey Department of Canada, have returned to Ottawa from Yukon Territory, in which country they spent the field-work season of the year in topographical, and general and economic geological work.

Mr. F. M. Tweedie, manager of the Princess Royal Gold Mine Company, owning a mine situated near Surf Inlet, Princess Royal Island, B.C., is down from the north. The steamer Tees on her last trip brought down 1,000 sacks of Princess Royal mine ore for treatment at the Tye Copper Co.'s smelter, Ladysmith.

Mr. W. I. Cook, president of the Unuk River Transportation & Smelting Co., is on his way to his home in Danville, Illinois, U.S.A. He has been visiting his company's mineral claims, situated in British Columbia, near the headwaters of Unuk river, which stream flows through United States territory about 30 miles before discharging into Burroughs bay, on the Alaskan coast, some 70 miles north of Ketchikan.

Mr. Chas. Camsell, of the Geological Survey Department of Canada, after having spent the field-work season in exploration work on the Peel river, in the Arctic regions, was married in Vancouver recently to Miss Isabel Doucie Thomas, youngest daughter of the late Wm. Thomas, Esq., C.E., of Pengwern, Glamorganshire, Wales. Mr. and Mrs. Camsell are spending their honeymoon in California.

Mr. F. August Heinze, of Butte, Montana, who in 1895 built the smelter at Trail, B.C., and constructed the first railway from the Columbia river to Rossland, reached Grand Forks on October 9, and the following day went up to Franklin camp, north fork of Kettle river, to look at some mining properties there. He was accompanied from the south by Mr. G. Leonard, of Butte, and Mr. W. H. A. Fisher, of New York.

Mr. D. W. McVicar, superintendent of the Last Chance mine, near Greenwood, Boundary district, on October 6 had the misfortune to fall a distance of about 35 ft. when descending the shaft of the mine, breaking his right leg and two ribs. A rung of the ladder in the shaft broke under Mr. McVicar and caused him to fall.

Mr. Sidney Rosenhaupt, of Spokane, Washington, secretary of the Spokane Boundary Mining Co., recently visited the company's Last Chance mine, near Greenwood. Some 700 tons of ore of good grade have been shipped from this mine since operations were resumed a year ago, and the development work done during that period, under the superintendence of Mr. D. W. McVicar, has proved the property to be a very promising one.

Mr. J. W. Astley has retired from the position of general superintendent of the Le Roi Mining Co., Rossland, B.C., under an arrangement with the company before the termination of the period of his agreement. He will probably remove from British Columbia to a warmer climate, for health reasons. Under his superintendency were made some of the most important discoveries of ore in the lower levels of the Le Roi in the history of the mine.

The directors of the Daly Reduction Co. have appointed Mr. R. B. Lamb general manager and superintendent of the company's business and property at Hedley, Similkameen. The company owns a 40-stamp mill, power house, water and tramway systems, etc., all used in connection with the reduction of the ores of the Yale Mining Co's Nickel Plate mine, about four miles from Hedley.

Mr. Paul Johnson, superintendent of the Alaska Smelting & Refining Co., of Hadley, Prince of Wales Island, south-east Alaska, was at the Tyece Copper Co's smelting works, at Ladysmith, Vancouver Island, on October 19 for the purpose of looking into the hot blast system invented and installed by Mr. Thos. Kiddie, now manager of the Britannia Smelting Co's works at Crofton, Vancouver Island. Mr. Johnson also visited the Crofton smelter before proceeding to Seattle, Washington, en route to Alaska.

Mr. J. G. Dixon, representing Hadfield's Steel Foundry Co., of Sheffield, England, accompanied by Mr. Frederic A. Peacock, C.E., of Peacock Brothers, Montreal, Quebec, sole Canadian representatives of the Hadfield's Co., left for Japan early in October. After having visited the chief mining districts in the interior of southern British Columbia, they spent a day or two at the Tyece Copper Co's Tyece mine, at Mt. Sicker, and smelter, at Ladysmith, and at the Wellington Colliery Co's coal mines at Extension.

Several of the Toronto directors of the Crow's Nest Pass Coal Co. were lately at the company's collieries at Coal creek, Michel and Carbonado. At Coal creek they were especially interested in the new steel trestle and tippie, erected and equipped at a cost of about \$200,000 and just completed. The party included Mr. Robert Jaffray, first

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