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SALUTATION.

It falls to the lot of many men to do much useful work conscientiously and well, but to have little reward other than the inward recognition that they have indeed tried to do their duty. It is one thing to do really good work, steadfastly keeping in mind what is believed to be right and acting accordingly; it is another to disregard worthy motives and use ability only with the object of gaining popularity. At no time is the former easy, sometimes it is exceedingly difficult. The latter requires little effort and, for the time generally appears to be, if not the better, the less troublesome course. The former, though approved by many, is seldom commended, neither spoken nor written word attesting appreciation; it often brings abuse or condemnation, occasionally, in the case of a journal like the *MINING RECORD*, it is punished by a withdrawal of advertising business. The latter wins praise and frequently paves the way for indirect reward, if direct be not asked for nor ostensibly permitted. In taking up the

work long and well done by Mr. H. Mortimer Lamb—whom I have to thank for his too kind references to myself, printed last month before my return to Victoria—I feel justified in expressing the opinion that he adhered to the former course and thereby deservedly obtained for the *MINING RECORD* a name for honesty of purpose and in practice. It will be my constant endeavour to maintain its good name so long as its reputation and interests shall remain in my charge.

In greeting my many personal friends and acquaintances, scattered throughout the mining regions of British Columbia and elsewhere, I invite their attention while I take advantage of this opportunity to make my position clear. ere my personality becomes submerged in the customary editorial "we." I have often been told that in a mining country the first duty of a writer for publication is to write only what is favourable of a prospect, a mine or a camp; if nothing favourable can be written, to avoid the subject altogether. I do not see things in this light. There may possibly be a duty of that nature to a mining district, there certainly is one, though in another direction, to the public when publicity is intended to induce the provision of money for mining purposes or what purport to be such. This is my conviction, consequently, whenever it shall appear to me to be in the best interests of the mining industry, I shall direct public attention to the unfavourable features of any mining enterprise or scheme. At times I shall be mistaken in my view; most men, however painstaking or conscientious, occasionally are; yet shall I earnestly endeavour to continue to merit the confidence so many have considerably assured me my work has begotten.

For numerous congratulations and kind expressions of appreciation I desire to express my deep sense of gratitude. These and a firm belief that a future of considerable expansion of, and prosperity for, the mining industry of British Columbia is at hand, make me reliant that my efforts will meet with success. Yet this can not so well be achieved without the constant recommendation and support of those engaged or otherwise interested in mining and allied industries. I, therefore, respectfully bespeak their hearty co-operation, so as to render more effective the work I have undertaken.

E. JACOBS.

COMMENTS.

The "big gooseberry" season appears to have come in early this year. The first evidences of its presence come from Vancouver, where was recently published "the first really definite news of the output of the mine at Hedley, which is making that part of the Similkameen famous and is pouring wealth into the coffers of the Daly estate, and those associated," the "really definite news" consisting of information, given as the utterance of a well-known Gold Commissioner, who, by the way, has not heretofore (if now, which may be doubted) been in the habit of making public particulars that, if "really definite," could only have come to his knowledge in his official capacity, and therefore were confidential. To this official was attributed the statement "that \$6,000 worth of gold is being recovered every day. This is in addition to concentrates, which are being allowed to accumulate in anticipation of the advent of a railway, when the company will add a smelter to its many enterprises. Then the amount will be increased to a considerable extent." Another emanation from Vancouver, this time from a press correspondent at no time disposed to allow others to outdistance him in chronicling big things and who went one better than his neighbour. From this last source came this information relating to the Iron Mask mine, Kamloops: "It is stated that by the first of May the Iron Mask will be shipping 500 tons of \$30 ore daily." So the Nickel Plate mine may this year be expected to produce between \$2,000,000 and \$3,000,000 (including the value of concentrates) and the Iron Mask, after adding the modest sum of \$325,000 for the first 120 days of the year to the \$3,675,000 to be produced, as above stated, during the remaining 245 days—about \$4,000,000. Now, the total value of the production of metallic minerals in the Similkameen and Yale divisions of Yale district, these including the Similkameen and Kamloops camps, was but \$53,318 in 1903, according to the Report of the Minister of Mines for that year. A rough estimate of \$300,000 for 1904 is, we think, in excess of the actual value of last year's production. But to increase to about \$7,000,000 in 1905 will indeed be a big advance. If this be likely the Minister of Finance may well meet the advocates of a reduction in the two per cent mineral tax, say by inducing the legislature to reduce it to one per cent, but is it? Perhaps the Vancouver optimists will guess again.

The brief report of the annual meeting of shareholders in the Le Roi Mining Company, cabled from London, indicates that the policy pursued under the direction of Mr. Anthony J. McMillan has been approved, that gentleman having been re-appointed managing director. It is evident that the shareholders have taken fresh heart and are encouraged to look for profitable results now that the affairs of the company are in better condition than for several years. A summary of the financial statement, etc., is given on another page, but until the arrival by mail of a full report of the meeting, little comment can be made

upon the reception by the shareholders of the report of Mr. Geo. S. Waterlow, one of the directors of the company, on the proposed amalgamation scheme. This is more comprehensive than is generally known in the province, embracing the acquirement of important properties in addition to those usually mentioned as being included in the project, and looking to the eventual reduction in British Columbia of all ore from the consolidated mines. While the enlarged scheme has the approval of men of high standing in the financial world as well as of those largely interested in the several properties proposed to be amalgamated, it is premature to conclude that it will necessarily be carried out. Though there is little probability of an adverse report being made on the mines it is proposed to consolidate, there is still the difficult question of values for capitalisation of the respective mines and reduction works to be agreed upon. Once get this question satisfactorily settled, there should not be much delay in disposing of other matters preliminary to raising the required working capital. If the undertaking be carried to a successful issue, it will be a distinct advance in the direction of reducing over-capitalisation at present so general; in increasing production, and in so reducing management and operating costs as to ensure the payment of dividends on a less inflated capital. Further, it will be an object lesson to other companies to similarly join forces and by co-operation obtain results that will induce the bringing in of capital for the much more adequate utilisation of the mineral resources of the Province.

A spirit of defiance of the law on the part of members of miners' unions occasionally finds expression in this province in such a way as to demonstrate that with a few there is a disposition to ride rough-shod over the law to gain their own ends. It is but just to acknowledge that the greater number of members of the unions neither sympathise with nor countenance violence nor gross injustice: but there is a small minority not disposed to stop at anything so long as they can carry out their objects and yet escape punishment for actions that are punishable by law. The several acts of violence committed in the Boundary upon either white non-union men or Chinamen have demonstrated the existence of a determination to secure certain ends without regard to either the rights of others or the unlawfulness of such proceedings. Heretofore, though, no such extremes have been gone to as that lately reported from Silverton, Slocan Lake, where a mine manager and lessee narrowly escaped a violent death at the hands of a would-be assassin for no other reason than that, after suffering much inconvenience and loss from the vagaries of white cooks, he adopted the only reasonable alternative open to him and employed Chinamen. That the man now awaiting trial in the superior court on a charge equivalent to attempted murder was president of the local miners' union does not necessarily imply that the unions as a whole approve such a murderous means of attaining the ends they have in view. On the contrary, they

will no doubt severely condemn such an outrageous proceeding. Yet it is but the extreme consequence of a policy of violence such as too many union men have tolerated in the Boundary. If the unions will be wise in time, they will be satisfied with the liberty they now enjoy and not compel considerations of public safety to imperatively demand that it be much restricted.

The Rossland Board of Trade has shown a practical appreciation of the value of Mr. Edmund B. Kirby's valuable paper on "The Ore Deposits of Rossland, British Columbia," read at the last annual meeting of the members of the Canadian Mining Institute, by arranging for the distribution of at least a thousand copies, which number is additional to that already sent out by the Institute. Not only Rossland, but the lode mining districts of the province generally cannot but be benefitted when such thoroughly reliable geological and mineralogical information is freely disseminated, and all interested in the lode mining industry are deeply indebted to Mr. Kirby for having gratuitously undertaken so difficult a task and performed it so well. Besides his own intimate knowledge of the War Eagle and Centre Star mines, Mr. Kirby had available much data and information relative to the structure of ore deposits occurring in the neighbouring Le Roi, Le Roi No. 2 and Rossland-Kootenay, the respective managers of those mines having extended friendly assistance and courtesy to him. The structure details of the maps illustrating the paper were by mining engineers engaged in the mines described. With such co-operation to supplement his several years' personal experience in connection with his subject, Mr. Kirby was enabled to inaugurate a work that it is believed the Dominion Geological Survey will continue and elaborate so that the important mineral resources of Rossland camp, which during a period of ten years have contributed about \$30,000,000 to the mineral production of British Columbia, may in the future be more intelligently, as well as extensively, turned to profitable account.

The construction of a wagon road from Atlin to salt water at the head of Taku inlet is being advocated at Atlin. It is claimed that with such a means of communication freight could be hauled in from the coast at all times of the year and that, too, at a lower cost than is now paid. Further, that if the merchants could obtain supplies as required and not have, as now, to get in large stocks in the fall for the necessities of the winter and early spring months, prices would not be so high as under existing conditions. With cheaper provisions, etc., individual miners could afford to work ground that at present cannot be worked at a profit. Again, the payment of money to freighters would lead to a larger share of it being circulated locally than is the case now that railway and other transportation companies pay their profits to non-residents. It is estimated that the distance by the old Hudson's Bay trail to Juneau is 168 miles,

but less than 100 to the head of navigation on Taku river. An easy grade is said to be obtainable and materials for road-making are at hand. The proposal is looked upon locally as feasible, and an endeavor is being made to provide funds for sending a civil engineer over the proposed route. If the building of this road be found practicable at a reasonable cost, the carrying out of the work will be supported by most concerned in advancing the interests of a camp that, since the discovery of gold in it in 1898, has contributed about \$3,000,000 to the mineral production of the province.

In the course of his comprehensive address at the annual general meeting of shareholders in the Canadian Bank of Commerce, held in Toronto last month, the general manager's comment on the condition of the mining industry of British Columbia was significant and, on the whole, favourable. He said: "There has been a handsome increase in the quantity of the coal mined, and this great business is in a prosperous condition. The mining and smelting of metalliferous ores is probably in a sounder position than ever before. High prices for copper, increased knowledge of the technical features of mining, a sufficient supply of coke, and the absence of share speculation in untested or worthless properties are the satisfactory features. The least favourable is the uncertainty as to the permanence of reasonable relations between the mine owners and labour." Such disinterested and well-informed testimony to the substantial improvement that has taken place can not but be beneficial to mining in the province. A banker's point of view is necessarily one that embraces results actually obtained rather than optimistic possibilities, consequently the conclusions of the executive head of a large and flourishing institution, such as the Canadian Bank of Commerce undoubtedly is, carry great weight. It is therefore satisfactory indeed to this province to have the mining situation described in terms calculated to establish confidence in the industry.

It was gracious of the Vancouver Province, in its comments on the sale of the Esquimalt and Nanaimo railway to the Canadian Pacific Railway Company, to make flattering reference to the mineral resources of Vancouver Island, nevertheless it was incorrect in an important particular. It is true that gold, copper and iron, together with practically inexhaustible coal measures are known to exist in parts of the island, but to assert that acknowledged experts have examined the country, throughout its extent, is inaccurate. On the contrary, there is still a comparatively large area that is to all intents and purposes a *terra incognita*. Much of the northern half of the island is so mountainous and thickly forested as to be not easily accessible to the prospector. Neither is a simple change of ownership of the island railway likely to soon alter the situation. Not until after extensive prospecting shall have disclosed the occurrence of payable ore in large quantity may the construction of

railway lines to open up mining territory be reasonably looked for. It may be that a few years hence conditions will arise that will lead to the extension of the railway to the west coast of the island and, incidentally, mining camps en route be afforded railway transportation facilities, but here as elsewhere, the existence of sufficient freight tonnage to make the railway pay will have to be shown before the C. P. R. or any other company will construct a railway solely to open up new mining fields.

The Canadian Mining Institute is in troubled waters, owing to dissension between its officers and partizan feeling among other members supporting one side or the other. As a result the harmony that should exist in an institution of this kind has been much disturbed. Unless a general determination to sink all differences and to promote the best interests of the Institute by working together to maintain its usefulness be speedily arrived at, the breach will be widened and the value and good influence of the organization much weakened. It is to be hoped, though, most earnestly, that better counsels will prevail and all strife between individuals and provinces cease, so that the single aim of all may be, as through the years when the late Mr. B. T. A. Bell was its guiding spirit, "to take concerted action upon such matters as affect the mining and metallurgical industries of the Dominion of Canada, and to encourage and promote these industries by all lawful and honourable means." We commend this excerpt from the charter of the Institute to the thoughtful attention of those who for the time appear to have lost sight of it, and trust that when the members shall meet in annual sessions early next month the *esprit de corps* characteristic of the best years of the Institute's career of usefulness will have been fully restored.

The Provincial Mineralogist's approximate valuation of the mineral production of British Columbia in 1904, published elsewhere in this issue, exhibits an increase in value over that of 1903 of all minerals produced except coal. If, however, coal and coke be added together, these also show a larger value than in the year immediately preceding. The total increase for the year is \$2,274,046, of which amount more than one-third must be credited to lead, the production of which was more than double that of 1903. Silver and gold also show substantial increases. It will be seen that the estimated value of the coal produced is \$1,734,000 less than that shown in an estimate published in the January number of the *MINING RECORD*. The explanation of the occurrence of this wide difference is that the tonnage of coal made into coke at the Crow's Nest collieries was added to the "consumed in Canada" total, when it should have been deducted. The compiler of the production statistics we published last month accepted the assurance of an official of the coal company that this course was the correct one, and it was not until after the figures had been published that the mistake of the official was discovered.

Last summer Mr. Justice Martin delivered judgment dismissing the action of the plaintiffs against the Crow's Nest Pass Coal Company, Ltd., for damages claimed as having resulted from an explosion that took place at the defendant company's colliery near Fernie in May, 1902. More than 100 suits had been brought against the company, and of these five had been selected as test cases, the result of the consolidated trial of which was, after much expert evidence had been taken, as stated above, in favour of the defendants. Notice of appeal to the Full Court of British Columbia was afterwards given by the plaintiffs' solicitors, but lately notice was served on the company's solicitors to the effect that the appeal will not be proceeded with. The litigation following the calamity, which had such disastrous effects in great loss of life and property, is therefore at an end. As the company voluntarily did more than could reasonably be expected of it to defray expenses and relieve suffering and distress, it is a matter for congratulation that it is not to be further embarrassed by a continuance of legal proceedings, the tendency of which would probably be to hamper it in carrying out the progressive policy necessary to make its big enterprise even more successful and profitable than it has been in the past.

We reproduce in this number of the *MINING RECORD* an interesting article on the electrolytic refining of lead, taken from *Mines and Minerals*, of Scranton, Pennsylvania, one of the most widely-circulated mining journals in America. The plant and process are described by the author, Mr. Robert L. Whitehead, now of the United States Mint, Philadelphia, Pa., who for some time directed operations under this process at the refinery of the Canadian Smelting Works, Trail. Since then the plant has been gradually increased, and now 108 new tanks are being put in, which will so enlarge the capacity of the tank room as to admit of a daily output of 50 tons of pig lead from this refinery. The establishment of this increasingly important industry in British Columbia is due to the enterprise of the Canadian Pacific Railway Company acting upon the recommendations of the chief of its mining and metallurgical department, Mr. W. H. Aldridge.

The close of 1904 and the opening months of 1905 have been marked by a decided improvement in results from several of the silver-lead and zinc mines of the province. First the St. Eugene company paid a dividend totalling \$70,000 and the Slocan Star one of \$25,000, both in December; then in January the sale of 2,000 tons of zinc ore gave the owner of the Lucky Jim mine a return, stated to be, after payment of the purchase price of the property and cost of mining the ore, of \$16,000; now the Reco adds its quota of \$20,000, declared a few days ago. As there is good reason to look for further dividends shortly from these several properties, and from others in addition, it would appear that what has long been a reproach to the metalliferous mines of Slocan and

East Kootenay—namely, their unprofitableness—is in a fair way towards being removed.

Either the gentleman who recently arrived from Cariboo to attend to his legislative duties has been incorrectly reported in the daily press or he has been hibernating continuously for a number of years, if he thinks the suggestion said to be agreed upon by the miners of his district, namely, that all persons employed in any way in connection with a mine should be charged with a \$5 miner's license fee, will be seriously considered by the provincial legislature. With few exceptions, the members of the provincial parliament know so little of the mining industry of British Columbia that they fail to appreciate its growing importance, yet they are not at all likely to countenance such a retrogressive step. It may, we think, be taken for granted that neither the present nor any other government will venture in this way to arouse the opposition of the large numbers of working miners regularly employed in the mines of the province.

The Camborne section of the Lardeau district, long known as Fish river camp, is the subject of an interesting descriptive article contributed to the current month's number of the *Mining Magazine*, of New York, by Mr. Newton W. Emmens, E. M., of Pittsburg, Pennsylvania, a specialist in gold, silver, lead and copper. The publication in this influential and widely-circulated mining journal of a carefully-prepared review of mining operations in a district giving so much promise of big mining potentialities as does the northern Lardeau, cannot fail to be of material benefit to Camborne and, indirectly, the whole of a large area which, though as yet comparatively little developed, made excellent progress in 1903-4 towards utilising its rich mineral resources. With three 10-stamp mills for treating gold ores and a 20-stamp combination silver mill, all successfully operated, the output of this district is steadily increasing and becoming an important addition to the mineral production of the province.

The finding of the Commission appointed to enquire into the charge made against Mr. Archibald Dick, one of the provincial inspectors of coal mines, was only what those who have knowledge of the conscientious manner in which that official performs his arduous duties were confident it would be—a complete exoneration, the evidence having failed to disclose any wrongdoing on the part of Mr. Dick. Not only was the charge, that while acting in the capacity of a government official he had accepted from the Crow's Nest Pass Coal Company a retainer of \$300 per month, completely disproved, but His Honour Judge Spinks, who presided over the Commission, reported in terms of high commendation on the work done by Mr. Dick in his official capacity at the Crow's Nest collieries.

The St. Eugene mine's production of silver and lead in January is reported to have been larger than usual. The *Moyie Leader* gives the output of concentrates from the mill as having been 2,520 tons. Calculated at last year's average silver and lead content, this would show an output of about 3,360,000 lb. of lead and 83,160 oz. of silver, of a total value at New York prices for those metals of approximately \$180,000. During the latter part of the month the mill output was 120 tons of concentrate per day, which if maintained throughout a 30-day month, would at above-mentioned averages, give a monthly gross value of about \$250,000.

Press despatches from Dawson tell of drastic retrenchment of Dominion government officials in Yukon Territory. The diamond drill expert, a dozen or more mining inspectors, several mining recorders and three or four clerks in the gold commissioner's office are named as among the numbers who are stated to have been notified that their services are to be dispensed with. The offices of gold commissioner and public administrator are to be combined, and other economies effected in these departments. If such wholesale dismissals, of which the above-mentioned are but a part, are warranted, it would appear that mining the Yukon public treasury has been a distinct industry in that gold-producing region.

If it be a fact, as stated by the *Boston News Bureau*, that the Guggenheim Exploration Company has secured an option on a large block of the Montreal & Boston Consolidated Mining & Smelting Company's stock, and the result of the examination an expert mining engineer is understood to now be making of the latter company's properties in the Boundary district be such as to lead to the acquisition of the stock by the Guggenheims, this outcome of the Munroe & Munroe bankruptcy should be of decided advantage to the Boundary. Operations must be on a large scale in that district to make copper mining pay adequate profits, and no doubt they will be in connection with the Montreal & Boston if the Guggenheim Exploration Company obtains control.

The suggestions made by Mr. Geo. Huston, in a letter to the *Sandon Standard*, with the object of having a representative exhibit of British Columbian zinc products made at the exposition to be held at Liege, Belgium, this year, are well worthy of the consideration of all concerned in advancing the interests of zinc mining in the province. A good display of zinc ores and concentrates in the vicinity of one of the world's chief markets would be an excellent advertisement for this province, so it is to be hoped that it will be found practicable to adopt such an effective means of drawing the attention of European buyers of zinc to British Columbia as a source of supply.

Shareholders in the copper mining companies of British Columbia will be much gratified if the forecast regarding the prospects for copper in 1905, pub-

lished in the press as that of Mr. John Stanton, of New York, shall be realised. With an average New York price of about 15 cents per pound and an increased output, all the copper producing mines of the province should soon be in a position to pay dividends. Stockholders in most of these companies would gladly welcome a change of this nature, for in most instances their experience has thus far been that they have not had any return for money put into the copper mining companies of British Columbia.

Atlin miners are stated to have a grievance, namely, that in their district there is much unworked ground held by leaseholders who are not complying with development and rental conditions of their leases. A strict enforcement of the law in such cases is urged, so that no "dog-in-the-manger" policy may be followed by leaseholders. Either insist that conditions be observed or throw the ground open to others who will work it, is what is asked, and what should be promptly granted.

The judicial committee of the Privy Council, after hearing counsel for and against the application, decided to advise His Majesty to grant British Columbia special leave to appeal from a judgment of the Supreme Court of the province on a question relating to the employment of Chinamen in coal mines. The Attorney-General for British Columbia, who went to England and there appeared before the judicial committee in support of the petition, consented to give an undertaking to abide by any order as to costs which the Board might think fit to make.

Among the subjects to be introduced for consideration at the annual convention of delegates from the Associated Boards of Trade of Eastern British Columbia, convened to take place at Nelson this month, are two relating to mining, namely: "The organization of a department of mines as a branch of the Dominion service," and "The encouragement of the production of zinc in the province." Others will probably be dealt with as well, the secretary having requested the several boards to notify him of all matters to be brought before the convention.

In the course of his speech at the opening of the present session of the Legislative Assembly of British Columbia, His Honour the Lieutenant-Governor referred to mining in the province as follows: "It is satisfactory to know that the mining industry is entering on a period of greater activity, the effect of which cannot fail to be of benefit to the whole province." This official intimation of improving conditions is commended to the careful notice of all who are any way interested in the progress of the mining industry in British Columbia.

The *Victoria Colonist* recently quoted Mr. Stuart Henderson, M. P. P., of Ashcroft, as authority for the statement "that there are persistent enquiries about the quicksilver claims at Savonas, and it is said

that the Cinnabar Trust of the United States is considering the advisability of adding the Savonas properties to its holdings in order to retain absolute control of the market." Next.

Last month the Crow's Nest country sent a delegate to the national convention of the United Mine Workers of America, held at Indianapolis, Indiana. It is stated that that delegate, Mr. F. H. Sherman, president of the district Miners' Union, enjoyed the distinction of being the first representative from Canada to be present at a U. M. W. A. convention.

At the time of writing there appears to be uncertainty as to whether a Dominion Minister of Mines is to be appointed or not. The statement that included in the estimates is an amount of \$20,000 for a mines department seems to be generally accepted as correct, but whether there will be a distinct department with a minister of mines at its head is not yet known. Probably the federal government will shortly make public its intentions in this direction.

In connection with the recent declaration by the Reco Mining & Milling Co., of Sandon, Slocan, of another dividend, it is stated that the only cash the shareholders in the company were required to provide was the price of the claim, which was purchased some years ago for \$2,700. Out of proceeds of ore all working and plant expenditures have been paid and dividends totalling \$307,082 beside, with more to follow.

In its Boston comments on mining stocks, the *New York Engineering and Mining Journal* on January 19, ulto., published the following: "The Granby mine's December net earnings amounted to \$65,000, from the treatment of about 1,800 tons of ore per day." Assuming that this information is authentic, such a result compares favourably with the average monthly earnings during the company's last financial year, when, however, the price of copper was lower.

We were unable to obtain in time for publication this month the full financial statement and directors' report of the Crow's Nest Pass Coal Company, the annual general meeting of shareholders in which was held a few days ago at Toronto, Ontario. The summary we print on another page will, however, show the principal financial and production features.

Among those who are always ready to say a good word for the mining industry of British Columbia is ex-Governor Macintosh. Interviewed at Winnipeg he gave a representative of the *Free Press* many facts and figures relative to mining in this province, and reiterated his belief that British Columbia will prove to be the richest province in the dominion.

Once again there is a prospect of a large number of members of the American Institute of Mining Engineers together visiting British Columbia, thanks chiefly to the persistence of Mr. W. M. Brewer, in endeavouring to bring about so desirable an event. In 1903 arrangements had almost been perfected for an excursion of the Institute through some of the mining sections of the province and, after holding sessions at Victoria, thence to the British Yukon, but unfortunately after some two hundred members had intimated their intention to join in the excursion it was found impossible to secure for the return journey the requisite number of Pullman cars to accommodate so large a party, so the intended trip to British Columbia was cancelled. Such a generally favourable response has been received by the secretary to the Institute that it is now thought there will be no difficulty in obtaining a sufficiently large number to join in the proposed excursion next summer to make it a success. The visitors will be heartily welcomed in the province, where they will find much to interest them.

It is reported that the Sullivan Group Company's lead smelter at Marysville, East Kootenay, has commenced smelting operations, but the report has not yet been confirmed.

TWO PER CENT MINERAL TAX.

Though there is little doubt the vexed question of the two per cent mineral tax would in any case have been brought up by the Provincial Mining Association while the local legislature is in session, we think the accustomed sagacity of the gentleman who was chairman of the commission appointed to enquire into and report upon the operation of the "Assessment Act, 1903," was lacking when he permitted such irrelevant evidence as that of Mr. Byron White to be given before the commission, and thus led to the agitation that has followed. We do not believe, as has been suggested was done, the finance minister or any other member of the government either induced or directly encouraged Mr. White to appear before the commission for the express purpose of stating his opinion, known to be favourable to the retention of the tax, upon the question. If he did, he blundered, and played into the hands of those who are at issue with the government as to the equitable-ness of this impost. Of course owners of mines yielding comparatively large profits are better content to bear the ills they have than to fly to others they know not of, whether in the shape of a tax upon profits or on mine and mill property. It is evident, though, the executive of the Associated Silver-Lead Mines concluded that to unqualifiedly endorse Mr. White's opinion at this time would be to take a stand upon combative ground, so they adopted the resolution printed elsewhere in this issue and left themselves a way of escape from the active hostility of representatives of the copper mines, the Provincial Mining Association and, possibly, the Associated Boards of Trade of Eastern British Columbia. The position now is

that the appointment of a commission, representative of the various branches of the metalliferous mining industry, to endeavour to agree upon an equitable basis of mine taxation, is being recommended by both those decidedly opposed to the tax in its existing incidence and others who regard it as the lesser evil. A common ground of recommendation to the government having been thus found, it will, perhaps, be better to await developments before once more stating the many objections urged against this tax in its present form. It is to be hoped, though, that if the government decides to adopt this recommendation it will act at once, so that there may be no unnecessary delay in obtaining conclusions deliberately arrived at after such a commission shall have heard all available evidence for and against the tax.

LEAD SMELTING CHARGES AND BOUNTY.

EARLY last month the *Slocan Drill* published the following among other comments reflecting upon the operating lead smelters of the province: "Mine owners assert the smelters have persistently raised their rates for treating ores, and that the latter are getting the major portion of the \$15 bounty on lead." Had the circulation of these mis-statements been confined to the Kootenay, where their incorrectness is known to all familiar with the actual position in this regard, little harm could have resulted, but unfortunately they were reprinted in outside newspapers having a wide circulation. In order to obtain the opinion of those in the best position to judge of the truth or error of these statements, a circular letter was sent from the *MINING RECORD* office to the managers of the more important of the Kootenay silver-lead mines and the smelters quoting in full the comment of the *Drill*, and asking particularly whether the allegations above quoted were correct. A number of replies were received, and, without exception, a denial was given to the statements regarding the raising of smelter rates and the receipt by the smelters of the bounty on lead. Later the *Drill* admitted that "One point has been established, the local smelters have not raised their rates since 1902." Both the *Drill* and the *Sandon Standard* have, however, since carried on a campaign of abuse of the Hall Mining & Smelting Company and its smelter, suggesting the old adage: "No case; bully the witness."

The Hall Mining & Smelting Company replied to us as follows: "There has been no increase whatever in the rates on silver lead ores since the coming into operation of the Lead Bounty Act, and we are getting no additional treatment charges in consequence. We have not intimated any intention of increasing the rates, nor do we expect to do so. None of the Slocan shippers are tied to us by contracts." The Canadian Smelting Works says: "There has been no increase made in freight and treatment charges since the granting of the bounty on lead. The standard rates are \$15 for freight and treatment, and at no time as far as we remember have they been any less." One mine manager sends three settlement

sheets which show charges on the respective dates as follows: February 8, 1901, freight and treatment, \$22 per ton; April 25, 1901, freight and treatment, \$19 per ton; January 10, 1905, freight and treatment \$15 per ton. All show settlement on a similar basis, namely, 95 per cent of the silver and 90 per cent of the lead; from the first there was a deduction of 70 cents per 100 lb. of lead, and from the others \$1. Another mine manager wrote "When I asked the Hall Mining and Trail smelters for rates less than three weeks ago, each quoted me the same rates as have been current here for the past two years on lead ores."

To quote from the replies to our letter even one-half of the comments bearing on the m. -statements to which attention was called would take far more space than can here be spared for that purpose. The summing up of the position by Mr. Wm. Blakemore, of Nelson, in contradiction of similar misrepresentation previously made as regards the smelters and the lead bounty, contributed by that gentleman to the *Canadian Mining Review* last July so well states the case now that it is re-published here. It will place the situation more clearly and forcibly before our readers than many more quotations from the numerous pages of correspondence we have before us. Mr. Blakemore wrote: "In consequence of the conflicting opinions expressed on this subject I have made the fullest inquiries as to existing arrangements between mine owners and smelters, and summarize the results as follows, first stating the facts as briefly as possible, and then making my own inferences:

"1. When trade was at its worst in 1901 a \$15 freight and treatment rate was granted by the smelters with a sliding scale attached entitling them to \$1 additional for every £1 increase in the price of lead in the London market above the basis of £12 per ton.

"2. In 1902 the zinc limit was reduced from 10 per cent to 8 per cent, an additional penalty of 2 per cent against the producer.

"3. In 1903 the zinc limit was again raised to 10 per cent, where it still remains.

"4. In 1903 the sliding scale was abolished and the charge for freight and treatment made constant at \$15.

"5. In 1903, in consequence of representations made by Mr. Retallack (representing the lead miners) that the \$100,000 bonus granted by the Government for the establishment of a lead refinery in Canada stood in the way of the bounty being granted, it was voluntarily surrendered by the smelters.

"6. In 1903 it was mutually agreed between the mine owners and the smelters that, if the bounty were granted, it would be fair for the former to benefit to the extent of 60 per cent and the latter 40 per cent, and some plan was to be devised to achieve this end.

"7. In the spring of 1904, pursuant to the above, it was contemplated to raise the rate from \$15 to \$17. This was discussed between the parties interested and ultimately abandoned in favour of joint support to the petition for applying a portion of the bounty to exported ore.

"8. The smelter charge to-day is therefore actual-

ly lower than at any previous time, since the standard rate is the minimum \$15, the sliding scale which permitted an automatic increase is abolished and the zinc penalty has been improved to the extent of 2 per cent in favour of the producer.

"The inferences to be drawn from the foregoing facts are as follows:

"1. That there has been no increase in any branch of smelter charges either for freight, treatment or marketing since the lowest figures were established.

"2. There has been a reduction represented by a more favourable adjustment of the zinc penalty, equal to about \$1 a ton, and a further concession in the abolition of the sliding scale.

"3. The smelters derive no benefit whatever from the bounty either directly or indirectly except from the increased tonnage available for treatment as a consequence of the support accorded to production of lead ores.

"4. The smelters have voluntarily relinquished the bonus of \$100,000 granted for a refinery and the Canadian Smelter is erecting works for the manufacture of lead pipe and sheet lead without Government assistance.

"5. Having had an opportunity of examining all the returns and documents necessary to verify the above statements and conclusions, I am convinced that any charge that the smelters are sharing the bounty, or that they are crippling the lead mining industry, can not be substantiated and would not be concurred in by the producers themselves."

There are two or three points we draw attention to, in conclusion: (1) That there is convincing testimony in the correspondence before us that the Slocan lead producers fell considerably short of supplying the quantity of lead ore they promised the smelters they would do. (2) That one of our correspondents enumerates as among the causes that combined to cause the depression in silver-lead mining the eight-hour law, the two per cent mineral tax, the Western Federation of Miners, the increase in the price of supplies of all kinds and the very low price of metals. (3) That the smelters have never availed themselves of their rights in respect of the agreement with the mine owners that the former should receive 40 per cent of the bounty on lead; on the contrary they have not received and are not now receiving one cent of it. (4) That it is contended on behalf of the smelters that the rates to-day are lower for freight and treatment than they were at the time when there was the keenest competition between Canadian smelters, and between different United States smelters, some of the latter being engaged at the time in a very bitter war among themselves. (5) That such mis-statements as those made by the two Slocan newspapers (though since generally contradicted) not only do a great deal of injury to the community as a whole, but the general investing public are apt to think mine and smelter managers do nothing but wrangle among themselves, and that the mines are more or less throttled by the greed of the smelters, which has never been the case.

ELECTROLYTIC REFINING

Of Lead and the Treatment of the Slimes Resulting Therefrom at the Canadian Smelting Works at Trail.

IN the December, 1904, number of the *MINING RECORD* there appeared a general description of the lead and silver refinery at the Canadian Smelting Works, Trail, and an account of the process in use there. *Mines and Minerals*, of Scranton, Pennsylvania, last month (January) published a technical description of the same refinery and processes, written by Mr. Robert L. Whitehead, United States, Mint, Philadelphia, Pa., whose contribution, together with the illustrations used, is reproduced herewith:

In June, 1902, in connection with Canadian Smelting Works, at Trail, British Columbia, an experimental electrolytic lead plant of 10 tons capacity was erected by Mr. Anson G. Betts, of Troy, New York, to operate under his patents, and ran with varying success until March, 1903. While in operation about 5 tons per day of electrolytic lead of a very pure quality were produced. The silver slimes from this electrolytic separation were sold to the Seattle Smelting & Refining Co., Seattle, Washington. The cost of refining lead by this experiment was exceedingly high, about \$29 per ton of lead produced. The loss of acid in the electrolyte was very large, which, however, was largely caused by leakage and waste in handling it, the electrolyte alone costing \$4.95 per ton of lead refined. With this discouraging outlook the writer undertook the task of putting on a commercial basis, the electrolytic refining of lead under the Betts patents.

The plant was remodelled in every particular save the kind of tanks in use. New additional tanks were put in to the number of 44, being differently arranged,

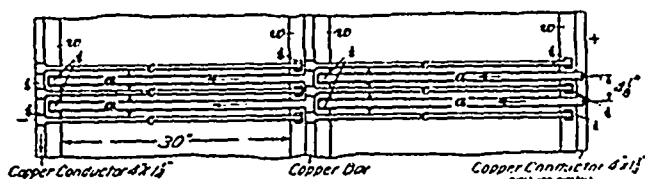


FIG. 1.

a, Anodes; c, Cathodes; w, Tank Wall; i, Wood Insulators.

however, with different electrical connections, making the total number of tanks 72, and thus giving the plant an estimated output of 20 tons of refined lead per day. Owing to the scarcity of lead ore, then being mined in British Columbia, only one lead stack could be operated by the smelting company, consequently 28 tanks only, were operated during my connection with the plant. Before severing my connection with the company, the cost of refining lead was reduced to about \$10 per ton, which was considered by the management a satisfactory figure, inasmuch as they were paying the Selby Smelting Works, San Francisco, \$15 per ton for refining, and only obtaining 99 per cent of the silver (fire assay) and \$20 per ounce for

gold. As the charges for refining these slimes were exorbitant and likewise prohibitive, the management decided to put in a plant for refining their own silver and gold, thus giving them a complete Canadian plant for smelting and refining lead ores.

The current for the 28 tanks in operation was obtained from two Holtzer-Cabot machines of 2,000 amperes and 16 volts each. These generators were driven by a 165 horse power induction motor. The power for the motor was brought 30 miles across the country from the West Kootenay Power & Light Company's plant at Bonnington Falls, near Nelson, British Columbia. This was a three-phase alternating current, 550 volts. The two generators were belt-driven and run in multiple, the tanks being connected in series. The current obtained through the electrodes was 4,000 amperes, 12½ volts.

The electrolyte contained 10 per cent of free hydrofluosilicic acid with 5 per cent of lead in solution as lead fluosilicate; with this amount of free acid present, a uniform current density was obtained without any difficulty. The potential between the electrodes was .25 volt. The anodes were cast 1 in. thick and placed 4¼ in. from centre to centre, thus giving in the tanks 20 anodes and 21 cathodes; the cathodes being 1-16 in. thick, were obtained by a deposit of 30 hours on a steel plate, lead coated and paraffined. For making starting sheets a current density of 4 amperes per square foot of cathode surface was used, while the current density on the working tanks was 15 amperes per square foot. The starting sheets were very smooth and tough, and would stand the weight of 200 pounds of deposited lead before breaking from the copper support bar, which was ½ in. by 1 in.

The tanks are 7 ft. 2 in. long, 2 ft. 6 in. wide, 3 ft. 6 in. deep, inside measure, and are made of 2-in. selected fir, bolted together and nailed with copper nails and braced on ends and sides with 3 in. by ½ in. iron. They were also painted inside and out with best quality of P. & B. acid-proof paint. The circulation is obtained through 1½-in. hard rubber pipes from one tank to another, as is customary in the Cascade system.

The arrangement of the 28 tanks was in two rows of 14 each, two tanks being placed side by side connected by a small copper frame, the current entering the tank on a bar of copper, 4 in. by 1¼ in., and leaving the second tank by the same size bar, as per sketch, Fig. 1.

The additional 44 tanks were arranged side by side, 22 in a row, each tank being connected with the tank ahead by a thin sheet of copper 1-32 in. thick, the current, of course, entering on heavy copper and leaving the tank on same size copper as shown in sketch, Fig. 2.

The circulation being through two tanks instead of through 14 as in the arrangement of the 28 tanks, the advantage gained here, was the use of about 60 per cent less copper than in the old system, and gave a more uniform circulation. The lead and acid contents by the old system were as follows:

	Beaume	Specific Gravity	Lead Per Cent	Total Acid Per Cent
Top.....	20½	1.167	4.03	12.52
Middle.....	21	1.171	4.23	12.60
Bottom	23	1.19	5.24	13.13

By the new system as follows:

	Beaume	Specific Gravity	Lead Per Cent	Total Acid Per Cent
Top.....	23	1.19	4.8	13.69
Bottom	24	1.2	4.95	13.71

The acid results represent the combined as well as free acid.

The new tanks then in operation were used for making starting sheets. The anodes and cathodes were 6 in. longer than the regular stock; this was done to obtain long enough starting sheets to wind around the copper bars, so as to get the proper contact and support; a rapid circulation of the electrolyte was found to be best, as it gave a more uniform percentage of lead in solution. It was found as soon as the lead contents at the bottom of the tank differed more than 1 per cent from the top, the deposit would begin to "tree," as shown in Fig. 3, thereby causing a short circuit, which not only cut down the output of the tank but increased the silver contents of refined lead. There is very little trouble from irregular working as long as the circulation is kept at the same rate of flow, which can only be obtained by an efficient pumping system.

MELTING HOUSE.

The bullion was brought from the smelter, which was a half mile away, in freight cars and unloaded directly into the melting kettles, each of which had a capacity of 30 tons of lead. There were two kettles, one for bullion and the other for refined lead. After the anodes were cast great care was used in straightening. A steam pump, Roesing style, was used for casting the lead into anodes; after being straightened

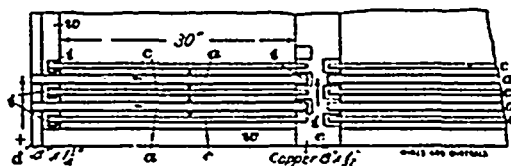


FIG. 2.

a, Anode; c, Cathode; w, Tank Walls; d, Copper Conductor; e, Copper Between Tanks, 8 in. x 1-32 in.; i, Insulation.

they were placed on cars in an upright position and then run into the tank room ready for use.

During the melting of the bullion, about 5 per cent of dross is formed, which carries about 3 per cent of copper and more gold than the original bullion and nearly as much silver. This material is hard to sample and is likely to cause a loss in value, unless the present method of sampling is corrected. I suggested a different method for handling this material, which would obviate any danger of loss due to sampling, and not require that it be run through the smelter again, which would a second time cause a metallurgical loss. I understand the method of disposing of

this material has not been changed yet, although the clean-up showed the loss of gold six times as much as silver. These results to any competent metallurgist would be conclusive evidence of the inaccuracy of the method.

The usual methods for sampling ores will not apply to this kind of material on account of the presence of large pieces of metallic lead varying in size from a half to 15 pounds; when little care is shown in handling values that have been once charged to an electrolytic refinery, both the electrolytic and the slimes refining processes are placed at a decided disadvantage, as was the case here.

The anodes weigh 300 lb. apiece and require 6 days before deposition is complete. The amount of scrap obtained is 22 per cent of the total weight of anode lead. By casting the anodes in closed moulds and inserting copper hooks in the molten lead, so that they are supported by cross-bars instead of cast lugs, the amount of scrap can be cut down to 10 per cent. The cathodes weigh, when taken out of the tanks, from 150 to 200 lb., and each plate is washed separately with hand brushes to remove any adhering slimes and then taken to the melting house and charged into the refining lead kettle while still hot.

During the sweating down of the cathodes about 4 per cent of dross is formed, which contains the antimony and tin that has deposited; to insure the complete removal of both, the heat is raised until the lead shows red on the surface, then three large green maple poles about 10 ft. long are forced under the surface of the hot lead and kept there for 30 minutes, during this time the metal is kept in a state of agitation, being constantly exposed to the air, during which time any antimony or tin that has escaped the sweating process is removed, with the large amount of lead oxide formed. There is also formed considerable fine dust, which unless collected in a dust catcher, will be inhaled by the workmen and cause lead poisoning.

The poling operation now complete, the heat is allowed to go down and the metal is cast with the same steam pump into 100-lb. moulds. The moulds rest on a semi-circular stand, which is equipped with 90 moulds. The pump is so arranged that the spout can be plugged, causing the lead to overflow into the kettle, enabling the furnace man to bring the trough back to the starting point, without stopping the pump, so that in about 3 hours, 30 tons of lead can be cast, dumped and loaded into cars for shipment. The dross from this operation, is also sent to the smelter to recover the lead contents.

HANDLING OF SLIMES.

The slimes, which adhere to the scrap of the anodes, are removed from the tanks by lifts; there is very little danger of loss in handling in this way, on account of the compact way in which the slimes adhere to the scrap; two men are required to wash the slimes with the aid of stiff brushes. As the amount of lead fluosilicate absorbed by the slimes during the process of electrolysis is quite large, the percentage of lead and

acid in the electrolyte is decreased from day to day, and necessitates that free acid and white lead be added each day to the electrolyte in order to maintain a uniform percentage of each ingredient. After the slimes have been washed from the scrap, they are allowed to settle, and this first wash water is run back into the electrolyte. It was also necessary to add glue, about 6 pounds, every other day, to each 2,000 cu. ft. of electrolyte; this prevents "treecing" and short-circuiting, and also gives a beautiful crystalline deposit as shown in Fig. 4. The effect of the "dope" is especially marked in the starting-sheet tanks. When the deposit is brittle, if all other conditions are right, a couple of pints of glue poured across the tops of the tanks will show the good effect

allowed to cool, and during the next 24 hours it is run back into the electrolyte in small amounts, so that it becomes thoroughly mixed.

During electrolysis lead oxide is readily formed at the anode, and as readily goes in solution with the free fluosilicic acid present, forming lead fluosilicate. A large amount of this salt is absorbed by the slimes adhering to the anode and does not enter the body of the solution, thereby depleting the lead contents of the electrolyte. Another cause of further depletion of the lead contents is the large amount of antimony in the slimes, from 25 to 30 per cent dry weight, only about half being soluble as oxide of antimony, Sb_2O_3 , the remainder being combined with lead. This causes a further loss of lead in the slimes, and for



FIG 3. Tree from Bottom of Cathode After Short-Circuiting on Account of Lack of Circulation in Electrolyte.

in a few hours. When the starting-sheet plates become pitted, they should be thrown out, otherwise a sheet after having been stripped will be perforated and have a honey-comb appearance. The circulation of the electrolyte is obtained by raising the solution to a distributing box, by means of a wooden pump driven by a 1 horse power motor.

To free the slimes from fluosilicic acid and lead fluosilicate, they are washed three times by decantation with boiling hot water; the arrangement of the washing tanks is shown in the sketch. Fig. 5.

The slimes still contain, after this washing, 1 per cent of fluosilicic acid. The dilute solution containing the wash water is concentrated by evaporation in a copper tank, 8 ft. by 8 ft. by 18 in. deep; when the solution reaches a strength of 30 degrees Beaume, giving by analysis 16 per cent metallic lead and 8 per cent of free acid, it is run off into a settling tank and

each 10 tons of lead refined about 100 lb. are lost, which in Canada amounts to about 25 cents per ton.

The Betts process for refining lead, has its advantages as well as drawbacks. The process, when applied to a plant of large capacity, where mechanical appliances are used in charging and unloading the tanks, and every point of economy taken advantage of, where the acid can be handled in large quantities and proper tanks made to prevent leakage, both of solution and current, is a decided improvement over zinc desilverisation. The further advantage obtained by the requirements for deposition, namely, one-third as many tanks as in copper electrolysis and three times the amount of lead deposited as compared to copper, gives the advantage of cutting down the interest on stock in process of refining. Further, bismuth is completely separated by the use of this electrolyte, and both the bullion and the refined lead are

easily and cheaply melted. Some of the obstacles which can be overcome are the high price of acid; the loss of acid in the electrolyte by decomposition, due in a great measure to polarization which takes place whenever the circulation is stopped for any length of time; the loss of acid in the slimes due to imperfect washing; and the cost of labour, which is higher than in the average electrolytic work, on account of the nature of the acid. This acid also readily attacks most metals, whose price would warrant their use in electrolytic work. The question of tight tanks, evaporators, and the proper receptacles for storing an acid supply has yet to be solved. The most serious problem yet to be overcome in connection with the process, is the purification of the electrolyte without loss of acid or lead.

12 amperes per square foot of cathode surface. By using lead as a cathode, the resulting deposit will make a hard lead alloy, 25 per cent antimony, 75 per cent lead. The tanks used for this treatment are made of steel, 8 ft. by 3 ft. by 6 ft. deep, having an oval bottom as shown in Fig. 6. Two boiling pipes perforated with holes extend the full length of the oval bottom. After this treatment of washing, the slimes are sluiced into a tank, which is of the same dimensions, but made of wood and lined with 12 lb. lead; after the slimes have settled, the clear solution is run off and used to make up the solution for the first boiling. The second or acid treatment consists of boiling the slimes in this lead-lined tank for 8 hours with 15 per cent sulphuric acid to remove the copper, iron, and bismuth. Air is injected with the

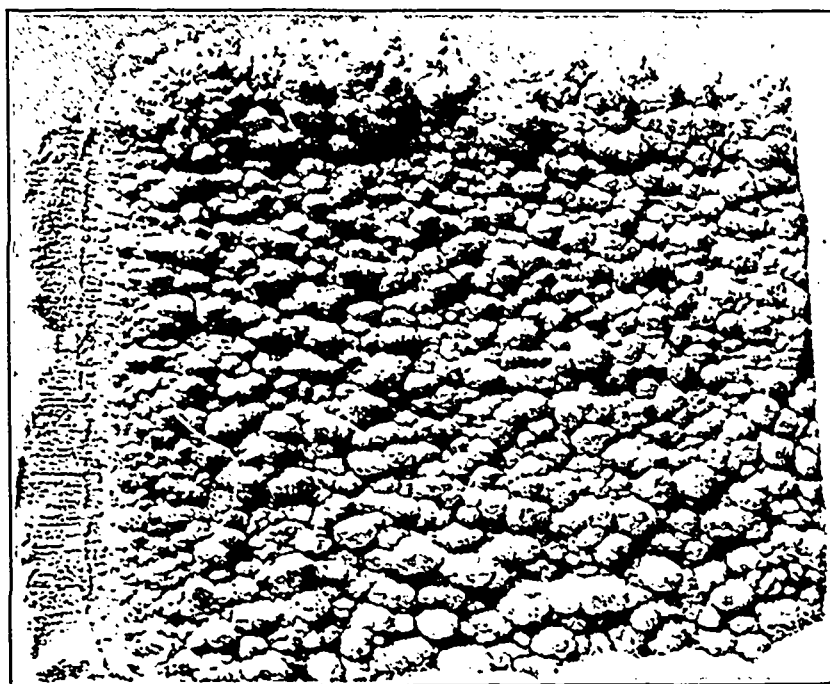


FIG. 4. Showing Coherent and Crystalline Deposit.

During electrolysis all the iron, nickel, aluminum, and some tin go in solution; copper forms an insoluble salt; very little arsenic and antimony go in solution; zinc goes partly into solution and deposits; bismuth remains entirely with the slimes, thereby giving a complete separation from lead.

REFINING OF SLIMES.

The slimes after being washed free from acid contents are boiled with 200 lb. caustic soda to each 1,000 lb. of slime. The solution should contain about 8 per cent of free caustic soda; during this boiling, all the antimony present as oxide goes in solution. This generally amounts to about 50 per cent of the total antimony contents of the slimes. The decanted solution after being mixed with two wash waters, can be treated with electricity and the antimony and arsenic deposited on lead or iron by using a current density of

steam through the two boiling pipes from the bottom of the tank to hasten the solution of these metals. The solution from this tank, with the wash waters, is evaporated for blue vitriol and sulphuric acid. The treated slimes, after proper washing, are sluiced on to a filter and washed with boiling water and then allowed to drain. The slimes are now transferred by hand, for the first time, to a steel drying pan, 4 ft. by 8 ft. by 12 in. deep: these pans are heated by direct heat; after slimes are sufficiently dried so as to handle with a shovel, they are mixed with 400 lb. of soda ash and 50 lb. of saltpetre to the ton of dried slimes and charged into a water-jacketed reverberatory furnace lined with magnesia firebrick. While being charged care must be used to cut off the blast and close the damper on the stack, otherwise considerable fine dust would be carried into the condens-

ing chambers. A gradual heat is kept up until the charge begins to fuse, then the heat can be raised to the highest point, when the thin slag of sodium antimoniate can be readily skimmed off free from metallic particles. This slag will not contain more than 30 oz. of silver and a trace of gold per ton. After it is all removed, the lead content of the slimes is gradually oxidized and combines with the copper of the slimes and any antimony that has escaped the fusion with soda in the first melting; by raising the heat to a very high point this slag becomes very fusible and is readily skimmed, assaying from 150 to 200 oz. in silver and $\frac{1}{2}$ oz. of gold to the ton. After 2 hours of working the lead is all removed and the dore metal which remains still contains some lead and copper, but does not assay over 900 fine in silver. As about 950 fineness in silver is required, the copper is removed by placing a $\frac{1}{2}$ -in. blast pipe in the back of the furnace at an angle so that the blast of air strikes the surface of the metal and oxidizes the copper, blowing the oxide of copper formed to the front of the furnace. In order to maintain this slag liquid, it is necessary to have the highest heat in the furnace. The oxide of copper formed absorbs considerable silver, making the silver contents of the slag average about 3,000 oz. per ton of slag. To remove 5 per cent or 50 parts of copper per 1,000 on a charge of 40,000 oz., requires 3 hours blowing and this brings the dore to the required fineness; namely, 950 fine in silver.

This rich slag which amounts to 400 lb. per charge, contains 40 per cent of copper and is worked back into the next charge with silica, slagging out the copper as a silicate, the slag resulting from this operation assaying about 200 oz. of silver per ton. The dore is cast into 500-oz. bars and parted with sulphuric acid in the usual way; after solution in acid, the gold is removed to smaller kettles for refining. The sulphate of silver formed is siphoned to the settler by a steam siphon, where the finely divided gold is allowed to settle for 30 minutes. It is now run by a second steam siphon into the copper reduction tank. Fig. 7 illustrates steam siphon in position.

The silver sulphate is reduced by metallic copper cast in plates, 30 in. long, 12 in. wide, $\frac{1}{2}$ in. thick. These plates are placed in the bottom of the tank and around the sides, when the following reaction takes place: $Ag_2SO_4 + Cu = CuSO_4 + Ag_2$.

The solution, after 6 hours boiling, is free from silver, and after settling is siphoned off to the evaporation tanks, to be concentrated to 40 degrees Beaume, the copper is recovered as blue vitriol ($CuSO_4 \cdot 5H_2O$). The silver after being washed free from copper sulphate is allowed to drain and charged into a water-jacketed furnace of the same construction as the dore furnace, the silver being charged into this furnace through a hopper opening in the roof. A track leads from this platform across the roof of the furnace over which the loaded filter runs, the moist silver is sweated down and successive charges from the filter are added until about 80,000

oz. have been charged, then the heat of the furnace is raised and the whole charge is melted. As the slimes from the electrolysis of this lead bullion contain no tellurium or selenium, a marked difference from copper slimes, the charge, after being thoroughly melted, requires no further refining and is ready for the covering of lump charcoal, which removes the oxygen that has been absorbed while melting; after 30 minutes under charcoal, the silver is then cast into 1,200-oz. bars, is weighed and stamped and ready for shipment. The gold, after the dore is all dissolved, having been removed with iron ladles to a smaller kettle is now boiled with repeated additions of acid until the silver is nearly all removed. It is then taken out and washed with hot water which removes the copper and all the silver in solution as sulphate. This process of washing has the effect of producing "float" gold, which if continued is likely to cause a loss. When the "float" gold first appears, the washing must cease, although the gold may not be free from copper. It is then placed in a filter, washed and dried, and again put into the iron kettle, where it is boiled with sulphuric acid with the addition of two hand shovelfuls of saltpetre; this not only dissolves the metallic silver still remaining, but lumps up the gold so that there is no further danger from washing. After thoroughly washing, until the wash water gives no reaction for silver with hydrochloric acid, the gold is dried and melted in a black-lead crucible with borax. After removing the borax slag, should a test of the gold be brittle, due to the presence of lead, a ring of bone ash is put on the surface of the metal and saltpetre is worked into the eye of the ring until the gold is free from lead; one ring is usually sufficient. Gold refined in this way will assay from 995 to 998 parts in a thousand.

The plant erected for the refining of slimes has a capacity of 2 tons of slimes per day or 12,000 oz. of silver. The present output, however, is only about 3,000 oz. per day. The copper contents of the slimes as well as the copper used in reducing the silver sulphate is all recovered in the blue vitriol plant, which is in a separate building adjoining the silver refinery.

The slag from refining the slimes which amounts to about 600 lb. per ton of dried slimes contains about 3 per cent of the silver treated, besides lead, copper, and antimony. This slag is worked back through the smelter and a portion of the impurities again finds its way into the lead to be treated, the process not eliminating over 60 per cent of the same. A still larger amount, however, can be recovered by pulverizing the antimony slag from the dore furnace and leaching the antimony out with water containing about 2 per cent of caustic soda, recovering the antimony from solution by electrolysis.

The refining of slimes from lead electrolysis is yet incomplete, as it does not recover the impurities completely. In other words, no process, however cheap, is a complete metallurgical success, unless the impurities are eliminated from the smelting operations. A comparison of the analyses of some samples of slimes, which were refined will show how impure these are.

A process, which the writer is now perfecting and in which electricity plays a prominent part, is intended to solve the question of melting silver in the presence of arsenic or antimony, and will probably cure the nightmare which haunts most smelter managers who have this impure material to handle.

The system of flue chambers in connection with the two furnaces is very complete, containing about 300 sq. ft. of condensing surface for the waste gases. The gases enter a dust chamber from each furnace and pass by a flue 15 in. by 15 in. to the flue chamber proper outside of the building. Here the gases, in order to reach the 60-ft. stack pass through four separate compartments 10 ft. by 6 ft. by 10 ft., connected by "goose necks" 25 ft. high and 30 in. in diameter, these are made of boiler iron and being exposed to the air have the effect of lowering the temperature of the escaping gases. In the last chamber, next to the stack, are hung steel plates 10 ft. by 6 ft. by 1/4 in., parallel with the sides, and placed 6 in. apart. This, to some extent, checks the draft and condenses considerable flue dust. Below will be found some analyses of interest to readers of this article.

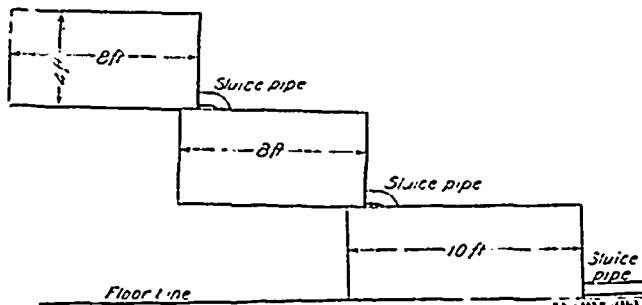


FIG. 5

ELECTROLYTE ANALYSIS.

	Per Cent.
Metallic lead	5.20
Hydrofluosilicic acid, free	9.50
Total acid	13.80
Iron	1.34
Alumina86
Tin006
Lime	Trace
Magnesia	Trace
Copper	None
Bismuth	None
Zinc	None
Nickel	None
Cadmium ..	None
Potash056
Soda261
Antimony006
Arsenic	Trace
Organic matter	Not determined

ELECTRO-LEAD SLIMS ANALYSES.

	I Per Cent.	II Per Cent.
Arsenic.....	4.91	2.2
Antimony..	35.71	24.6
Lead.....	9.57	12.6
Copper.....	1.40	6.6
Silver.....	9222.9 oz. per ton	9397.00 oz. per ton
Gold.....	180.33 oz. per ton	81.99 oz. per ton

REFINED LEAD.

	Before Poling.	After Poling.
Arsenic....	Nil	Nil
Antimony.....	.0030 per cent.	.0015 per cent.
Bismuth.....	Nil	Nil
Tin.....	.0410 per cent.	.0280 per cent.
Cadmium.....	Nil	Nil
Cobalt.....	Nil	Nil
Nickel	Nil	Nil
Iron.....	Trace	Trace
Silver.....	.0005 = .17 oz. per ton	.0005 per cent.
Copper0017 per cent.	.0025 per cent.
Zinc.....	Nil	Nil
Lead, by difference	99.9533 per cent.	99.9675 per cent.

N.B.—This lot was not poled long enough to remove the tin.

The analyses of refined lead given below represents shipments of over 500 tons:

REFINED LEAD.

No.	Silver oz. Per Ton.	Copper	Iron	Antimony	Tin	Arsenic	Zinc	Bismuth	Cadmium	Lead
1	.39	.0005	.0010	.0006	Trace	Nil	Nil	Nil	Nil	99.996
2	.29	.0011	.0015	.0003	Trace	Nil	Nil	Nil	Nil	99.996
3	.23	.0014	.0015	.0006	Trace	Nil	Nil	Nil	Nil	99.995
4	.55	.0005	.0017	.0003	Trace	Nil	Nil	Nil	Nil	99.995
5	.20	.0010	.0013	Trace	Trace	Nil	Nil	Nil	Nil	99.997
6	.23	.0020	.0015	.0003	Trace	Nil	Nil	Nil	Nil	99.995
7	.23	.0007	.0015	.0009	Trace	Nil	Nil	Nil	Nil	99.996

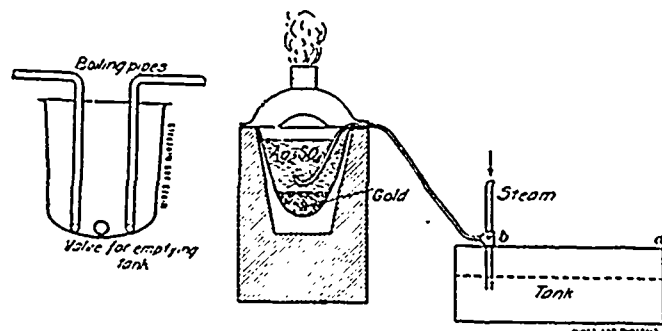


FIG. 6

FIG. 7. a, Lead-Lined Tank, 8 ft. + 8 ft. + 2 ft.; b, Siphon.

With the establishing of this refining plant Canada enters on a new era of industrial progress and can now, for the first time in its history, refine the products of its lead ores. The refined lead is all consumed by Eastern Canadian manufacturers, the silver is transported over Canadian lines to the China market, where the purchaser is a British corporation. The Hong Kong and Shanghai Bank. The gold is sold to the United States assay office at

Seattle, Washington, as Canada, having no mint, is not a purchaser of gold. As the establishment of a mint has been arranged for, we may see in the near future, Klondike gold coined at Ottawa.

LARDEAU DISTRICT.

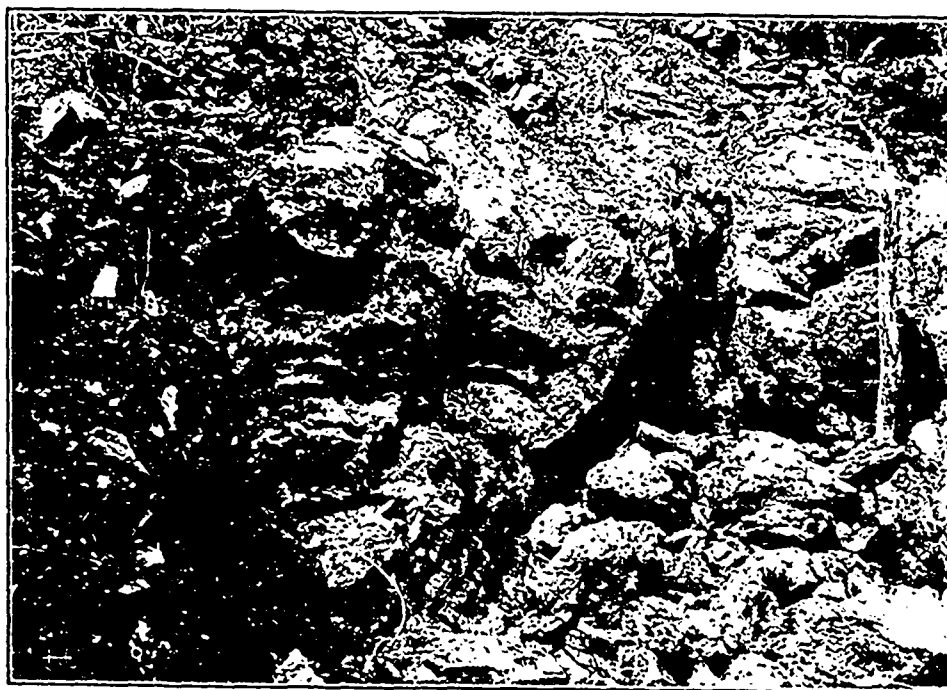
THE following notes on mining in the Lardeau district were, with those of other camps, crowded out of our Annual Review number, published last month:—

The most important advance made in the Lardeau in 1904 was the starting of the combination silver mill, the erection of which, by the Silver Cup Mines, Ltd., commenced in the summer of 1903, was not completed until last May. No details of the quantity of

ages the hope that this year the Great Northern Mines and others will settle down to production, so as to prove whether confidence will be warranted in the future in that part of the Lardeau country.

FISH RIVER CAMP.

Eva.—Fire played havoc with tramways and mine buildings on the property last summer and prevented any production during the latter half of the year. The quantity of ore sent down to the mill during the six months to the end of June, was 5,144 tons. The aerial tramway was stopped early in July to have a new running cable put in. After renewals and repairs had been made the tram was started again in August, but it had only been running three days when the forest



Eva Mine, near Camborne, Fish River, Northern Lardeau. Outcrop of Quartz on No. 1 Vein. No. 2 tunnel has been driven in ore about 300 feet on this vein.

ore milled or the value of bullion, etc., produced were obtainable, but a brief notice of the work of the mill appears below. Recent newspaper reports credit the Triune mine, also in the Ferguson section, with having made a new strike of valuable ore. Snow-slides in winter and forest fires in summer interfered greatly with the year's progress, both about Ferguson and around Camborne. Aerial tramways were partially destroyed, mine buildings burned, flume lines damaged and other difficulties encountered. In most instances, though, renewals were made, and work is being carried on again. In the vicinity of Trout Lake some progress was made, and in the Poplar creek section development work was done on several properties, notwithstanding the uneasiness occasioned by the troubles that beset the Lucky Jack. A recent announcement that these have been settled encour-

fires destroyed the upper half, together with the mine buildings, ore chutes, trestles, etc. Two months passed ere the amount of loss sustained could be adjusted with the insurance companies concerned, and it was the end of the year before all the buildings had been replaced and the tramway ready for work. From May the property was operated by the Eva Gold Mines, Ltd., the Calumet & B. C. company not having been able to take up its bond. The principal development done during the year was driving Nos. 1 and 3 tunnels, extending No. 7 and connecting Nos. 7 and 5, the vertical depth between these being 225 ft., and driving No. 6 intermediate level.

Oyster-Criterion.—At mine and mill 30 men were employed the greater part of the year. The mill was started on December 1, 1903 and in 11 months \$34,000 was realized from the ore that was put through it.

The mine has been developed sufficiently to warrant the mill being enlarged, so the Great Northern Mines, Ltd., which owns the property, will increase it to 40 stamps as soon as finances shall permit.

Gold Finch.—The Gold Finch Mining company commenced to work under favourable auspices but, after working three or four months, and it was understood making good profits out of the ore milled, fire destroyed the mine buildings and part of the aerial tramway. Being without sufficient funds to replace these, the mine was closed down.

Beatrice.—Through the summer and autumn preparations were made to ship ore from this mine when the snow should be deep enough for rawhiding. Recently a new shoot of high-grade galena was discovered. Some 200 sacks of ore have been sent down to Beaton, at the head of the north-east arm of Arrow lake, for shipment to the smelter, and more is following. The prospects are good for this mine for the winter.

Silver Dollar.—Systematic development on the Silver Dollar has brought good results. At the end of the cross-cut tunnel drifts have been run on each side: one drift being in 190 ft., and the other, which was started recently, is in 90 ft. From the drifts cross-cuts are being driven at intervals of 50 ft., and so far all of them have exposed nice-looking ore. The ore body is wider and more solid at the bottom of the drift than it is overhead, which makes it appear that with depth the lead will be both wide and permanent.

Mammoth.—This group is located on Goat mountain, and is owned by a syndicate. Considerable prospecting work on the vein has been done. Two tunnels have been started: about 700 sacks of ore have been filled and a rawhide trail $4\frac{1}{2}$ miles in length has been made. Towards the close of the year rawhiding the ore from the upper ridge was in progress. The ore is grey copper and galena. It contains high values in silver and about 75 per cent lead. There is also a fine showing of zinc on one of the claims, with high silver values. Work will be resumed as soon as the season shall again be favourable, the snow drifts being situated above timber line, preventing operations, except at high cost and with much difficulty, being carried on in the depth of winter. Should future developments prove that the ore goes down, the Mammoth will be a valuable property.

FERGUSON.

Silver Cup.—Until lately no mining was done here last year, after the close down in February, all the summer having been spent in repairing the damage done by the snowslides in April to the tramway. When these repairs were completed the dumps were worked on to supply the reduction mill until the men were driven off by snow in December. The works are now being supplied by this mine from the stope fillings and some milling ore is being broken down.

Nettie L.—This mine was started up again at the end of April and supplied the mill until the Silver Cup tram was repaired. It was practically closed

down again at the end of November, only a small force of nine men being left there to make some connections and have the ground prepared for future work. All the ore taken out here goes to the mill.

Reduction Works.—These works were not completed until the end of May and were not in running order until midsummer. During the summer the plant only ran spasmodically, owing to the excessive dryness of the season, and the consequent shortness of water. Since this was overcome the mill has run steadily to date. The output of the mill has been about 75 bars of silver bullion and 22 cars of concentrates.

Triunc.—Deep snow above the lower terminal of the aerial tramway impedes production at this mine. The old workings and No. 3 tunnel are being connected by a raise. The shoot of high-grade ore recently encountered is proving continuous.

Badshot.—This mine is situated on Gainer creek and has been working in a small way for a time, doing some 50 ft. of development work. Some 30 tons of ore was shipped; this ran 156 oz. silver and 56 per cent lead to the ton.

TROUT LAKE.

About Trout lake there were several properties worked in 1904, among them the Lucky Boy and Horseshoe. The former did development work and made occasional small shipments of high-grade ore. A shoot of good ore was also opened on the latter and some of it was sacked in readiness for shipment when the trail should be favourable for rawhiding. Some placer mining was done on Lardo creek, with results that have encouraged the company engaged in it to arrange for a continuation of the work.

POPLAR CREEK.

Some notes on Poplar creek camp, also held over from last month, are printed elsewhere in this issue of the MINING RECORD.

A GOOD FIELD FOR PROSPECTORS.

The important and valuable work of Mr. R. W. Brock, assisted by Mr. W. H. Boyd, both of the Geological Survey of Canada, during 1903-04, should be mentioned here. Mr. Brock's exhaustive report on the wide area covered by him, and the topographical and geological maps prepared and issued by the survey department, must eventually be productive of permanent benefit in the direction of assisting in the opening up of the Lardeau country.

In closing his report, Professor Brock said: "Although all of the ground at Poplar creek itself is staked, there remains a good deal to be prospected, particularly for gold. The belt from Rapid and Tenderfoot creeks to Silver Cup mountain is still largely free ground and should be examined, and from Silver Cup mountain to Camborne it should also be prospected for gold. Free gold was found last autumn across the divide from Silver Cup mountain. It is not certain that the belt is auriferous throughout, and this point should be settled by actual examination. Whether this belt extends south-eastward from Cascade creek below Poplar is not known. The south-west belt

between the valley and the granite contact, in which the Spyglass occurs, is of some promise, and is mostly open for prospecting. The lime dyke series might also be re-examined for gold. Numerous quartz veins, similar to those in the gold camps, occur in it under like conditions, and it is quite probable that some of them are auriferous. Quartz veins and some galena veins occur between Fish River camp, the Columbia river and Revelstoke, but a closer examination is necessary before this area can be pronounced barren, and, so far as known, prospecting might be attended with success."

MINES NEAR NELSON.

(From our Special Representative.)

THE Nelson Mining Division not only takes in the mining properties around the City of Nelson, but most of those about Kootenay lake and all in the Ymir and Eric sections to the south of Nelson. The following notes relate only to those in the vicinity of the city, the others having attention under separate heads.

Silver King.—The mine was worked under lease during the greater part of last year. The work done by the lessees was in the part of the mine above the fifth level, and various small veins of ore, supposed to be out-shoots from the main body, were discovered and mined at a profit. An arrangement made for the working of the mine jointly by Mr. M. S. Davys and the owners, the Hall Mining & Smelting Company, went into effect late in the year, and since then more ore has been found above the floor of level No. 5. The work of mining this ore has been, and is still being carried on. It is intended to next summer lower the water in the mine to the seventh level, with the expectation that mining will be found profitable between the seventh and sixth levels. Much confidence is felt that a considerable quantity of ore of good grade will be found between the seventh and fifth levels, and if this expectation be realized it will be extracted. The agreement between the company and Mr. Davys does not apply to ore below the seventh level, so if it be found that the ore goes deeper, that part of the mine will be subject to such other arrangement for its working as shall later be found advantageous. While not much is made public regarding the developments of the last few months, it is understood that they are important, and promise to well warrant continued operation of the mine. The output last year was 2,509 tons of ore carrying good values in silver and copper.

Athabasca-Venus.—Some 1,793 lin. ft. of development work was done in these mines in 1904, and about 7,220 tons of ore sent to the mill. During two months and a half last spring the mill was shut down, there not being enough water to keep it running. Towards the end of the year a similar shortage existed, so operations were temporarily suspended. These mines are being worked under discouraging conditions, for notwithstanding that they are well and

economically managed, and are stated to more than pay working expenses, they are loaded down with the debts of two old companies whose liabilities, as well as whose property, the consolidated company took over. So long as this shall be the position, there will be little chance of their making headway. It is hoped, though, a solution to these difficulties will be found, and the excess of earnings over expenses be placed at the disposal of the mines for necessary development and betterments of plant, until such time as larger returns shall warrant division of profits among the stockholders.

Juno.—The Juno, situated on the summit of Morning mountain, above the Venus, has been systematically developed for more than two years. About 2,500 ft. of work were done last year. The Venus vein extends into the Juno property. The ore is free milling quartz, and on the Juno it is from 18 to 24 in. thick. A second vein gives more than twice that width of ore. Development is stated to have opened up a large quantity of ore, but none has been shipped. It has been announced that the intention is to install a mill, probably before next summer. The company is said to be out of debt and to have in its treasury ample funds to pay for the purchase and installation of a 10-stamp mill.

Granite-Poorman.—These mines are owned by the Duncan United Mines Company, which in 1903 worked the Poorman until late in the autumn of that year, making an output of about 10,000 tons of ore, which was milled at the company's own stamp mill, situated near Granite, a few miles west of Nelson. Last year the mines and mill were leased to Messrs. M. S. Davys and S. S. Fowler, of Nelson, who worked the Granite mine, doing fairly well, notwithstanding that lack of water for the mill much hampered them. They mined and milled nearly 1,200 tons of ore. They also put through the mill 450 tons of ore from the neighbouring Greenhorn mine. The mill was running in July and August, but it had to be shut down for the two next following months. On November 1 there was enough water to admit of its being started once more. With a better supply the compressor and rock crusher can be run one shift and the stamps the other. It is intended to keep the Granite mine working, as it can be profitably operated.

Greenhorn.—This property, which is on Eagle creek, is owned by Nelson men, who were reported to have made a good strike on it a few weeks ago. The ore is free milling white quartz, in some specimens of which gold can be plainly seen. The Greenhorn is within only a short distance of the Granite-Poorman tramway, with which connection is easily made, for the purpose of shipping ore to the Granite mill. If the property proves up to recent promise it should be a regular shipper.

Reliance.—Last summer the Reliance Gold Mining & Milling Company was organized in Nelson to acquire the May and Jennie group, situate on 49-Creek. Since then prominent Pittsburg, Pa., men bought a large block of stock, so that there is ample cash in

the treasury to complete the mill and plant, with which the property is being equipped. The group comprises six crown-granted claims. The principal development work has been done on the May and Jennie, on the main lead, which consists of a band of schist and quartz, the continuity of which has been demonstrated for a length of more than 2,000 ft. The width of the vein is hard to determine; it varies from 20 to 100 ft., approximately, in different places. There is another lead running parallel to the main lead, at a distance of about 300 ft. from it. A gold-bearing pyrite is the characteristic ore, and copper, lead or zinc are not associated with it. Much of it is partially or wholly oxidised and carries a considerable proportion of its values as free gold. The indications are that the oxidised ore will extend to a considerable depth. Much development has been done and there is an abundance of ore ready to stope; enough to keep the mill supplied for several years. An aerial tramway is being constructed, 1,750 ft. long. The difference in elevation of terminals is about 435 ft. The upper terminal is 16 ft. below the level of No. 2 tunnel, near which it is placed. The upper ore bin in course of construction, has a capacity of about 200 tons and the lower one, already completed, is of similar size. The mill building is also finished. It is of wood and its dimensions are 70 by 40 ft. A 9 by 15 Blake crusher and 14 by 36 set of rolls have been installed. A 50-ton Chilean mill is expected to arrive shortly from the manufacturers. A 12 ft. Hendryx agitator, capacity 50 to 75 tons a day, is also being put in. The building for the agitator and cyanide tanks is completed. The plant will be driven by water power. One 24 in. Pelton motor will run the crusher and another the rolls and Chilean mill. A 15 in. motor will operate the agitator and drive the dynamo to furnish electricity for lighting and electro-cyaniding. A sawmill on the ground, run by water power, cut all the timber required for construction work. It is planned to start the mill next April, although it will probably be completed before then, by which time the season should be favourable for an uninterrupted run. The enlargement of the capacity of the plant to 100 tons per day is proposed, and all preliminary arrangements in construction have kept this probable addition in view. The prospects of the company appear promising, and success is confidently anticipated.

There are other gold properties on 49-Creek—Gold Hill, Referendum, etc., but no recent information was obtained relative to them.

ABOUT KOOTENAY LAKE.

(By our Special Representative.)

ALL the properties mentioned below are in the Nelson mining division, though not in the immediate neighbourhood of Nelson. They are all reached from that city by water to their respective landings on one or other of the shores of Kootenay lake, and thence by wagon road or trail. With the exception of the Molly Gibson and, to a smaller ex-

tent, the Alice, they have not yet shipped ore or concentrate to the smelters. Among them, though, are claims giving promise of proving regular shippers after they shall have been adequately developed, and provided with necessary transportation facilities for the conveyance of ore to the several landings at the lake.

Molly Gibson.—The surface works at this mine were in bad condition when Captain Trethewey resumed work there last autumn. Since then the tramway, 8,450 ft. long, from the mine down to the wagon road, has been rebuilt, as also have two bunk-houses, blacksmith shop, two ore houses and two stables, (one at the lower terminal), so that now everything is under cover. There are two parallel veins on the property, in the granite. Both carry good values, chiefly in silver, the ore being galena with a little quartz. One shoot has been drifted on for 178 ft., and the end of it has not yet been reached. Another shoot is 300 ft. long. All three drifts now being extended have ore in their faces. The two other drift tunnels, higher up the hill, are also in ore. The second vein is being opened up as well, one drive being in about 200 ft. and the other, at another level, about 250 ft.. Some of the richest ore yet found in the mine has been obtained from this vein. The shipment of ore was commenced late in December, by which time there was snow to make the hauling good. About 100 tons were sent down to Kokanee Landing. There is an excellent mill site convenient to the mine, and water for power. It is intended to install a compressor plant in the spring, and later a concentrator will probably be put in, when the mine shall have been sufficiently opened up.

McMillan-Robinson Group.—The development of the iron properties known as the McMillan-Robinson group, situated at the head of the east fork of Hooker creek, a tributary of Crawford creek, which flows into the lake at or near Pilot bay, was in progress last summer. The work consisted mainly of open cuts and cross-cut adits. There is a big outcrop and 6 distinct ledges, these ranging in width from 6 ft. 6 in. to 28 ft. They are exposed almost the entire length of 7 of the 9 claims composing the group. The organisation and incorporation of a company to acquire and work them is now in hand.

Five Metals Group.—The Five Metals Mining Company owns 9 mineral claims situated at the head of Houghton creek, on the north side of Sphinx mountain, distant 6 miles from Crawford bay. The ore occurring here carries values in silver, lead and copper. There is also much iron ore, and a lime dyke, these together providing excellent fluxes for economical treatment of the ore on the spot. More than \$10,000 have already been expended on the property, and at present men are employed in driving a deep-level adit to cut the main ledge, which the manager states is about 100 ft. wide. It is proposed to purchase and erect at the mine a 50-ton furnace, and recently it was decided to sell 100,000 of the company's shares for the purpose of obtaining the necessary funds.

La France.—The La France Mining Company, of Chicago, has been developing its Bald mountain claims, situated about 8 miles up La France creek, on the eastern side of Kootenay lake, between Pilot Bay and Kuskanook. During 8 to 10 years before the company acquired them these claims had been prospected by former owners. The upper tunnel, known as No. 2, was driven on the lead about 125 ft. with the object of getting under a big blowout of ore occurring at the surface. At near that distance in the direction of the drive was changed a little, when it encountered a vein of 2 ft. of clean ore—grey copper, carbonates and galena, assaying \$100 per ton. Working back towards the portal of the tunnel, crosscuts were made at intervals, these cutting the same vein along a distance of nearly 100 ft. Later work has shown this vein to be 3 ft. wide in places, and to be making in size and carrying higher values as it goes down below the floor of the tunnel. There is beside a large body of concentrating ore, consisting of quartz and lime carrying about 20 oz. silver per ton and 10 to 15 per cent lead. No. 1 tunnel, which is at a vertical depth below No. 2 of quite 500 ft., has been driven about 225 ft. So far it has opened up chiefly concentrating ore, with occasional bunches of clean galena. It is intended to extend this tunnel to more than twice its present length before crosscutting the ledge, which where crosscut at other places is 25 to 30 ft. in width. Development work is done by contract. There is a quantity of concentrating ore on the dump and about 50 tons of first-class ore. The buildings consist of cabins, blacksmith shop, etc.

Snow King and Others.—There are as well on La France creek two groups of claims, owned by Mr. Thomas Wall, who has been doing the development work on the La France company's property, and one by Wall and Baer. These are the Snow King, Umpire and Celebration groups. In the first named there are 8 claims. Development consists of about 400 ft. of tunnelling and much open cut work. A streak of rich sulphide ore has been drifted on for more than 200 ft. and in the face of the drift this has a width of 14 in. The surface croppings show a strong mineralization for a width of 30 ft. and along a distance of 1,200 ft. Average assay values of the ore are about \$90. There are three claims in the Umpire group and four in the Celebration group. These properties merit a description, but space limits prevent. They are situated along the creek, some on one side and some on the other, and are favourable to working by adits, and timber and water are in plenty. The first location in this camp was made by Mr. Wall in September, 1891, and he considers the showings there among the best in the Kootenay.

Alice.—The new concentrator at the Alice mine, near Creston, was operated for a time late last year and a half a dozen or more cars of concentrates were shipped. The mill is a 100-ton, coarse concentration plant, having the customary crusher and rolls, two double-2 and two double-3 jigs, and three Overstrom tables. Water for mill washing purposes was brought by flume about two miles from Lizard creek.

Not much development work was done in the mine during the year, attention having been concentrated on the erection and equipment of the mill.

Bayonne Group.—This property is situated on Summit creek, which stream joins the Kootenay river about 6 miles south of Kootenay lake. The group consists of 10 claims, on two of which, the Bayonne and Ohio, tunnels have been driven. On the Bayonne a shoot of oxidized ore is reported to have been opened up for 150 ft., and on the Ohio a body of sulphide has been exposed for 100 ft. Since last summer more work has been done on this property, which was purchased from Nelson residents by a Butte, Montana, syndicate.

YMIK, SALMO AND ERIE.

(By our Special Representative.)

IN the Ymir, Salmo and Erie sections of the Nelson mining division there are numerous mining properties that were operated in 1904. While there were not so many of the small mines being worked at the end of the year as at the beginning, several of the larger mines were reported to be doing better, so that the prospects generally for the camp seem to be more promising than at the close of 1903. Ymir made an excellent display at the Nelson exhibition last autumn, and received the bronze medal for the best collection of minerals.

HALL CREEK.

No information was received regarding the Fern mine, which for some time was worked under lease and bond by Mr. E. Rammelmeyer, who allowed his bond to lapse. Other parties are reported to be now working this mine and its mill.

Messrs. Falls and Dewar have been prospecting some placer ground in this neighbourhood. It is stated that they have formed a company with a capital of \$50,000 in 500,000 shares at 10 cents each to work three placer leases here, and will put in a hydraulic plant next season.

Between Hall creek and the summit, at Clear creek, 6 miles from the railway, the Ark group, on Ararat mountain, has been worked by the owner, Mr. W. Budd, of Spokane. The group consists of 9 crown granted claims. Three or four men have been at work during the winter sinking a shaft to explore a vein of free milling gold ore.

SALMON RIVER.

Peterson Bros. have been placering on this stream for the greater part of the year, and are understood to have done well.

Porto Rico.—This mine was idle during the first part of 1904. Mr. Geo. H. Barnhart secured a new lease for three years from July 1, since when 7 or 8 men have been employed. About 300 tons of ore were taken out of the old stopes and put through the Porto Rico mill, giving profitable returns. Supplies to last 7 men until spring were sent to the mine before the snow fell, and through the winter the driving of No. 4 level has been vigorously pushed.

When this reaches the pay shoot it will give about 140 feet of backs. Between Nos. 4 and 3 there is yet much virgin ground to be worked.

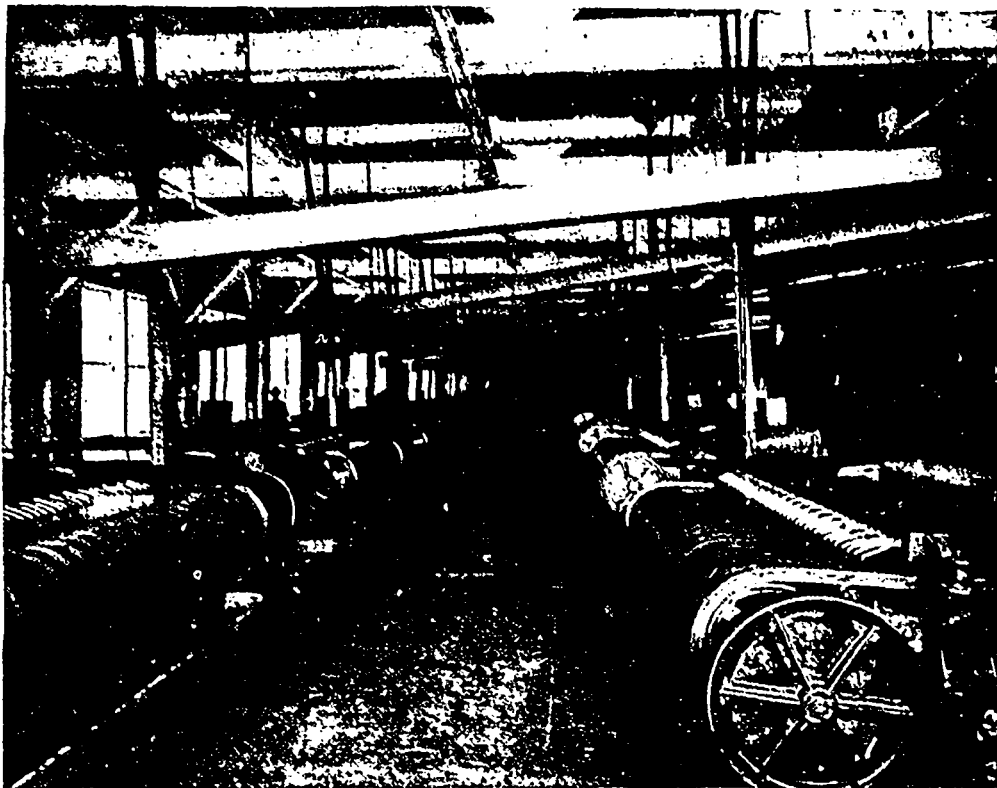
Gold Cup. This mine was worked until May by Messrs. Con. Wolfe and G. F. Dewault, who found that their experimental 2 stamp mill and Willey table did not save the values. Some 80 or 90 tons of ore were put through, but the returns were unprofitable, so the mine was closed.

WILD HORSE CANYON.

In Wild Horse canyon the mines working were the Ymir, Wilcox, Foghorn, Pilot, Bonanza and one or two others.

head office in London, England, at the close of November, gave the following information. "No. 10 level looks most promising, 4 ft. 7 in. (width), \$4 (value)." In December 2,350 tons of ore were milled; the estimated realisable value of this was \$11,540. The excessive dryness of the season unfavourably affected the mill costs, the auxiliary steam power having to be used for some time, while the water flow was insufficient to run the mill. The number of stamps dropping was restricted, for the same reason. The outlook for this mine is understood to be better now than for some time past.

Carthage. This property was under a bond ex-



Ymir Gold Mines Limited.—Vanner Room, containing 24 Frue Vanners, at 80-Stamp Mill, near Ymir.

Ymir.—The development work done in this mine during the year was as follows: No. 4 level was extended about 100 ft.; No. 6 some 80 ft.; an intermediate level was opened at 660 ft., between Nos. 6 and 7, and a raise made connecting these levels with the intermediate; a raise was also put up from No. 4 to No. 3, in the west end; No. 10 was driven in the direction it is hoped to meet the same pay shoot of ore as was encountered in levels above. Stopping was continued in the stopes of Nos. 4, 5, and 6, and to a small extent in the intermediate above mentioned. During the latter part of the year an old pillar, left on the floor of No. 1 level, was taken out. This yielded a considerable quantity of good ore. Nearly 32,000 tons of ore were mined and milled. The estimated value of the resulting bullion and concentrates was about \$170,000. A cable sent to the company's

tending over 4 or 5 years to the Chicago National Mines Development Company, which drove 2 tunnels, one about 1,000 ft. in length. The bond lapsed last year, it is supposed through an oversight. The owners resumed possession and their intention is to continue the longer tunnel another 100 ft., which distance will, they think, reach the ledge—an extension of the Ymir mine ledge.

Wilcox.—The Wilcox mine, owned by the Broken Hill Mining & Development Company, had a successful year. Between November, 1903, and July, 1904, in which month the company's financial year ended, 2,400 tons of ore were mined and milled. Total returns for that year were \$38,260. Development to July included the extension of No. 1 tunnel on 4th of July claim, and drifting from that tunnel, together 150 ft.; also the opening up of stoping ground 136 ft.

in length by 65 ft. in depth, the vein here varying from 18 to 24 in. in width. No. 2 tunnel was extended 45 ft. and in a winze sunk from this level the vein was found to be about 2 ft. wide, of ore carrying good gold values. A second vein running parallel at about 86 ft. distant shows at this level a 9-in. paystreak, averaging about \$10 in all values. A crosscut from No. 2 is expected to cut this vein in about 16 ft. from present face, and give a vertical depth of 160 ft. In the face of the old No. 3 tunnel the ledge matter is barren. A crosscut from this drift had not, at 175 ft., reached a body of ore outcropping on the surface. No. 4 has been extended to 225 ft. and has 6 in. of good ore showing in the face. No work was done in No. 5 last year, but No. 6, which is above No. 3 and on the same vein, was driven 180 ft, the vein varying in width from 2 to 4 ft., with good average values. An additional tramway—from No. 3 to the mill—was constructed. Production since last July totalled about \$16,000. The 4-stamp mill has been shut down to allow of preparations being made for putting in a 10-stamp mill, installed some time ago at the Golden Wedge, situated on the second north fork of Lemon creek, in the Slovan City division having been purchased. It is thought the mill will be in running order again by March.

Foghorn.—On this property Messrs. Wolfe and Dewault pushed the long adit through to the vein, which was found to be 5 to 6 ft. wide. Where cut it consisted of pyritic ore, and no payshoot having been found and funds being limited, work was started from the surface on another vein, showing galena and zinc blende with pyrites. After sinking on this it opened out until 10 ft. of good ore showed. It was then prospected for from the long crosscut tunnel. A report received late in December was in effect that a vein of ore similar in size and character had been discovered. The depth from the surface is about 500 ft., so this find at that depth is regarded as important, especially if the ore be of a shipping quality, as stated.

Pilot.—The tunnel was extended and, after running out of ore, reached a second pay shoot. Work was stopped last May and the property bonded to a Toronto man, who has not commenced mining operation on it.

Commodore.—No recent work reported, but the owners intend putting on men in the spring. About 400 ft. of drifting were done on the ledge prior to 1904. The upper drift is in 180 ft. and the lower, 220 ft. The vein is strong and the ore pyrite and galena, carrying fair values, chiefly in silver.

Bonanza.—This claim was worked all last winter and a lot of good ore taken out, which will, it is expected, be shipped shortly.

DUNDEE MOUNTAIN.

Dundee.—This mine was unwatered last winter and a few tons of ore sent out, for test purposes. Afterwards it was leased, but although the lessees obtained fair returns from 30 tons of ore they shipped, work on a very limited scale was unprofitable so it was dis-

continued. The organization of a company to acquire and operate the mine is being proceeded with and work may be resumed in the spring.

Yankee Girl. A drift on the ledge is being extended, with the object of connecting with the shaft at 75 ft. depth. This drift is now in about 200 ft. in ore all the way. The ledge has been exposed in open cuts at intervals the full length of the claim. The ore is galena blende and pyrite. About 40 tons are on the dump awaiting the repair of the Dundee wagon road, to admit of its being shipped.

Atlin. A lot of development work was done on this claim, which was worked on a co-operative basis by local men. Bunk and boarding houses to accommodate 14 men were built, also a 40-ton ore bin. The road was washed out, so no shipping could be done. Another misfortune was the destruction of the company's office at Ymir by fire. Work was suspended towards the end of the year, but it was intended to ship ore whenever there should be sufficient snow on the ground.

Iona.—An adit is being driven, but at the close of the year the ledge had not been reached. The rock being passed through is all mineralized, carrying values up to \$5, and having the appearance of a very wide low-grade ledge.

New York Central.—A few men were regularly employed on this group of five claims nearly all last year. Besides doing development work, quarters for the men, blacksmith shop and other buildings were erected, and two miles of trail made. A tunnel is now being driven on the main vein and work is to be continued all the winter.

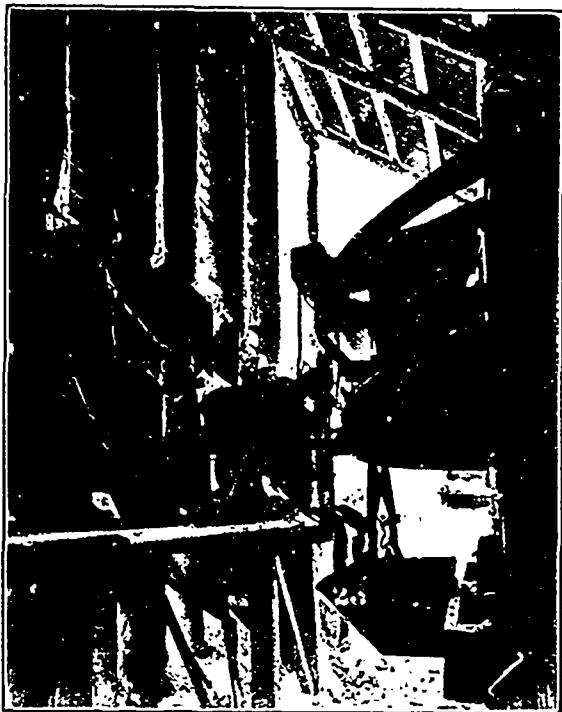
PORCUPINE CREEK.

Not much mining work was done in this part of the camp other than that done on the Hunter V. group. The Union Jack, owned by the Active Gold Mining Co., of Cincinnati, was hindered by litigation, so gave its attention to its timber limits only, getting out a lot of logs preparatory to erecting a sawmill. On the Big Horn ledge was further prospected by the extension of the long drift tunnel, but no pay shoot was encountered.

Hunter V. Group.—The Hunter V. group, owned by the B. C. Standard Mining Company, which was organized in Nelson in 1903, is believed to be one of the most meritorious and promising mining properties in Nelson district. The property is situated at a high elevation, on the divide between Hidden creek and Porcupine creek, tributaries of Salmon river, and distant about 5 miles from the town of Ymir. The formation is limestone, nearly surrounded by granitic rock. The ore deposits occur in the limestone and contain grey copper, a little galena, blende and silver, with native silver frequently showing.

The mineralized zone is of considerable extent, in places up to 150 ft. in width, and outcropping on the company's claims over a distance of 2,000 ft. The principal development has been done on the Hunter V. and Double Standard, on each of which a big quarry has been opened, the whole of these excava-

tions being in ore. A Riblet automatic aerial tramway, about 1,300 ft. in length, was completed last February, and from its upper terminal short auxiliary trams run to the open workings. This means of transportation down to the railway has been found efficient and economical. Production for the year was about 17,000 tons, the ore having been shipped to the smelters at Northport (Washington), Grand Forks, Greenwood, Trail and Nelson. The average grade of the ore, working the mines on the "glory hole" system, proved lower than from the trial 400 tons shipped during the winter of 1903-04, but the percentage of lime was considerably higher and the silica lower, and taking the average grade of ore shipped, with the costs of mining and tramming which became possible



Upper Terminal of Riblet Automatic Aerial Tramway at Hunter V Mine.

after a few months of preliminary work, a fair profit was left. Ore is at present going to Northport and Nelson. Shipping to the Marysville smelter, East Kootenay, will shortly be commenced. A great increase in the demand took place just at the time of the first winter storms, and it has been found difficult with the present arrangements to keep the output up to demand, but now that a sufficiently large market is assured, it will only require some further time to so open up the property as to make it practicable to increase the shipments to a very considerable extent. The appearance of the workings and the results of the surface prospecting certainly indicate that there is here an immense deposit of ore.

JUBILEE MOUNTAIN.

May Blossom.—On this group, situated at the back of Jubilee mountain, and on which a lot of work had previously been done, men worked all last spring,

further developing the ledge, in which there is a fair showing of solid galena, running up to \$50 per ton.

Sophie.—This is an adjoining property to the May Blossom. It was also worked last spring. A tunnel was driven 50 ft. on a 5-ft. ledge of galena and zinc blende, values in which have so far been low.

SALMO.

Activity was noticeable in Salmo camp last year, on two or three properties.

Queen.—The Queen was worked all the year, under lease to Mr. William Waldie, of Nelson, who also leased the Yellowstone mill. From 14 to 20 men were employed the year through. Development consisted of driving the several tunnels. In opening up the ledge from the bottom tunnel good milling ore was met with. Shipments are reported to have been 8 cars of concentrates and 2 cars crude ore. Concentrates run from \$25 to \$30 per ton and picked ore up to \$30, much of the milling ore going about \$12.

Kootenay Belle.—This property, situated up the hill above the Queen, is described as having ore running higher than usual in gold. One car shipped in November is reported to have netted \$60 per ton. Three cars of sacked ore were awaiting sufficient snow for good sleighing. The ore is sent down on the Queen tramway to the Yellowstone mill, where it is sacked, and hauled thence by wagon about 10 miles to the Nelson & Fort Sheppard railway. Part of the mine is leased. The lessees employ 4 or 5 men. The owners are driving a tunnel to tap the vein at about 100 ft. depth. Much of the work is near the surface, with one shaft down about 50 ft.

Ore Hill.—A shipment from this claim is stated to have recently netted \$287 per ton clear of all expenses. For a time the property was leased, but the lessees discontinued work before the shipment referred to was made. Since then negotiations for the sale of the mine have been proceeding with a good prospect of its further development being undertaken soon.

There are in this camp several other claims upon which development was done earlier but these were not worked last year.

ERIE.

Arlington.—The development work done in 1904 in the main tunnel of the Arlington mine, opened up entirely new ground to the north. The vein being nearly flat, this gives the Hastings syndicate owning the property, a large area on the dip of the vein on its own ground, and opens up the possibility of adding considerably to the life of the mine, the productive ground in the old workings having latterly been very limited, with a prospect of being worked out in a short time. The new ground is being opened on two levels and a connection is being made that will facilitate working to best advantage. The several streaks of ore are somewhat scattered at present, but if they follow the ordinary course experienced in this mine they will come together and form a valuable shoot of ore. There were shipped during the calendar year 1,092 dry tons of ore, the gross contents of which were: Gold, 2,878 oz.; silver, 7,188 oz. and lead.

93,955 lb. The net smelter value was \$49,059. The new work done comprised 1,096 lin. ft. in the Arlington, and 387 ft. in the Head Arlington. The statement for the company's financial year, ended May 31, showed that in that period 1,068 tons of clean ore were shipped, realizing at the smelter \$47,360 after payment of freight and treatment charges and making the customary smelter deductions. The average gross assay value of the ore shipped was: Gold, \$52.40 per ton; silver, \$3.73; total, \$56.13. The average net smelter value was \$44.32 per ton. The total cost of mining and hauling to Erie was \$32,604.03, leaving a gross profit over mine cost of \$14,666.

Canadian King.—This property was under lease and had a few men working. Three cars of ore were shipped to the smelter, returning an average of about \$80 a ton.

Keystone.—Also leased and since released. It is reported that each of three former lessees cleared about \$4,000 from this property. One car of ore was shipped in the autumn, but three cars more the present lessees have on hand are awaiting an opportunity to get the ore hauled to the railway. One car is of oxidised ore and the others sulphide.

Copper Farm.—Drifts run east and west from the 400 ft. tunnel are reported to both be in good ore assaying 5 to 9 per cent copper and low values in gold and silver.

Second Relief.—This mine was worked the greater part of the year, and employed 20 men. About 3,000 tons of ore were milled. Development was continued until December 1, but the mill had to be closed down on October 18, water supply by that date having been insufficient to admit of operations being continued. This mine has its own 10-stamp mill and cyanide plant, connection between No. 2 adit of the mine and the mill being by an incline gravity tramway 650 ft. in length. It is distant from Erie about 13 miles, the wagon road between the two points having been well built by the owners of the mine at a cost of about \$12,500.

Waffer.—The Lucky Boy Mining & Development Co. did a little development on this claim, which adjoins the Second Relief. Two good ore bodies are stated to have been discovered. A consolidation with 5 other promising claims in the district has been effected. Work on a larger scale is proposed for next spring.

Ida D.—This is a rich free gold property, upon which work was done for several months last year. Ore is being sacked ready for shipment.

Armstrong and Treasure Box Group.—Owned by the Transvaal-Zambezi Co., of London, England. Development is being carried on by several men under the direction of Mr. James Johnstone, of Nelson.

Placer Mining.—Shortness of water unfavourably affected those engaged in placer mining in this section. Gold was taken out by Anderson Bros., who afterwards sold their interests to a Spokane syndicate. The greater part of last season was occupied

in doing dead-work in preparation for operations when the water supply shall be larger. Major Boyd and Judge Peel are reported to have done fairly well placering here.

On the Pend o'Reille, near Waneta, south of Erie, placer mining was also carried on last season.

ELMORE OIL PROCESS AT LE ROI NO. 2, ROSSLAND.

THE London, England, correspondent of the *Engineering and Mining Journal*, writing to that journal under date January 7, ulto., gave the following information:—

"Your British Columbia correspondent reported some six months ago that the Elmore oil concentration plant had been shut down at Le Roi No. 2. The consulting engineers, Messrs. Alexander Hill and Stewart, have now issued a statement relating to the operation of the process. During the time the plant was running, from October, 1903, to May, 1904, there were treated by the oil process 4,578 tons of tailing, averaging 0.107 oz. of gold, 0.227 oz. silver and 0.394 per cent copper, having a gross assay value of \$3.23 per ton. Concentrate amounting to 136¼ tons was obtained, averaging 1.129 oz. gold, 3.244 oz. silver and 6.532 per cent copper, having a gross assay value of \$40.35 per ton. The final tailing averaged 0.076 oz. gold, 0.135 oz. silver and 0.206 per cent of copper, equal to \$2.10 per ton.

It should be remembered that the tailing treated by the Elmore process had previously been treated by the Wilsley tables. During the year, from Oct. 1, 1903, to Sept. 30, 1904, these tables ran regularly and treated 11,601 tons of ore, averaging 0.191 oz. gold, 0.279 oz. silver and 0.522 per cent copper, or \$5.25 per ton. Concentrate having an average assay value of \$48.57 was obtained, and the tailing averaged \$3.23. Some of this, as already mentioned, was treated by the Elmore process. It will be observed from these figures that the recovery on Wilsleys was \$2.02 per ton, and by the Elmore process \$1.13 per ton, so that \$2.10 was not recovered. The consulting engineers finding that so little could be recovered by oil concentration, abandoned it, and devoted their attention to the improvement of the water concentration. At the present time, the proportion of values recovered on the Wilsleys has increased so that a dollar more is recovered. Messrs. Hill and Stewart mention the cost of consumption of oil and finer grinding as economic points that have to be considered in connection with oil concentration. Although the first two items were susceptible of considerable economies while the plant was running, the expenses continued to be above the income. The publication of the report has been received with considerable interest in London, where the fortunes of the oil process are keenly followed. The results obtained at Col. R. M. Thompson's Canadian mines are looked forward to with some anxiety."

It is but fair to the Canadian Ore Concentration,

Ltd., to state here that its technical representative in British Columbia a few weeks ago expressed himself to a representative of the MINING RECORD as follows: "There does not appear to be room for doubt that technically the Elmore oil process was a success at the Le Roi No. 2, but conditions were not favourable to it: being a commercial success as well. Beside the drawback of the lowness of the grade of the ore sent to the mill there were other things that combined to prevent its being operated profitably here. First, conditions at the Le Roi No. 2 mill were against economic handling; then there were interruptions to a practically continuous run, much time having been lost through stoppages of the mill, cost of labour, etc., in connection with the oil process meanwhile continuing; next, the price of oil was higher than later, and finally, the scale on which the plant was operated was altogether too small to admit of a profit being made with these and other adverse conditions to contend against."

BIG LEDGE GROUP NEAR ARROW LAKE.

The Big Ledge group of seven mineral claims is situated a few miles west of Upper Arrow lake, in the Arrow Lake mining division, on a mountain reached by following up Pingston creek, which enters the lake from the west immediately opposite the St. Leon hot springs. Some of the claims were located eight years ago, and prospecting work has been done on the property every year since location. The group, which consists of the Ontario, Maple Leaf, Anna S., Monarch, Forest Chief, Dellenger and Empress claims, is owned by Messrs. A. M. Symons, T. L. Savage, W. F. Case and L. L. Tower, of Northport, Washington. The claims all adjoin along an east and west line extending over the summit of the mountain which reaches an altitude of 6,700 ft. above sea-level.

The ledge running through the property is a large one, having a total width, on the Monarch claim, of 345 ft. from wall to wall. Probably 100 ft. of this is a zincy ore and the remainder iron and other ledge matter. On the Empress, which is the most easterly claim of the group, lead ore occurs, the shoot having a width of six to seven ft. and carrying assay values of 15 per cent lead, \$3 gold and \$3 silver and a trace of copper. On the other claims the ore is generally of a concentrating character, averaging 30 per cent zinc with up to 20 ft. of the ledge running from 44 to 46 per cent zinc.

Development has been done chiefly on the Monarch, Forest Chief and Empress. Big open cuts on the Monarch are in ore; on the Forest Chief, a cross-cut tunnel encountered the ledge at 150 to 160 ft. in from its portal; on the Empress one 40-ft. adit is in ore at 240 ft. below the summit of the mountain, and another has been driven 25 ft., also in ore, at 300 ft. still lower elevation. It is intended to adopt the "glory hole" method of mining on the Forest Chief and Monarch.

The further development of this property has been postponed owing to delay in the establishment in the

district of a zinc smelter or other works suitable for the reduction of this class of ore. A wagon road has been built from the mine workings five miles down the mountain towards the lake, but there are still three miles and a half to be constructed to complete this means of communication with the lake. Arrangements have been made with the C.P.R. for that company to at once build a wharf at the mouth of Pingston creek, and thus provide for the ore being loaded directly into railway cars on barges for transshipment to Nakusp and thence to Rosebery, where zinc works are being erected, or elsewhere, according to market conditions as they shall affect this property. A considerable proportion of the ore will be shipped to the smelters as mined, and it is expected that shipments of this class of ore will be commenced by June 1st next, or earlier if the product can be disposed of to advantage. The owners of the group need assistance in completing the wagon road, which there should not be much difficulty in obtaining from the provincial government, since the road would not only benefit a number of mining properties in this locality, but would give access to a comparatively large area of open grassy country which is stated to extend for fully 30 miles beyond the mountain upon which the mining camp is situated in the direction of the head waters of the Spallumcheen river.

DUNCAN RIVER DISTRICT.

THE Duncan river district continues to receive the attention of a number of men who, notwithstanding its slow progress, by reason of lack of transportation facilities, are confident that it will eventually repay them for all their persistent work under difficulties and patient waiting until it shall be made easily accessible. A characteristic of the district above Howser lake is that good values generally prevail wherever ore is found.

The district is reached from the head of Kootenay lake, into which flow the Lardeau and Duncan rivers, the confluence of these streams being a few miles from the lake. Simpson Bros., well-known in the Duncan country, are building a boat to run next summer on the upper Duncan, which is above Howser lake. It will have either steam or gasoline to furnish power, and will be a great convenience to prospectors.

Red Elephant.—The Red Elephant group is owned by J. W. Powers and H. McKay, who were working on it nearly all last summer, and intend resuming development next season. They have driven a tunnel, which cut a vein of lead ore, carrying good values in silver and gold.

Golden Eagle Group.—This group is about 21 miles above Howser lake, on Granite creek, and is owned by George Hagman. Work has been done on the property at intervals since 1896, about \$6,000 having been spent in tunnelling, sinking and open cuts. One tunnel is in something like 186 ft., at its face giving a depth of 260 ft. The lead it cut is from 8 to 10 ft. wide. An 18-in. paystreak gives values up to \$360

per ton, in gold and copper. Then there is four feet, running about \$92 gold, copper and silver. The gangue is quartz, and the gold is largely free.

Irene Group.—This group is on East river, a tributary of the Duncan, and some 28 miles north of Howser lake. It is owned in the Coeur d'Alenes, and has had a deal of development work done on it.

Bannockburn Group.—This group is on Hall creek. A company has been incorporated, and it is intended to do much development next summer. A big ledge traverses the property and this has been traced along a distance of 2,000 ft. Its width ranges from 2 to 5 ft., and the vein yields an average of nearly 2 ft. of clean ore. The values are in lead, silver and gold, in a quartz gangue. There are two other veins on the property, one of similar character and value of ore to that occurring in the above mentioned lead. The third vein shows a big body of concentrating ore, but this has not yet been developed to show its extent. Mr. A. C. Jardine, of Kaslo, is the local representative of the company.

KEREMEOS DISTRICT.

THERE are promising mining camps in the Keremeos section of the Similkameen. The following notes briefly describe the more important of the mining properties in this part of the district.

On the Bullion group of 9 claims, situated at Olalla, development includes 900 ft. of tunnelling, 50 ft. of sinking and 150 ft. of open cut work. The ore consists of pyrrhotite, chalcopyrite and sulphides, in a garnetite and lime gangue. Assay values run from 1 to 30 per cent copper, a trace to \$40 per ton gold, and a little silver. Owing to the lack of railway transportation no shipments have been made.

The Dividend group consists of 7 claims, situated on Dividend mountain, 10 miles north-west of Olalla. Development consists of several hundred feet of open cuts and sinking. A tunnel now in 50 ft. is being extended 150 ft. The ore runs in value up to \$26 per ton in gold and copper. The gangue consists of a mixed garnetite and lime carrying pyrrhotite and copper pyrites. Small quantities of arsenical iron occur also throughout this property. No shipments have been made.

The Riordan Mountain group comprises two claims situated on the divide at the headwaters of Keremeos creek, about 15 miles north-west of Olalla. This property possesses an immense capping of mixed garnetite, lime and quartz. A large amount of open cut work and shallow shaft sinking has been done. A tunnel is now in about 30 ft. Valuable bodies of copper ore, also containing gold and silver values up to \$10 per ton, have been opened up. Lack of transportation facilities prevents the active operation of this property.

The Flastaff group of 7 claims is situated at Olalla. Development consists of upwards of 200 ft. of tunnels and extensive open cuts. The ore exposed is mainly copper pyrites in a lime gangue. The principal capping throughout the property is magnetite

which occurs in large deposits and usually carrying gold values as well as copper. In addition there are several veins of quartz which traverse the property and contain values in gold and copper.

The Opulence is situated about a mile and a half south-east of Olalla. The ore on this claim is native copper occurring in an altered metamorphic rock. Values run from 1 to 30 per cent copper, with an average of about 5 per cent. Several open cuts and two shafts embrace the development done. The deepest shaft is 50 ft., with a 30-ft. cross-cut at the bottom, which discloses quantities of self-fluxing copper ore of good grade. The cross-cut is to be driven 75 ft. further to intersect the hanging wall of the ore body. It is expected that this cross-cut will show up an important body of high-grade native copper ore.

If railway transportation be provided the above mentioned properties, together with many others in the district, will rapidly swell British Columbia's yearly output of precious and other metals. Their natural situation is favourable for economical mining. This also applies to the entire Keremeos valley and Similkameen regions from the Similkameen and Tulaheen rivers. Railway connection, both east and west, from the coast to the Kootenays, with Similkameen, is urgently required, and that too, at the earliest date possible.

A PROMISING MINERAL SECTION

(By a Correspondent.)

IN the Grand Forks mining division, but more than 70 miles from the recording office at Grand Forks, there is a section of country, containing some promising mineral properties, which has apparently as yet received but little attention from mining men or the general public. This section is at and around the extreme head of the west branch of the north fork of Kettle river, and at present is reached by road and trail from Fire valley landing on the west side of the lower Arrow lake.

The principal properties are the Lightning Peak, Rampolla and Waterloo groups, but there are as well a number of likely undeveloped properties in the district.

The Lightning Peak group consists of seven claims four of which are being crown-granted. This property is owned by capitalists of St. Paul, represented by their agent and manager, W. Thomlinson of New Denver. During the past past season the following preliminary work was done. About four of the claims were surveyed for crown grants, considerable surface work and about 80 lin. ft. of underground development was done on the group.

A five-ton sample of ore was sacked and taken out to the smelter at Nelson, as a test of values, and gave satisfactory results, the smelter returns showing 164 oz. silver and 26 per cent lead per ton.

The present route to the property from Fire valley landing is about 26 miles in length, about four miles being wagon road and the remainder fairly good pack

trail. Transportation charges are heavy, but as the several properties get opened and ore tonnage increases, these may be gradually decreased.

The Rampolla group, owned by Scaia brothers of Fire valley, is crown-granted and has considerable development work done on it. Good values in gold and silver are shown by the assays, but no ore has yet been shipped from this property.

The Waterloo group, owned mainly by parties residing in Grand Forks, has been developed to some extent. Two small shipments of ore have been made, one of which gave the high return of 669 oz. silver, 45 per cent lead, and \$10.30 in gold.

The Scaia brothers have done much development work on an extension of the Waterloo group and have several promising showings of ore.

To the west of the Waterloo group Messrs. Glover *et al* of Fire valley have located a number of claims, on which high-grade silver ore is said to occur, but these claims and a number of others at different points in the district have not had enough work done on them to allow of their value being even approximately estimated.

In a different section of the country situate north of Wauchope, near the head of Fire valley river, and tributary to Fire valley landing, there are also a number of mineral properties. The Paladora, or Olds group on Eureka mountain, has been favourably known for many years, but the sale and development of the same has been retarded, mainly by lack of transportation facilities.

The ore is of a kind likely to require local treatment and mills or other plants are not easily nor cheaply conveyed over a pack trail. At present a movement is being made to secure from the provincial government a grant sufficient to construct a sleigh road northward, up Fire valley, for a distance of 16 miles. This road, if built, will serve all the properties included in the Lightning Peak, Rampolla and Waterloo groups, on the north branch of the Kettle river.

MOLYBDENUM AND TUNGSTEN.

THE Geological Survey of Canada has issued a number of bulletins on the Mineral Resources of Canada. Among them is one by Mr. R. A. A. Johnston, on Molybdenum and Tungsten, from which the following information has been taken:—

MOLYBDENUM.

Molybdenum is an essential constituent of the following minerals:—molybdenite or sulphide of molybdenum; molybdite or molybdic oxide; wulfenite. molybdate of lead or yellow lead-ore; powellite. molybdate and tungstate of calcium; belonesite or molybdate of magnesia; ilsemanite, supposed to be a molybdate of molybdic oxide. Of these molybdenite and molybdite are the only ores of molybdenum which have so far been reported as occurring in Canada. They form the source of by far the greater portion of the molybdenum of commerce, molybdenite being the more important of the two. As for the other

ores of molybdenum mentioned above, wulfenite alone has ever attained any economic importance and that only to a very limited extent, the supply being so small and uncertain as to be almost inconsiderable. The remaining ores do not possess other than a purely scientific interest.

Molybdenite, free from impurities, contains 60 per cent of molybdenum and 40 per cent of sulphur. It occurs sometimes in tabular hexagonal crystals, but more often in foliated masses. It is a soft sectile mineral with a hardness of 1 to 1.5 and a specific gravity of 4.7 to 4.8. It has a pure lead-gray colour and metallic lustre. On white paper it affords a bluish-gray streak and on porcelain a slightly greenish streak. Before the blowpipe, it is infusible but imparts a yellowish-green colour to the flame. On charcoal the pulverized mineral gives, in the oxidising flame, a strong odour of sulphur dioxide, the coal at the same time becoming coated with crystals of molybdic oxide, which are yellow while hot and white after cooling. This coating acquires an azure-blue colour if touched intermittently with the reducing flame. Molybdenite is decomposed by nitric acid with separation of a white or grayish-white residue of molybdic oxide.

Previous to the year 1778 much confusion existed as to the identity of molybdenite and graphite, owing to the close resemblance of the two minerals, but in that year Scheele showed that whereas graphite was entirely consumed on prolonged ignition molybdenite on the other hand left a white crystalline oxide. And in 1782 Hjelm succeeded in isolating the metal itself. Molybdenite is readily distinguished from graphite by its greater specific gravity, by its greenish streak on porcelain and by its chemical properties.

Molybdenite is often found disseminated through granite, gneiss, limestone and other crystalline rocks, but frequently in greater abundance in quartz-veins traversing such rocks. In some instances where the enclosing silicious gangue has been removed or disintegrated through atmospheric or aqueous agencies or both, the molybdenite has been found loose in the soil, having apparently suffered but little alteration.

Molybdite or molybdic acid, the earthy varieties of which are also known as molybdic ochre, contains under normal conditions 66.7 per cent of metallic molybdenum. It occurs in capillary crystallizations, tufted and radiated; also subfibrous and as an earthy powder or incrustation. The lustre of the crystals is generally silky or adamantine, less often pearly. The colour varies from straw-yellow to yellowish-white. The hardness varies from 1 to 2 and the specific gravity from 4.49 to 4.5. This mineral frequently occurs in association with molybdenite from which it has been derived by oxidation.

Uses.—Up to within very recent years the use of molybdenum was almost entirely confined to its employment in the form of a molybdate as a laboratory test-reagent for the detection of phosphoric acid. For a time small quantities of molybdenum were employed in the preparation of certain pigments used in the colouring of textile fabrics. But since the

introduction of aniline compounds into the dyeing industry, little, if any molybdenum is now used for this purpose on a commercial scale. Recent experiments of M. E. Pozzi-Escott have demonstrated the possible use of molybdenum salts as a means of imparting a deep yellow colour to leather. Various shades may be obtained by combining these salts with logwood extracts. Lately, molybdenum has gained considerable economic importance through its introduction into the manufacture of certain kinds of steel. In quantities up to about 4 per cent, it has the effect of rendering steel peculiarly hard and tough, with the additional advantage that heating and welding are unattended by any deterioration or change in these qualities.

Different kinds of tool-steel contain from 2 to 4 per cent and a steel containing 3 per cent of molybdenum has been found eminently suitable for the manufacture of armour-plates, owing to the high degree of resistance it offers to the passage of projectiles.

For other purposes, from 1 to 2 per cent of molybdenum is employed, according to the use for which the steel is intended. At the steel-works it is ordinarily added in one or other of three different forms, viz: as dark blue powdered metal, containing 95 to 99 per cent of molybdenum; as ferromolybdenum, containing 50 to 55 per cent of molybdenum; or as molybdenum-nickel, containing 75 per cent of molybdenum and 25 per cent of nickel.

The effect which the addition of molybdenum has on certain other metals—notably lead and copper—has been the subject of attention from a number of investigators, but so far no very definite conclusions seem to have been arrived at and very little has been published in this connection as yet.

Market Requirements.—Molybdenum ore, to be of marketable quality should contain at least 42 per cent of molybdenum. Ores containing less than this amount must be subjected to concentration by cobbling or other suitable means. It should too as far as possible be uncontaminated by other metallic minerals as the presence of any of these is objectionable and materially reduces the market value of the ore.

The presence of copper especially in any thing more than traces renders molybdenum ores valueless as such for commercial purposes, as the cost of its removal by chemical means, more than offsets the present value of the molybdenum.

Sources of Supply.—For many years the world's supply of molybdenum ore was drawn almost exclusively from a very few localities in Norway and Sweden. Lately however the demand has stimulated the production at other centres, notably in Saxony and in the United States of America. Many deposits of molybdenite have been developed in the states of Arizona and New Mexico and are now producing large quantities.

Some localities in the states of Washington and Colorado are also being made productive and a deposit of molybdite near Telluride in the last mentioned state is being operated with success. In Canada,

comparatively little has been done in the production of molybdenum ore, although it is known to occur at many localities scattered over a very large area of the Dominion. As to the extent or value of any of these deposits very little is known except from purely surface indications or from the little development work which has been carried on in one or two isolated cases.

From reports of the Geological Survey and other sources it is learned that ores of molybdenum occur as follows:

In Nova Scotia thick bands of laminated quartz, running with the strike of the felsites contain, in most instances, small quantities of molybdenite. It has also been observed spotting syenite rock. In New Brunswick it occurs in granite rocks, in quartz veins cutting the granite, and in quartz traversing gneiss. In Quebec, a fine granular form of molybdenite has been found in short veins of quartz and bitter-spar intersecting copper-bearing slates; in nodules of from one to three in. in diameter and also in flakes a quarter of an inch thick and sometimes 12 in. across in a bed of quartz interstratified in a white coarse-grained gneiss holding garnets and black mica; imbedded in iron-pyrites, apatite and pyroxene; foliated masses are to be found either loose in the soil or imbedded along with lamellar aggregations of brown mica and large quantities of pyrite in a massive pyroxene, the loose condition of the masses of molybdenite in the soil having been ascribed to the weathering and disintegration of a highly pyritiferous pyroxene; elsewhere, some very fine crystals have been found as well as others of a lesser degree of perfection. In Ontario molybdenite in masses, said to reach up to 6 in. in diameter, is reported to occur in a zone carrying pyrrhotite, pyrite, hornblende, calcite, quartz, pyroxene and black mica; in considerable quantities in a dyke of felspar cutting crystalline limestone; in a granular green pyroxene which has been formed by the complete alteration of a mass of limestone, enclosed in the fundamental gneiss, and holding small stringers of an association of molybdenite, pyrite, pyrrhotite, tourmaline and sphene; masses of molybdenite, generally coated with pulverulent molybdite, distributed rather abundantly through what is probably an intercalated mass of quartz enclosed in gneiss; also occurring in association with apatite, scapolite and titanite in a vein of limestone. Occurrences of molybdenite have also been noted in the districts of Ungava, Keewatin, Saskatchewan, and in the Whitehorse copper region of Yukon Territory. Known occurrences in British Columbia are as follows:—

Kootenay.—Fine flakes of molybdenite have been found in a quartz vein traversing altered granite near Granite Crossing on the Kootenay river. It has been found at some of the mines in the Trail Creek region. That of the Deer Park mine has been reported to be auriferous. At the Giant it is in bright bluish-gray fine granular masses, sometimes exceeding 12 in. in diameter, associated with galena, pyrrhotite, chalcopyrite and arsenopyrite.

Yale.—At a point about three miles south-west of Grande Prairie, fine specimens of molybdenite have been found accompanying chalcopyrite in a gangue composed of a massive clove-brown andradite associated with a light greenish fine-grained pyroxene. Fine specimens of molybdenite have also been found near the headwaters of the south fork of Spuzzum creek.

Lillooet.—Molybdenite has been observed in the neighbourhood of Lillooet river.

Coast.—Molybdenite has been found in association with copper ore near the head of Salmon arm, Jervis inlet; it has been noticed in the neighbourhood of Knight inlet; reported from the upper part of Cowichan river, Vancouver Island; small quantities have been found in quartz veins in an obscurely stratified hornblende granitic rock at a point just east of Carrington bay, Cortez Island, and on Texada Island, molybdenite has been observed at the Malaspina copper mine, associated with copper- and iron-pyrites in a vein consisting of calcite and quartz, with andradite, tremolite and chlorite as accessory minerals.

Notes on Molybdenite:—Mr. C. W. Willimott, of the Geological Survey, contributes the following:

"As the demand for molybdenite has increased very much within the last year or two, more attention is being paid to the search for this mineral, and reports of new finds are reaching us from all parts of Canada. In Ottawa and Pontiac counties, its occurrence may be said to extend, at intervals, over a length of one hundred and fifty miles. At Eardley, in Ottawa county, it has also been found. In the township of Hull, it is first met with at Eaton chute, near Kirks Ferry, where it occurs sparingly in felspar in small scales. A few yards east of this place, on the bank of the Gatineau river, I observed a number of loose pieces of quartz holding molybdenite in foliated masses. On the west side of the river, a large mass of this mineral was thrown out of one of the pits, while excavating for mica. The next place where I observed this mineral was in the township of Wakefield, but in very small quantity.

"On the east side of the Gatineau in the township of Masham, molybdenite has been met with at a number of places. Four miles west of the village of North Wakefield, this mineral occurs in veins and was tested by Mr. Henry, of the Molybdenum Company of Cooper, Maine, U.S., who stated that it ran three and three-fifths per cent of molybdenite. At another place in the same township, I observed beautiful hexagonal crystals, about an inch in diameter, on the face of a protruding rock.

"In Oldfield, the next township in Pontiac county, a band of grayish pyroxene has been penetrated in several places to a depth of fourteen feet. At the surface, in one of these openings, some very fine crystals of molybdenite were found several years ago. More recently an attempt was made to work this locality, but without satisfactory results. The mineral became very scarce at the depth of a few feet. Among the debris of the pits which had been sunk, I noticed

two zeolites, chabazite and stilbite, associated with scapolite.

"In the township of Allyn, in the same county, molybdenite, in small scales, is distributed throughout the country rock. The latter is intersected by felspathic veins that sometimes hold a considerable quantity of molybdenite. In the same township, this mineral is often turned up by the plough. From this locality to a point forty miles north of Maniwaki, it would be safe to say that molybdenite is found at frequent intervals over a wide range of country. I have seen specimens, said to have come from the townships of Alwin, Wright and Bouchette.

"At Mount Cerf, Egan, there is a band of ferruginous pyroxene which is, for the most part, covered with a peaty soil. At one small outcropping on this band, molybdenite makes a considerable showing, and foliated masses and plated crystals of the mineral, sometimes weighing five pounds, were met with. From two shots I obtained thirty-nine pounds of the pure mineral. I sent two hundred and fifty pounds of the enclosing rock to the museum, which was later examined by Prof. Porter, of McGill University, who found it still to contain 2.8 per cent, making a total percentage of 15.92. (See Summary Report of the Geological Survey Department for 1900, page 10.)

"Molybdenite was also found in loose pieces in the soil about twenty yards off at right angles to the strike. I was shown some very fine specimens of this mineral by an Indian, who stated that they came from the Tomatine river, but I had not an opportunity of visiting the locality.

"In the township of Litchfield a number of pits have been made in prospecting for mica. During the progress of this research a noticeable quantity of molybdenite was met with in all the pits. From one small pile, I picked out a piece that measured five by four inches and was a quarter of an inch thick. I was informed by the owner of the property that he had seen pieces as large as a dinner plate. This property has been recently well exploited with a view to finding a place that might afford some encouragement to start mining the molybdenite, but so far, I believe, no such spot has been found. From one little pocket I extracted about two pounds of the mineral.

TUNGSTEN.

Owing to the similarity of the applications of molybdenum and tungsten in the arts, it has been thought not inadvisable to add here a few notes regarding the latter metal, and to collect together in convenient form, such information as is available, regarding its occurrence in Canada.

The addition of tungsten to steel produces properties almost identical with those produced by the addition of molybdenum. For this purpose, though, it is necessary to add the tungsten in very much greater amount than is the case with molybdenum: 9 per cent of the former produces about the same effect on steel which is obtained with 4 per cent of

the latter. It is in this connection that tungsten is for the most part used. Recent experiments have also shown that the addition of tungsten has a very beneficial effect on certain of the aluminum alloys, particularly those with copper. Small quantities of it are also consumed in colouring textile fabrics, and tungstate of soda is used for rendering such materials fireproof.

The most important ores of this metal are scheelite or tungstate of calcium; wolframite, which consists essentially of tungstate of iron, and hubnerite, which consists essentially of tungstate of manganese; there are however many intermediate varieties between the last two types, the iron and the manganese replacing each other in varying amounts.

These ores form frequent accompaniments to tin ores and in some instances have been profitably worked in connection with the gold-washings of placer-mining.

The chief countries producing tungsten ores are England, Austria-Hungary, Germany, Australia and the United States of America.

Ores of molybdenum are known to occur in the provinces of Nova Scotia, Quebec and Ontario. A deposit of wolframite in Nova Scotia is mentioned in "The Mineral Industry" for 1900. In the same province an occurrence of hubnerite was found associated with small quantities of chalcopyrite and a very little pale yellow hydrous mica, irregularly distributed through a mass of light grayish-white translucent quartz, weighing about a ton and a half, found lying at the outcrop of a lenticular vein of similar quartz some two feet and a half to three feet in width, cutting a gneissic or granitic rock of Pre-Cambrian age. The vein however contained but a comparatively small scattering of the mineral and that only for about a couple of feet. It here occurs in the quartz in the form of narrow seams and small irregular masses having a coarsely laminated structure; it has a brownish-black colour, a submetallic lustre, breaks with a small subconchoidal fracture and affords a brownish-yellow streak.

Scheelite is found associated with a little arsenopyrite and pyrite, in a quartz-lead intersecting the main auriferous vein at the Ballou or Old American mine, Molega gold mining district. It possesses a compact massive structure and shows an uneven fracture; it is light smoke-brown in colour and has a vitreous lustre; it is subtranslucent.

In Quebec scheelite occurs in crystals of a pale wine-yellow colour associated with specular iron, pyrrhotite, galena and copper—and iron-pyrites in quartz veins cutting the Cambrian slates of the district. At this locality the scheelite is sometimes accompanied by small quantities of tungstite and meymacite.

In Ontario crystals of wolframite associated with magnetite have been found in a boulder of Laurentian gneiss.

GRANBY COMPANY'S PRODUCTION IN 1904.

THE quantities of the several metals produced in 1904 by the Granby Consolidated Mining, Smelting & Power Co., Ltd., at its smelter at Grand Falls, as recently published in the provincial press, falls considerably short of those supplied to Mr. E. Jacobs from the company's office under date December 19. The former figures, with values calculated at New York average prices for 1904, are as follows:

Copper, 13,431,226 lb., at 12.8c.	\$1,719,196
Gold, 47,968 oz., at \$20	959,360
Silver, 180,844 oz., at 57c.	103,081
Total	\$2,781,637

Those obtained from the company's office and published in last month's MINING RECORD were as under (metals recovered in December having been estimated):

Copper, lb.	17,843,390
Silver, oz.	217,472
Gold, oz.	50,694

The discrepancy between the two sets of figures is so large that it is evident a mistake has been made in one of them.

MONTREAL & BOSTON CONSOLIDATED MINING & SMELTING COMPANY.

THE following statements concerning the Montreal & Boston Consolidated Mining & Smelting Co., Ltd., were published recently by the *Boston News Bureau*:

The Guggenheim Exploration Company will probably get the Montreal & Boston Company.

Samuel Untemeyer, as counsel for various New York Stock Exchange creditors of Mumroe & Munroe, arranged a settlement whereby creditors will receive 100 cents on the dollar. The Guggenheim Exploration Company, of which company Mr. Untemeyer is general counsel, has secured an option on a large block of the stock of the Montreal & Boston Company at \$1 per share. A Guggenheim expert is now examining its properties and if he reports favourably, the option will probably be exercised.

The settlement provides for a cash payment on the part of the underwriting syndicate of \$100,000 and the deposit of 225,000 shares of Montreal & Boston stock taken at \$1 per share. In addition is the Guggenheim option on the above stock and other stock in hands of the brokers, which option is good for 20 days.

With the Guggenheims in British Columbia, with the vast wealth of the Exploration Company back of them, an effort will probably be made to rival the Granby Company in copper output. The Montreal & Boston Company has good mines, well equipped, and a smelter with two furnaces. The Montreal & Boston troubles have been on the promotion end, not the property end.

CROW'S NEST PASS COAL CO.

THE annual general meeting of shareholders in the Crow's Nest Pass Coal Company, Ltd., was held at Toronto, Ontario, on February 10, inst. The financial statement submitted showed that a net profit of \$406,049 resulted from last year's operations, as compared with \$310,492 in 1903. The amount divided among shareholders in 1904 was \$347,000, this being at the rate of ten per cent per annum on the issued stock. Of the large sum standing at credit of profit and loss account (\$1,870,813 was brought forward from 1903) chiefly obtained from sale, at a premium of 150 per cent, of new stock in 1902-3, an amount of \$1,700,000 was transferred to a reserve fund. The assets of the company, valued at the close of 1903 at \$5,798,647, now exceed \$6,000,000.

The total production of coal in 1904 was 744,000 tons as against 661,000 in 1903. Of this quantity about 366,000 tons were made into coke, 216,000 disposed of in Canada and 162,000 tons exported to the United States. The production of coke was 244,000 tons, which was an increase of more than 76,000 tons over that of 1903, practically all of which increase found a market in the United States, the quantity exported having been 106,000 tons in 1904 as compared with 31,000 tons in 1903. The quantity of coal exported (162,366 tons) was about 600 tons less than in the year immediately preceding. An improved domestic market was reported, and the outlook for 1905 regarded as promising larger results than those of any previous year. Last year's directors were all re-elected.

WESTERN OIL & COAL CO., LTD.

THE annual meeting of shareholders in the Western Oil & Coal Co. was held in Vancouver on February 13. The secretary, Mr. J. B. Ferguson, presented a report from which it is learned that when the company was organized last year it had only eight sections of ground, situate near Morrissey. When the extension of the Crow's Nest Southern railway to Fernie was being graded across the company's lands last year, coal measures were exposed, which indicate that these may yet prove valuable coal lands. The company has acquired 4,810 of the 5,000 shares in the Vancouver Petroleum Syndicate, thus securing control, and, as well, it controls the Canadian Oil & Coal Mines, Ltd. The Alberta Oil & Development Co., of Toronto, has transferred to this company its rights to three square miles of ground at Pass creek, the consideration being 18,000 shares of Western O. & C. Co.'s stock. The latter company now holds 9 square miles in Alberta and 16 square miles in British Columbia. It also owns two complete, modern boring outfits, together with material for putting down several wells. Oil has been obtained in the company's No. 1 well, on section No. 29, but the quantity has not been determined. No. 2 well, on the same ground, proved a dry hole. No. 3 well is down 779 ft., but an accident to the tools has stopped drilling here until after the drill can be

withdrawn. The rig formerly on section 29, with the exception of boiler and engine, has been transferred to Pass creek. The company should soon be in a position to commence drilling on its ground in this province.

The following were elected directors: Dr. R. E. McKechnie, Messrs. J. E. Miller, H. J. Thorne, R. A. Welsh, John Burns, George E. Macdonald, J. G. Scott, J. B. Ferguson and E. F. Hutchins, of Winnipeg.

At a subsequent meeting of the directors, Dr. McKechnie was elected president, Mr. Thorne, vice-president, and Mr. Ferguson, secretary.

LE ROI MINING CO., LTD.

THE report of the Le Roi Mining Company, Ltd., for the year ended 30th June, 1904, submitted at the annual general meeting of shareholders held in London on January 31, ulto., shows a balance at debit of profit and loss of £88,194 on the operations of the company for the financial year under review. This result is arrived at after paying to the bank the sum of £10,419 on account of interest on advances and after writing off £31,175 in respect of exploration and development and £15,369 on account of depreciation of plant, machinery, buildings, etc., at the mine and smelter. These various sums together amount to, say, £57,000. There remains a loss of upwards of £30,000, which is accounted for by over-estimates of the value of the stocks on hand at 30th June, 1903, and of the value of ores shipped to Northport, and by losses in realisation of copper on a falling market. The liabilities of the company at 30th June, 1904, amounted to £125,537, and the liquid assets to £140,740. The books of the Rossland office show that during the fiscal year 160,109 dry tons of ore were mined and shipped to the Northport smelter, the gross value of which amounted to \$1,752,024, equal to \$10.94 per ton, and that, in addition, the ore shipped from the second-class dump to Northport amounted to 19,013 tons, with a gross value of \$143,078, equal to \$7.52 per ton.

Owing to the serious illness of Mr. Parrish—the then general manager—during the early part of 1904, which prevented him from attending to the duties of his office for several months, Mr. J. H. Mackenzie, of San Francisco, was, at the end of last March, asked to take temporary charge of the mine and smelter, and on his consenting to do so, was appointed temporarily as general manager. Immediately before his appointment the directors were advised by cable that the Northport smelter had been closed down by Mr. Wilson, the smelter manager, owing, as he stated, to the lack of suitable fluxing ores. A cable was received from Mr. Mackenzie on 9th May last giving his opinions regarding the position of affairs, and this cable was at once reported to the shareholders. At the request of the Board, the managing director, Mr. A. I. McMillan, left England for Rossland in April, where he remained until December last, with the exception of a short interval during which it

was necessary for him to visit Montreal and London on the financial business of the company. Mr. Parrish resigned his position as general manager in May, and later Mr. Wilson, the smelter manager, resigned, as did also the office manager and other employees of the company. As stated in Mr. McMillan's report, changes have been made in the local management, which will, in his opinion, prevent the recurrence of troubles similar to those reported last spring. From 1st September, 1904, Mr. McMillan was at Rossland and Northport discharging the duties of general manager, with Mr. J. W. Astley as general superintendent, and Mr. Albert I. Goodell as superintendent of the smelter.

The directors have given much attention to the question of concentrating the low grade ores of the mine. In the month of May a small mill near Rossland was leased, and tests were carried out there under the supervision of Mr. J. H. Mackenzie and his partner, Mr. Bradley, who, under a temporary arrangement, were acting as consulting engineers. The result of these tests was, however, not sufficiently satisfactory to warrant the directors in spending a large sum of money in the erection of a concentrating plant. Other investigations have been made, and a small experimental plant of its own is now being erected by the company at Rossland in which, with better equipment, to make further tests.

During the fiscal year the development of the mine has been vigorously pushed forward. Though the ore in the 1,350-ft. level has not proved as important a development as Mr. Parrish anticipated, yet the discovery of ore at this depth is most encouraging. Large bodies of ore have been found in other parts of the mine. Since the end of the financial year an important body of high-grade ore has been discovered on the 1,450-ft. level, which, according to latest advices, as already published, averages \$30 per ton in value and 9 ft. in width.

The directors have discussed the question of amalgamating with the Le Roi Company other large interests in British Columbia. The negotiations in regard to this matter, with the necessary independent examinations which are now being made, must occupy a considerable period of time, and the whole matter will, before any action is taken, be laid before the shareholders.

Since the close of the year ended 30th June last a great improvement has taken place in the financial position of the company, largely owing to the improved methods introduced for carrying on the business both at the mine and smelter. Steady profits have been reported during the past six months, and at 31st December last the liability of the company to the Bank of Montreal amounted to only £17,626, which was more than covered by matte in transit from the Northport smelter to the works of the Tacoma Company, which purchases the matte under contract. At the same date the liquid assets of the company exceeded the liabilities by £31,509. The company is now in a stronger financial position than at any time since the year in which it was formed.

Mr. George S. Waterlow, one of the directors, during the year paid a visit to British Columbia and other parts of Canada with special reference to the consolidation of interests above referred to, and his report thereon has been made to the board.

COMPOUNDED STAMP-HEADS AT MICHIGAN MILLS.

NOW that the milling of copper ore is in progress in one of the mining camps of British Columbia, the following extract from a contribution to the press by Mr. Horace J. Stevens, of Houghton, Michigan a well-known writer on subjects connected with the copper mining industry, may be of interest to readers of the MINING RECORD.

"The successful experiments with compounded stamp-heads at the Osceola and other mills of the district render it certain that something little short of a revolution is to be worked in the milling practice of the district during the next two or three years. The power consumption of the compounded-head is so much less per ton of rock stamped that necessity will drive all the progressive mining companies to compound their stamps, sooner or later. The cost of changing over a common head to a steeple-compound is about \$10,000, as compared with about \$13,000 for original cost, so that there is little saving over putting in an entirely new head. A feature that has escaped general attention is the fact that compounded heads will necessitate an entire alteration of the balance of the mill. An increase of 40 to 50 per cent in crushing capacity must be followed by an increase of equal amount in the washing department, or else there will be a very inefficient saving of copper. More jigs and concentrators will be needed, and this will require more room, meaning remodeling of the mills, either by cutting down the number of stamps in a given space, or providing more wash room for the jigs.

"Few of the simple heads now working in the district are run to their full stamping capacity, solely for the reason that while an increase of 20 per cent in output is possible in many cases, the actual recovery of copper in the average mill is no greater when 600 tons are crushed than when 500 tons are stamped, showing that the washing machinery, being planned for the smaller amount, simply loses every pound of copper contained in the excess of rock stamped. This is not a theory, but a fact, demonstrated by careful tests at several mills. Of course conditions vary somewhat, but as a rule the mills are speeded to their capacity, and compounding, while certain to come, will bring with it a train of problems connected with milling space and jiggging capacity."

The finding of a lump of platinum weighing 35 lb, was recently reported from Dawson, Yukon Territory. Such a discovery is not impossible, but is improbable. The confirmation of the truth of the report or its contradiction, will be awaited with interest.

NEW ROASTING FURNACE AT NELSON SMELTER.

THE Hall Mining & Smelting Co., Ltd., is installing at its smelter at Nelson a Merton roasting furnace. This furnace is the invention of Mr. T. D. Merton, of Melbourne, Victoria, Australia. For many years he has used it satisfactorily in his works, where he is treating gold ores by chlorination and cyaniding. Recently several Australian smelting works have adopted the furnace, and finding that it treats successfully all kinds of roasting ores, Mr. Merton decided to make a trip to milling and smelting centres in the United States and Canada, to direct attention to the effectiveness of his furnace. He spent some time in California, where he established an agency, and next went to Vancouver and there made the Vancouver Engineering Works agents for Canada. Before this the furnace was being built by the Cyanide Plant Supply Company of London, England. Several companies in England and the United States have installed these furnaces, and it is stated that they are doing good work.

The furnace is compact, occupying a floor space of about 9 by 35 ft. It has three decks in the body of the furnace and one exterior hearth. The great advantages claimed for the furnace are that the system of rabbling is such as to lift and turn over every particle of ore with every revolution, exposing it more thoroughly to oxidation than any other system. Further, the exterior hearth makes it possible to obtain any degree necessary of heat or oxidation. Since the erection of this furnace was begun, the Queensland Smelting Works reports an improvement in the shape of an additional hearth, where the charge may be slagged if so desired. This will add to its length about ten feet.

POPLAR CREEK.

No important developments resulted from the work done last year in this camp, yet on several properties underground prospecting gave encouraging results. The following is a summary of operations on the most prominent of the numerous properties located in this part of the Lardeau district:

Handy.—Although not at Poplar, this property is only a few miles above that camp. In 1904 some 450 ft. of development was done, 50 ft. being sinking, 300 ft. cross-cutting, and 100 ft. open cuts. A shipment of 30 tons of crude ore was made. A steam boiler, pump and sawmill were installed and a shaft house, engine house, ore shed and other buildings erected.

Lucky Jack and Swede Groups.—Owing to litigation, the Great Northern Mines Company was much hampered in its operations at Poplar, during the year, yet 418 ft. of work was done in drifts, cross-cuts and raises, and 60 ft. of shaft was sunk on the Lucky Jack group. On the Swede group 357 ft. of similar development was done, this exploration work giving gratifying results. Mill tests of ore from Poplar were as follows: Ore from the Lucky Jack, 2,900 lb., realized \$259, from the Swede group, 7 1-2 tons of ore that was not picked, returned \$241 50, for the net weight of the ore. The litigation alluded to, having been settled, the company anticipates making a good showing in the new year on its several properties.

Marquis and Gilbert Group.—Much prospecting work has been done throughout the season, with encouraging results. Offers made for this property were considered too low, so were refused.

Copper King Group.—A tunnel 82 ft. in length has been driven on this property, and a strong body of graphite encountered, with ore coming in the face of the tunnel. Work will be resumed vigorously next season.

Pluto.—This property is adjoining and lying below the Swede group. Work will be carried on here all winter, as good showings of free gold and arsenical iron are being met with in progress of work.

Mother Lode.—A 300-ft. tunnel has just been completed.

Where the ore vein has been struck a cross-cut is now being driven through the ore body to catch the foot wall, but so far this has not been reached. The present depth is about 200 ft. on the vein. An incline shaft from the surface was sunk 30 ft. on the vein. The ore is fine concentrating galena.

Spyglass Group.—Situated 1 1/2 miles up Poplar creek, is a rich silver property. Much native silver has been found on it. Work was closed down for the year on October 27th, after three or four months of active development. Sample shipments of ore were made. No doubt next season work will be pushed rapidly with good results.

A considerable amount of prospecting has been done both around Poplar and Rapid creeks and another season will see much work being pushed in these parts of Poplar creek.

TEXADA ISLAND.

Van Anda.—These mines are temporarily closed down pending a decision from the bondholders as to whether or not they will continue to work them. The company has been shipping regularly to the Tyee Copper Company's smelter at Ladysmith. Lately the granite was struck in the mine; the quality of ore occurring near it was, if anything, better than that already shipped. It is hoped that the company, which has its head office in England, will decide to continue operations and will sink the main shaft, the finding of ore at depth being the main question to settle for the present.

Marble Bay.—This property was successfully worked during the past year by the Tacoma Steel Company. It is well known that the entire purchase price, about \$200,000, was paid out of proceeds of sales of ore. The main shaft has been sunk to the 600-ft. level, at which depth a large stope of high-grade ore is exposed. Recently a new boiler and steam pump were installed, and other permanent improvements were effected. Most of the ore mined has been sent to the Tacoma smelter, only a small quantity having been shipped to Ladysmith. It is regrettable that all British Columbia ores are not smelted at provincial smelters, especially as there is ample treatment capacity at the smelters in the province, both on the coast and in the upper country.

Iron Mine.—Last spring a tunnel was driven 260 ft. by contract, to intersect the shaft sunk from the open cut 160 ft. above, and the sinking of a shaft was commenced on the company's copper prospect. Two or three shipments of ore were made to Ladysmith, but since then the property has remained unworked. It is understood, however, that it is the intention of the company to resume mining operations next spring, and to build a tramway to Gillies Bay, where bunkers will be erected, to facilitate shipments of either iron or copper ore, the old dock there having been washed away during the last autumn's storms.

Loyal.—The Loyal prospects have been leased to a Mr. Jacobs, formerly of Colorado, but now of Seattle, whose intention is, so it is stated, to early in the new year, start sinking a shaft, which it is intended to carry down 200 ft.

General.—No development work was done last year on the Raven or other old-time properties, with the exceptions above stated. The lime quarries were operated almost continuously throughout the year, and the lime product was shipped to Honolulu. This lime is known in the trade to be of high-grade quality, in fact the limestone of Texada Island ranks among the purest found in America.

COAL NOTES.

The Interior Coal and Development Co., Ltd., capital \$10,000, has been incorporated to develop coal properties in the Quilchena district. The company is composed mostly of residents of Kamloops or Nicola.

It is reported that the Cassiar Coal and Development Co. has 56 square miles of coal lands in the district and the Kitamaat Coal Co. about 25 claims.

At a meeting of the Kamloops Coal and Development Co. held last month, a committee was appointed to consider a proposition for disposing of their concern to another com-

pany. It is understood that there is a strong probability of a deal being consummated.

At the Crow's Nest Pass Coal Co.'s Michel colliery, last month, an accident occurred to the engine that runs the elevator at the tipple. The facing of the belting broke and the engine ran away. The engine was completely wrecked and the foundation bed was also badly damaged. Several days were required to replace the engine and in the meantime the output of mines Nos. 4, 5 and 6 was curtailed.

Lundbrek is a new town in Western Alberta, started in connection with the opening up of the Breckenridge & Lund Coal Co.'s coal lands, which are stated to have been under development in a small way for three years. The Crow's Nest railway crosses the property, of which a Vancouver visitor recently stated: "There are four large seams of coal on the property, and all have proved an excellent product. The development has proceeded 2,000 feet, in coal from the start, and in a year 500 tons will be produced every day. It is the intention to supply the settlers in the North West Territories with a good fuel, and the market is practically unlimited. An assay of the coal shows three per cent moisture, 50 per cent carbon, 32 per cent. volatile matter and 15 per cent. ash."

Official announcement has been made that Mr. Archibald Dick, inspector of mines, has been exonerated by the Royal Commission, presided over by His Honor Judge Spinks. The Minister of Mines stated that the evidence failed to disclose any wrongdoing on the part of Inspector Dick, and in his report, it is understood that Judge Spinks highly commends the work of this official in the Crow's Nest Pass. In substance the charge preferred against Mr. Dick was that he had accepted a retainer of \$300 a month from the Crow's Nest Coal Company while acting as an official of the government.

MINERAL PRODUCTION IN 1904.

An estimate of the approximate value of the mineral production of British Columbia in 1904 has been given out by the Provincial Department of Mines. The following table shows the actual production for 1903 and that estimated for 1904:—

	1903.	1904.
Gold	\$ 5,873,036	\$ 6,400,000
Silver	1,521,472	2,200,000
Copper	4,547,535	4,600,000
Lead	689,744	1,500,000
Miscellaneous	531,870	600,000
Total mineral output other than coal	\$13,163,657	\$15,300,000
Coal	3,504,582	3,270,000
Coke	827,715	1,200,000
Total mineral output	\$17,495,954	\$19,770,000

COMPANY MEETINGS AND REPORTS.

PIONEER MINING CO., LTD.

THE annual meeting of the Pioneer Mining Company, Ltd., which last year consolidated under its control the Two Friends, Bank of England and Black Prince groups, situated in the Slocan City mining division, was held on January 24 at Nelson. After some routine business had been transacted it was decided to adjourn until early in March, when officers will be elected and other business dealt with. Mr. Jas. W. Moffat, managing director, and Mr. C. B. McCuaig, assistant manager, were among those present.

FIVE METALS MINING CO.

At a special meeting of shareholders in the Five Metals Mining Company held in Nelson last month, the following officers were elected for the ensuing year: John P. Redding, president and manager; directors, Dr. D. R. Brockman, Rockford, Wash.; Judge Campbell La Force, Tekoa, Wash.; and J. P. Redding, of Nelson.

OMNIECA AND PEACE RIVER MINING CO.

At a meeting of the shareholders of the Omnica and Peace River Mining Co., Limited, held in Victoria on February 7, the following directors were elected: F. Peters, Captain William Grant, H. E. Levy, F. W. Vincent, A. Stuart Robertson, I. A. Ker and O. Baker. Subsequently the directors met and elected Captain William Grant president, F. Peters, vice-president and D. Fraser secretary and treasurer.

ROSSLAND-KOOTENAY MINING CO., LTD.

The report of the Rossland-Kootenay Mining Company, Ltd., for the period ended 31st August, submitted at the annual meeting, stated that owing to the difficulty of obtaining satisfactory rates from the smelters, the shipments of ore during the year were greatly restricted and finally ceased in August last; all expenses have therefore had to be charged against a very limited output; in addition the allowance for depreciation and the amounts written off, plus expenses, consequent upon the Centre Star litigation, all of which have been debited to the revenue account, aggregate over £5,000.

LE ROI MINING CO., LTD.

A press despatch cabled from London, England, states that the annual meeting of the Le Roi Mining Co., Ltd., was held in London on January 31. There was a large attendance of shareholders and considerable interest was evinced in the proceedings. Whilst the accounts for the year ending June 30th, 1904, showed a loss, the marked improvement in the company's financial affairs during recent months, the more conservative and economical management, the resumption of monthly profits, and the discoveries of high-grade ore in the lower levels, were the subject of the liveliest satisfaction to all present.

The meeting approved of the proposal that the Le Roi Company should amalgamate with Rossland mining and other companies, with a capital of £1,500,000 and a working capital of £300,000 or £400,000.

Mr. A. J. McMillan was re-elected managing-director, and his policy as general manager warmly endorsed.

BRITANNIA COPPER SYNDICATE, LTD.

The annual general meeting of the Britannia Copper Syndicate, Ltd., was held at Vancouver on February 6. Of the 400 issued shares, 310 were represented. The president, Hon. Edgar Dewdney, was in the chair.

The financial statement submitted showed that the syndicate's mining property, plant, buildings and water power are valued at \$212,104.13. New York office account shows an unexpended balance of \$51,042.74, and there is cash in the Bank of Montreal, \$14,102.84.

The president's report stated that since the last general meeting operations had been carried on energetically under the supervision of Mr. J. H. Robinson, managing director. Construction work on a Riblet automatic aerial tramway and on buildings at Howe Sound was commenced last August. Previous to that about 40 acres of densely wooded flat had been cleared. Several buildings have been erected on this flat, which is near the beach, and in these machinery is being installed. A substantial wharf having a frontage of 100 ft. and an approach of 250 ft., has been built, and a tramway laid down from this to the centre of the flat, to facilitate removal of machinery from wharf to buildings. A building 133 by 125 ft. for the concentrating tables, is completed and the tables are being installed. The crushing mill and power house are nearly finished and the machinery has been ordered. The lower section of the aerial tramway, about two miles long, is well forward, and the upper section, more than one mile in length, will probably be completed next month. A dam has been constructed on the creek and piping and all other material necessary for conveyance of water to the power house are on hand. Work on mine buildings for the accommodation of mine employes, ore bins at tunnels and upper terminal of tramway and connecting trestles and snow sheds has also been in progress. It is confidently expected that all buildings will be completed and plant installed ready for operation of the mine by May 1 at latest. The capital of the company has been increased from \$250,000 to \$625,000.

The directors were re-elected, the board consisting of Hon.

Edgar Dewdney, Messrs. G. H. Robinson, W. C. McMeekin, Chas. Dull, J. W. Lee and H. C. Bellinger. At a meeting of directors held later, officers were chosen as follows: President, Hon. E. Dewdney; vice-president, Mr. W. C. McMeekin; managing director, Mr. G. H. Robinson, and secretary, Mr. J. W. Lee.

B. C. RECORD, LTD.

At the annual general meeting of the shareholders in the British Columbia Record, Ltd., held in the company's office, Victoria, on February 1, Messrs. H. Mortimer Lamb, Thos. R. Cusack and E. Jacobs were elected directors for the coming year. Mr. Jacobs, who early in January succeeded Mr. Lamb as editor, was appointed managing director in place of Mr. Lamb, who has retired from active work in connection with the Mining Record, though still retaining the position of chairman of the directors. It is Mr. Jacobs' intention to change the date of the publication of the Mining Record from the 1st of each month to about the 15th.

LE ROI NO. 2, LTD.

The report of the Le Roi No. 2, Ltd., covers the financial year ended September 30, 1904.

Development during the year comprised 1,556 ft. of drift and cross-cutting, 135 ft. of raising and winzining, and 3,617 ft. of diamond drill holes. The last-mentioned cost \$2.22 per foot.

As a result of the year's working, 23,020 tons of ore were shipped to the smelter and 10,331 to the concentrator. Of the former 21,680 were from the Josie mine, and gave an average of \$24.80 per ton, as against \$20.69 for the previous year. The 23,020 tons shipped realized the sum of \$638,410 inclusive of an estimated amount of \$33,000 for ore in transit. The cost of mining, diamond drilling and general expenses in Rossland amounted to \$150,747, leaving a gross profit of \$217,663, but from this has to be deducted London expenses and \$60,529 written off for development and depreciation. The gross value of the ore put through the concentrator has averaged \$5.25 per ton, the gross value recovered being \$3.15 per ton, of which \$2.02 was from the Wilfley tables and \$1.13 by oil.

The accounts show a balance to the credit of the profit and loss account of £25,819, which, with £15,471 brought forward from last year, gives a sum of £41,290 available for distribution. A dividend for the year ended September 30, 1903, of 1s. per share was paid on the 13th of February, and an interim dividend for 1904 of 1s. per share was paid on the 9th of June, 1904. The sum of £9,547 has been written off against mine development account, and £2,933 as depreciation on machinery, plant, buildings, etc. The directors recommended a final distribution for 1904 of 2s. per share, leaving £16,090 to be carried forward.

The profit and loss account follows:

Net returns from sales	£75,961
Interest, etc.	350
Total receipts	£76,311
Mining and general expenses	£30,567
Development	9,547
Depreciation	2,933
Deficit in milling account	1,064
Salaries and audit fees	2,484
Office, etc.	2,437
Royalties on Elmore oil process	367
Income tax	1,093
Total expenses	£50,492
Net profit for the year	£25,819
Balance from previous year	15,471
Balance available for dividends	£41,290

RECO MINING AND MILLING CO., LTD.

The annual meeting of the Reco Mining & Milling Co., Ltd., was held at Sandon, Slocan, on February 1. The following were elected directors for the ensuing year: J. M.

Harris, president and manager, Sandon; S. M. Wharton, vice-president, Spokane; Fred T. Kelly, secretary-treasurer, Sandon; J. G. Steele, Sandon; G. C. Wharton, Mobile Ala. The profit and loss account and the statement of assets and liabilities are as under:

Profit and loss account—	Dr.
Mining expenses	\$26,545.75
Mining supplies	2,810.50
Stable expenses	2,696.70
General expenses	1,097.32
Office expenses	2,260.00
Taxes	1,025.29
Total expenditure	\$36,435.56
Balance	39,701.56

\$76,137.12

Cr.

Surplus December 31, 1903	\$ 8,476.47
Ore sales—803.3 tons, No. 2 vein	50,106.28
Ore in transit—101.3 tons, No. 2 vein.....	9,258.62
Due from smelter	2,079.95
Bounty received	3,756.06
Bounty due	2,298.44
Boarding house	161.30

\$76,137.12

The net profit for the year 1904 was \$31,225.09, which with the credit balance forward from 1903, leaves a total balance at credit of Profit and Loss of \$39,701.56. The statement of Assets and Liabilities shows the following balances:

Assets—	
Mines, plant, development, etc.	\$ 958,200.00
Stock in treasury	41,800.00
Ore in transit	9,258.62
Due from smelter	2,079.95
Due from bounty	2,298.44
Cash in bank	30,414.79
	\$1,044,051.80
Liabilities—	
Capital stock paid up	\$1,000,000.00
Accounts payable	4,350.24
Profit and loss	39,701.56
	\$1,044,051.80

A dividend of two cents per share was declared, payable to stockholders of record, 20th February, 1905. The capital of the company consists of 1,000,000 fully paid-up \$1 shares, but 41,800 shares remain in the treasury, so that the dividend of two cents per share will be paid on 958,200 shares, making a total disbursement of \$19,532 on this account. Previous dividends amounted to \$287,500, so that, including this dividend, the mine has paid \$307,082.

COMPANY NOTES AND CABLES.

Le Roi Company (Rossland)—November: Shipped from the mine to Northport, 10,182 tons of specially selected ore, containing 4,853 oz. of gold, 5,070 oz. of silver, 280,000 lb. of copper. Estimated profit on this ore, after deducting cost of mining, smelting, realization and depreciation, \$34,000. Expenditure on development work during the month, \$11,000. Development of the mine continues to be satisfactory. On the 1,450-ft. level new ore body, reported by cable November 11th, has been developed about 50 ft. in length; average width is about 5 ft.; the ore averages in value about \$20 per ton. Development proceeding vigorously.

December: Shipped from the mine to Northport during the past month 10,729 tons of specially selected ore containing 4,766 oz. of gold, 4,569 oz. of silver, and 246,200 lb. of copper. Estimated profit on this ore after deducting cost of mining, smelting, realization and depreciation, \$28,000. Ex-

penditure on development work during the month, \$9,000. Development of the mine continues to be satisfactory. Stope 1,450-ft. level is now 9 ft. wide. The ore averages in value \$30 per ton. Have found good pay ore in raise from 1,350-ft. level, extent at present unknown. 900-ft. level south vein at present 140 ft. long, the average width is 25 ft.

Le Roi No. 2.—November: Shipped from the mine during the month 1,800 tons. The net receipts are \$30,698, being preliminary payment for 1,313 tons shipped; \$3,952, being deferred payment on 1,662 tons previously shipped; \$1,288, being payment for 27 tons concentrates shipped; in all, \$35,938.

Tyce Copper Company.—November: Smelted 4,719 tons Tyce ore and 846 tons custom ore; total, 5,565 tons; matte produced from same, 441 tons; gross value of contents (copper, silver, and gold), after deducting costs of refining and purchase of custom ore, \$63,883.

December: Smelter ran 17 days. Smelted—Tyce ore, 3,494 tons; custom ore, 543 tons; total, 4,037 tons. Matte produced from same, 346 tons. Gross value of contents (copper, silver and gold) after deducting costs of refining and purchase of custom ore, \$47,651. N. B.—Short month owing to general holidays.

Ymir Gold Mines.—November: 30 stamps ran 29 days and crushed 2,700 tons of ore, producing 623 oz. bullion. The estimated realisable value (gross) of the product is \$7,170; 140 tons of concentrates, shipped, gross estimated value \$3,500; cyanide plant treated 1,800 tons of tailings, producing bullion having estimated gross value of \$1,275; 38 tons of crude ore, shipped, \$1,180; sundry revenue, \$350; total \$13,475; working expenses, \$12,750; profit, \$725. There has been expended during month on development, \$635.

December: 35 stamps ran 26 days and crushed 2,350 tons (2,000 lb.) of ore, producing 588 oz. bullion. The estimated realisable value (gross) of the product is \$6,600; 145 tons of concentrates, shipped, gross estimated value, \$3,750; cyanide plant treated 1,800 tons (2,000 lb.) of tailings, producing bullion having estimated gross value of \$1,190; sundry revenue, \$300; total, \$11,840. Working expenses, \$12,018. Loss, \$175. There has been expended during month on development, \$1,800.

Sullivan Group (East Kootenay)—The Sullivan Group Mining Company has approved the issuance of \$200,000 in new bonds. Officers have been elected as follows: President, Charles Sweeney; vice-president, George Turner; secretary, J. C. Williams; treasurer, Bruce Clendenning.

NEW REGISTRATIONS IN ENGLAND.

ALASKA CONSOLIDATED MINES, LTD.

Registered 2nd December by Oppenheimer & Southern, 10, St. Swithin's Lane, E. C. Capital £1,500,000, in £1 shares. Objects: To adopt a certain agreement (the parties to which are not named); to seek and secure openings for the employment of capital in any part of the world; to search for, prospect, examine and explore mines and ground supposed to contain gold or other minerals or precious stones; to acquire, own and turn to account concessions, leases, gold, silver, copper, lead, tin, quicksilver, etc. No initial public issue. The number of directors is not to be less than two nor more than seven; the subscribers are to appoint the first. Qualification, 100 shares. Remuneration, £200 each per annum (£250 for the chairman) and 2½ per cent. of the net profits available for distribution, divisible.

SLOUGH CREEK GRAVEL GOLD, LTD.

Registered January 4, by J. F. Shearer, 38 Broad Street Avenue, E. C. Capital £200,000, in 4s. shares. Objects: To acquire, lease, work, develop, turn to account and deal with mines, leases, concessions, mining workings and claims, alluvial ground, diggers' licenses, &c., and to carry on the business of miners, metallurgists, &c. No initial public issue. The number of directors is not to be less than two nor more than seven; the signatories are to appoint the first. Qualification, £250. Remuneration, £100 each per annum and 5 per cent. of the distributed profits, divisible. Registered office: 38 Broad Street Avenue, E. C.

NEW INCORPORATIONS.

Bannockburn Mines, Ltd.—Capital \$500,000 divided into 1,000,000 shares of 50 cents each. The head office of the company is at Kaslo.

Forty-nine Creek Mining Co., Ltd.—Capital \$600,000, in 2,400,000 shares of 25 cents each.

Gold Bug Mining Co.—Capital of \$250,000, divided into 250,000 shares of \$1 each.

Nelson Copper Syndicate, Ltd.—Capital \$10,000, divided into 100 shares of \$100 each.

Skylark Development Company, Ltd.—Capital \$250,000, divided into 250,000 shares of \$1 each.

American & B. C. Hydraulic Placer Company, Ltd.—Capital \$50,000, divided into 500,000 shares of 10 cents each.

Dease Creek Hydraulic & Developing Company, Ltd.—Capital \$50,000, divided into 200,000 shares of 25 cents each.

Enderby Coal Mines, Ltd.—Capital \$250,000, divided into 250,000 shares of \$1 each.

South Yale Copper Company, Ltd.—Capital \$450,000, divided into 450,000 shares of \$1 each.

It is reported from Ottawa that Messrs. E. A. Jukes, Toronto; W. S. McNamara, H. E. Larkin, F. T. Har and W. D. Woodruff have been incorporated as the Nicola Valley Coal & Coke Company; capital \$1,000,000; with headquarters at St. Catharines, Ontario.

VOLUNTARY LIQUIDATIONS IN 1904.

During the year 1904 the undermentioned joint stock companies, organised to operate in Canada and registered at Somerset House, London, England, were voluntarily wound up. The Portland and Velvet companies were consolidated, the reconstructed company, now known as the Velvet-Portland, having been at work near Rossland for some time past. The companies wound up include the following:

Alaska Steam Coal and Petroleum Syndicate.
B. C. Exploring Syndicate.
B. C. Minerals.
Canadian Oil Exploration Company.
Cottonwood River (B.C.) Alluvial Gold Mining Company.
Dewdney's Canadian Syndicate.
Gold Run Gravels.
Klondyke Consols.
Klondyke Corporation.
Loyal Dominion Creek (Yukon) Gold Mining Company.
Portland (Rossland) Mine.
Quartz Creek (Yukon) Syndicate.
Quesnelle Dredging and Hydraulic Syndicate.
Quesnelle Gold Recovery Company.
United Coal Fields of British Columbia.
Velvet (Rossland) Mine.

VISIT OF AMERICAN INSTITUTE OF MINING ENGINEERS.

A central committee to arrange for the visit and entertainment of the American Institute of Mining Engineers, and to co-operate with the secretary of that important organization, R. W. Raymond, Ph. D. of New York, and his assistant, Mr. Theodore Dwight, with respect to the proposed meeting in this city early in July and the trips from here into the mining districts of British Columbia and Alaska has been organized. About 200 prominent engineers are expected to attend the meeting.

Hon. Richard McBride, Minister of Mines, is honorary chairman of the committee, Mr. Wm. Fleet Robertson, provincial mineralogist, being chairman, and Mr. W. M. Brewer, secretary.

From a circular lately issued to members the following is taken: "Three or four days will be spent in Victoria, where sessions will be held. From Victoria a specially chartered steamer will convey the party to Skagway, stopping at Rudyerd bay, Snettisham bay, Douglas island—to visit the Treadwell mines—Junca, Shakan and Wrangell. From Skagway via White Pass and Yukon railway, the route will be

across the Alaskan Alps to Whitehorse, the end of the railway line. The party will then proceed by special steamer through lake Labarge and the upper Yukon river to Dawson. Here three or four days will be spent in visiting the neighboring mining camps on Eldorado and Bonanza creeks. The return trip will be up the Yukon and back to Vancouver via Sitka. From Victoria to Dawson and return to Vancouver will occupy about 21 days. The return train east from Vancouver will leave the coast about July 26 via Canadian Pacific, and will make stops at Field, Glacier and Banff, while those desiring to see the Kootenay and Boundary districts in British Columbia, visiting Nelson, Rossland, Trail, Greenwood, Fernie, etc., will leave the main party at Revelstoke and rejoin it several days later at Medicine Hat, arriving at Chicago or New York about August 4."

The two special trains will start from Chicago or St. Paul June 24 and make the trip direct to Seattle, the party crossing thence to Victoria. Members of the institute living on the coast who wish to go to Alaska may join the party at Victoria. The rate for such, Victoria to Dawson and return, will be \$200.

CANADIAN MINING INSTITUTE.

The annual general meetings of the members of the Canadian Mining Institute for the transaction of business, the discussion of papers, etc., will be held at Montreal on March 1-3, prox.

The council of the institute will award a gold medal, presented by the president, for the best paper contributed by a student member to the transactions of the institute during 1904.

The council offer three prizes of a cash value of \$25 each for the best papers contributed by Canadian mining students on the following subjects:

- 1.—Ore Deposits and Mining Geology.
- 2.—Mining Practice.
3. Ore Dressing and Metallurgy.

Syllabus, embracing a large number of papers presented by the members, and detailed programme of arrangements for these meetings will be mailed to members in due course.

ASSOCIATED SILVER-LEAD MINES.

The executive of the Associated Silver-Lead Mines met at Nelson on January 30. There were present Messrs. A. C. Garde, president; James Cronin, Moyie; John L. Retallack, W. E. Zwicky, Kaslo; N. J. Cavanaugh, Louis Pratt, Sandon; W. S. Drewry, New Denver, and Norman Carmichael, Nelson.

Mr. Garde tendered his resignation as president, which was accepted with regret and Mr. Garde withdrew from the meeting.

Mr. James Cronin was unanimously elected president, and Messrs. P. D. Ahier, of the Idaho-Alamo mine, and W. E. Zwicky, vice-presidents.

Mr. John L. Retallack was appointed delegate from the association to interview the Dominion government on the zinc question and to request that an investigation be held and a report made by an expert selected and paid by the government.

The question of the two per cent mineral tax was considered and after discussion the following resolution was adopted:

"Resolved, that this association approves of the principle of taxing the output of metalliferous mines.

"If it is deemed necessary to revise the present method of such taxation it would advise, that before any change is made a commission, representative of the various branches of the metalliferous mining industry be appointed; such commission to have power to summon witnesses, and examine mine and smelter books, with a view to arriving at an equitable basis of taxation, the expense of such commission to be borne by the government.

"Further resolved, that, if such commission shall find it

advisable to amend the present method of taxing the smelter or mill returns, this association suggests taxing at a rate to be fixed, the gross recovered value of ore."

PROVINCIAL MINING ASSOCIATION.

A meeting of the executive committee of the Provincial Mining Association of British Columbia has been called, to be held at the office of the association, Victoria, on Monday, February 20. There are numerous matters relating to the interests of the mining industry to be considered by the executive. The desirability or otherwise of holding a convention of delegates from the branches this year will also be dealt with. The secretary, Mr. L. Jacobs, has mailed a copy of the business agenda to each member of the committee. It is desired that all branches at once send in rolls of members' names and the half fees payable to the Association

TWO PER CENT MINERAL TAX.

The Nelson branch of the Provincial Mining Association on the 6th inst. unanimously passed the following resolution on the question of mine taxation:

"Resolved that the Nelson branch of the Provincial Mining Association is of the opinion that the taxing of mines in operation should be solely upon the profits earned; that in an endeavor to avoid the objections raised to a tax on net profit, on account of the supposed difficulty of determining whether the profits were correctly reported or not, it is recommended that the deduction of the mine payrolls from the net smelter or mill returns be considered in determining the amount to be accounted, this being in a measure a compromise or expediency; that the greater number of those operating mines, the employers of the majority of the miners engaged in the industry and the producers of the greater part of the tonnage mined, endorse this opinion as to the equitable basis for mine taxation and favour as a measure of expediency the recommendation referred to; that in order that so important a measure may be devised with the fullest possible knowledge of all the conditions, this branch would welcome the appointment of a commission to investigate the whole question of mine taxation and to recommend a system which would be alike equitable and practical."

BOUNDARY DISTRICT FACTS AND FIGURES.

The Holiday-Midwinter number of the Phoenix Pioneer, published last month, gives much useful information of the Boundary district. A narrative of its early history; full and freely illustrated descriptions of the more important producing mines and smelters; carefully compiled statistics of production, aggregate values, number of men employed, etc.; a concise presentation of leading facts concerning the larger mines, well-informed comment on progress made, opportunities now open, and numerous and convincing evidences of the permanent establishment of mining; and varied information relative to commercial, industrial and other conditions in the district, combine to make this special number one that cannot fail to direct increased attention to the Boundary as being a promising field for the investment of capital.

TELEPHONE COMMUNICATION WITH THE SIMILKAMEEN.

On April 3 of last year the Nicola-Aspen Grove and Lower Nicola-Coutlee branches of the Provincial Mining Association met jointly at Coutlee and passed a resolution urging upon the Department of Public Works, Ottawa, the necessity of constructing immediately a telephone line from Spence's Bridge, on the Canadian Pacific Railway Co.'s main line, to Lower Nicola and thence via Aspen Grove, Otter valley, Granite creek, Princeton, Hedley and Keremeos to Penticton. This resolution was forwarded to the President of the Provincial Mining Association and through him to Ot-

tawa, where it received prompt and favourable consideration. The portion of the line between Spence's Bridge and Princeton was first completed and this was connected with the previously constructed line from Nicola to Kamloops. Now the other portion, between Princeton and Penticton, a distance of 93 miles, is about finished. This means of speedy communication is proving a decided boon to those having business with the Similkameen points the line reaches, and it is one more step towards the development of that large and prospectively important district, with its great potentialities in connection with mining, lumbering, agriculture, etc.

THE HEDLEY GAZETTE.

The publication of the Hedley Gazette was commenced last month at Hedley, Similkameen, with Major A. Megraw as managing editor. The first number contained, among much of general interest relating to the lower Similkameen, a lengthy description of the Nickel Plate mine, situated about four miles from Hedley, and of the 40 stamp mill erected at Hedley to treat ore from that mine. So much has been published about the unusually high average gold values stated to have been obtained from the Nickel Plate that all information concerning this mine is read with more than ordinary interest, for which reason, together with a growing desire among the public to get reliable news of mining developments in the Similkameen, the Gazette will be welcomed by many. Major Megraw is an experienced journalist and, as well, is familiar with both the theoretical and practical sides of mining. Added to these qualifications is his good habit of stating facts rather than indulging in exaggerations such as sometimes characterise mining camp newspapers. The Gazette may, therefore, be expected to publish reliable information, and to merit the success it is hoped it will meet with.



Mr. Edmund B. Kirby, E. M.

ROSSLAND'S APPRECIATION OF MR. E. B. KIRBY.

Upon the retirement last month of Mr. Edmund B. Kirby from the general manager-ship of the Centre Star and War Eagle mines, Rossland, after having been five years in charge,

that gentleman was the recipient of several presentations and had many assurances of appreciation of his good work, both as mine manager and citizen. From mine employes and office staff, respectively, he received addresses, accompanied by valuable mementos of the cordial relations existing between those thus honoring him and himself. His colleagues on the executive of the Rossland Board of Trade also testified to his zealous labours in the interests of Rossland, while influential speakers at a numerous-attended gathering at the Rossland Club added their tribute of appreciation and expressed sincere regret at his departure from Rossland.

It is pleasing, though, to learn that Mr. Kirby has not said a final adieu to British Columbia, his professional connections requiring that he shall occasionally visit the province.

Mr. Kirby was educated as mining engineer and metallurgist at Washington University, St. Louis, Mo. After experience in the Lake Superior copper district and the lead and zinc regions of Missouri, he came west to Colorado and was there occupied as assayer and chemist; as ore buyer in Leadville; in charge of ore purchasing in one of the large smelting works of Denver; as superintendent of the Philadelphia Smelting & Refining Company of Pueblo; as superintendent of the Holden Milling & Smelting Company of Aspen; was for many years engaged in consulting and expert mining and metallurgical work throughout the west, with headquarters at Denver, Colo., and for the last five years has been manager of the War Eagle and Centre Star mines, at Rossland.

PERSONAL.

Mr. Norman Carmichael, manager of the Highland mine at Ainsworth and the Duncan United Mines, Nelson, left last week on a visit to England on business connected with his companies.

Mr. John P. Cosgro, of Rossland, was recently presented with a gold watch by the employes of the War Eagle and Centre Star mines on his retirement from the position of master mechanic at those mines. It is understood that he goes to Chicago to join the staff there of the Allis-Chalmers Company.

Mr. M. W. Loveridge, formerly consulting engineer for the Atlin Hydraulic Mining Company, has been engaged to act in a similar capacity for the Bullion Creek Hydraulic Mining Company, which controls eight miles of placer claims on Bullion creek, Alsek, Yukon territory.

Mr. Carl R. Davis has resigned as superintendent of the Centre Star and War Eagle mines, Rossland, to take the management of the Lancaster mines at Krugersdorp, South Africa.

Mr. N. W. Parlee left Rossland last month for Dillsburg, Pennsylvania, where he will be superintendent of one of the mines of Mr. G. A. Longnecker, who has mining interests in Pennsylvania and elsewhere.

Mr. Lorne A. Campbell, manager for the West Kootenay Power & Light Co., is visiting Montreal, Quebec.

Mr. Chas. McMichael, M. E., has been appointed superintendent of a mine at Cripple Creek, for which mining camp he lately left British Columbia.

Mr. John Peck, provincial chief inspector of boilers and machinery, last month delivered an interesting and instructive address to the members of the local Stationery Engineers' Association, on "Applied Mechanics and Strength of Materials." At a later meeting, Mr. T. Wilson took up the subject of "Condensers," illustrating his subject by black-board drawings; and Mr. W. Robertson read a paper on "Feed Water Heaters."

Mr. Jas. Cronin is now general manager of the Centre Star and War Eagle mines, Mr. E. B. Kirby's resignation having taken effect on January 15.

Mr. J. B. Tyrrell, formerly of the Dominion Geological Survey and now engaged in mining operations in the Yukon, came down from Dawson last month.

Mr. J. B. Hobson, general manager of the Consolidated Cariboo Hydraulic Mining Co., has gone to Toronto, Ontario,

to attend the annual general meeting of the company.

Mr. A. J. G. Swinney, general manager of the Silver Cup and Great Western Mines, Ltd., at Ferguson, Lardeau, is on a visit to England. He is expected to return early in April.

Mr. G. L. McKenzie, late manager of the Van Anda mines, Texada island, went to Seattle recently.

Mr. John H. McKenzie, of San Francisco, at one time general manager for the Le Roi Mining Company, Rossland, is reported to have recovered from a severe attack of pneumonia.

Mr. Alexander Sharp is now managing the First Thought mine, in Washington.

Mr. R. G. Drimman, who is in charge of the Crow's Nest Pass Coal Company's mine operating department, lately visited the coast.

Mr. Shirley Keeling, of Kaslo, has been appointed assistant to the inspector of claims under the Lead Bounty Act.

Mr. J. G. Allyn, M. E., of Chicago, was in Nelson last month.

Mr. Wm. Blakemore, of Nelson, visited Victoria early this month to present to the provincial government a resolution passed at Nelson in connection with the two per cent mineral tax.

Mr. Frank B. Smith, inspector of mines for the North-West Territories, recently returned to Calgary after visiting the coast cities.

Mr. W. E. H. Carter has resigned the secretaryship of the Ontario Bureau of Mines to engage in mercantile pursuits.

Mr. J. C. Lang, provincial assayer, of Greenwood, has been appointed one of the members of the Committee on Uniformity of Analysis of the Western Association of Chemists and Metallurgists, having headquarters at Denver, Colorado.

Mr. H. N. Galer, manager of the International Coal & Coke Co., Coleman, Alberta, visited the coast last week.

Mr. David Wilson, underground superintendent at the Crow's Nest Pass Coal Co.'s Carbonado colliery, has joined the management staff of the C. P. R. Co.'s Bankhead colliery, at Banff, Alberta.

Mr. Frederick T. Snyder, of Oak Park, Illinois, inventor of the Snyder automatic sampler, and now interested in a new zinc reduction process, was a visitor to Vancouver and Victoria last month.

Major W. F. Van Buskirk, formerly city engineer at Rossland, died recently at Stratford, Ontario.

Mr. J. E. McAllister, superintendent of the B. C. Copper Co.'s smelter, Greenwood, was operated on for appendicitis at Spokane a short time ago. His early return to duty is expected.

Mr. M. M. Johnson, M. E., of Salt Lake City, Utah, last month paid a visit to the Boundary, where he looked through the Montreal & Boston Consolidated Co.'s properties.

Mr. H. R. Jorand has been appointed mining recorder at Slocan City in place of Mr. H. P. Christie, promoted to be provincial government agent at Ashcroft.

Mr. C. A. R. Lambly, of Fairview, Okanagan, gold commissioner for Osoyoos mining district, recently spent a week or two in the coast cities.

Mr. R. H. Stewart, a graduate of McGill University, has been appointed assistant manager of the Centre Star and War Eagle mines, Rossland. For some time Mr. Stewart was connected with Rossland mines, first with the Le Roi and afterwards with the Giant. More recently he was engaged at the C. P. R. Co.'s Bankhead colliery, Banff, Alberta.

BUSINESS CHANGES.

Mr. Andrew Houston has acquired an interest in the well-known wholesale hardware firm of McLennan, McFeely &

Co., Ltd., of Vancouver. This firm is preparing for a considerable extension of its already large business, and recently it invited tenders for the erection of a warehouse at the corner of Water and Abbott streets, Vancouver.

Messrs. Cecil M. Bryant and E. Philip Gilman, who have during recent years owned and conducted the Vancouver Assay Office and Ore Testing Works, under the firm-name of Pellew-Harvey, Bryant & Gilman, have by mutual consent agreed to dissolve partnership. Mr. Bryant will continue to carry on the business of the Vancouver Assay Office and Ore Testing Works, under the name of C. M. Bryant & Co. Mr. Gilman will devote himself more especially to mine examinations and consulting practice.

PUBLICATIONS RECEIVED.

Chamber of Mines of Victoria, Melbourne, Australia (Incorporated). Monthly Report, November, 1904.

American Institute of Mining Engineers. Bi-Monthly Bulletin, January, 1905.

University of Texas Mineral Survey. Report of A Reconnaissance in Trans-Pecos Texas, north of the Texas and Pacific Railway, Bulletin No. 9. November, 1904.

Secretary of State, Ottawa. Report of Commission to inquire into the Treadgold Concessions in the Yukon Territory.

Royal Colonial Institute (Journal) No. 2. Session 1904-1905.

United States Geological Survey. Stone Industry in 1903. *Gazetteer of Indian Territory*. By Henry Gannett. Pages 70. *Comparison of a Wet and Crucible-Fire Methods for Assay of Gold Telluride Ores*. By W. F. Hillebrand and E. T. Allen. Pages 30. *Rock Cleavage*. By Charles Kenneth Leith. Pages 216; illustrated. *Results of Primary Triangulation and Primary Traverse*. By Samuel S. Gannett. Pages 311. *The Geology of the Perry Basin in Southeastern Maine*. By George Otis Smith and David White. Pages 92; illustrated. *Forest Conditions in the Absaroka Division of the Yellowstone Forest Reserve*. Montana, and the Livingston and Big Timber Quadrangles. By John B. Leiberg. Pages 144; illustrated.

REPORT ON PATENTS.

(Specially Reported for the MINING RECORD.)

775,778—Miner's car. William J. Neilson, Wilson, Pa. The combination with a mining-car having a hinged gate, of a locking-rod, said locking-rod having bent ends, angular clips carried by the sides of said cars and adapted to engage the ends of said rod, and means for automatically releasing said rod at predetermined locations.

775,360—Apparatus for the extraction of zinc. Chas. S. Brand, Knowle, England. The combination consisting of a retort, or detachable nozzle or condensing-pipe having a free space in its interior, an internal bridge or baffle-piece projecting from the under side of the said pipe toward the upper side of the same and dividing the pipe interior into fore-and-aft areas or chambers communicating only at their upper sides, a rearwardly-inclined lower surface in the aft area or chamber, a perforated closure at the rear end of the pipe and a detachable partial closure at the forward end of the same.

775,507—Process of extracting gold from ores. Henry R. Cassel, London, England. A process which consists in gradually and continuously generating by electrolysis at a high current density exceeding ten amperes per square foot of anode-surface, nascent cyanogen in the pulp containing a cyanid and a halogen salt, simultaneously agitating the pulp, dissolving and converting the precious metals into soluble cyanids, and retaining them in solution.

775,509—Process of extracting precious metals from ores. John D. Berrigan, East Orange, N.J., assignor to Francis

J. Arend, New York, N.Y., and John Bernstrom, Stockholm, Sweden. A process which consists in causing a mixture of comminuted ore and solution chemically active to dissolve said precious metal to descend by gravity centrifugally agitating the same during said descent and thereafter centrifugally separating said enriched solution from said ore.

775,414—Apparatus for extracting precious metal from ores. John J. Berrigan, East Orange, N.J., assignor to Francis J. Arend, New York, N.Y., and John Bernstrom, Stockholm, Sweden. An apparatus for extracting precious metal from ore by a solution chemically active to dissolve said metal, means for mixing said ore in comminuted form with said solution, means for agitating said mixture, means for centrifugally separating the enriched solution from said ore, and means for conducting said ore and solution from said mixing device and from said agitating device to said separator.

775,948—Ore-washer. Albert H. Stebbins, Little Rock, Ark. The combination of a frame, a concentrating-surface arranged upon said frame, said concentrating-surface being provided with perforations, said perforations being disposed to direct currents of fluid over or parallel to the concentrating-surface against the flow of material thereon, a series of riffles extending across the frame and disposed above the concentrating-surface, and means for introducing a blast of fluid through said perforations.

775,945—Ore-concentrator. Albert H. Stebbins, Little Rock, Ark. The combination of a chamber, a perforated concentrating-surface arranged above said chamber, a series of cutting and conveying boards arranged at an incline to said concentrating-surface, the upper edge of one cutting and conveying board projecting above the lower edge of the next adjacent board, said boards being perforated and means to produce an intermittent blast through the concentrating-surface and cutting and conveying boards.

776,113—Gold-saving apparatus. Horace O. Clark, San Francisco, Cal. The combination of a revoluble, foraminous cylinder, a trough below a cylinder and provided with parallel riffles arranged substantially concentric with the cylinder, and scrapers on the cylinder each operating in one of the spaces between adjacent mercury containing riffles and adapted to remove the material from said space for advancement to the succeeding mercury-containing riffle.

775,145—Process of separating metals from sulfid ores. Charles V. Potter, Balaclava, Victoria, Australia. A process which consists in adding to same an acid solution which is a non-solvent of the precious metals, then applying heat to the same, and removing the sulfids from the surface of the solution.

775,965—Dry separator. Thomas A. Edison, Llewellyn Park, N.J. The combination of a blast-tube substantially uniform in cross-area, means for producing an air-blast through said tube, a screen pressure-equalizing diaphragm across the whole area of the tube, a second and finer screen-diaphragm placed farther from the blast-inlet and at a distance beyond the first-mentioned diaphragm sufficient to form in the tube a pressure-equalizing chamber, a feed-opening in the top wall of the tube immediately in the rear of the finer screen and extending across the tube, means for feeding pulverulent or granular material in a thin, uniform, vertical sheet falling across the whole area of the tube, and receptacles for the grades produced.

775,947—Concentrating Machine. Albert H. Stebbins, Little Rock, Ark. The combination of a frame, a perforated concentrating surface supported thereby and a fluid chamber beneath the surface, said concentrating surface comprising sections arranged in different planes, means for introducing blasts of gaseous fluid beneath the said space for advancement to the succeeding mercury-containing riffle.

777,020—Dumping Car. Joseph D. Hampton, Hazleton, Pa. A dumping car having fixedly-held sides and ends and a gate

at one end, a movable bottom, means for automatically moving said bottom endwise to release said gate and carry the load there through to dump the same for the purposes specified.

12,293—Fuel Burner. Emer F. Gwynn, Pittsburgh, Pa. The combination of a hollow tube constituting a mixing chamber and provided with circumferentially-arranged openings passing through walls of the tube tangentially thereto, and terminating at the inner surface of the tube and discharging directly thereinto, with a separate sleeve or fitting mounted on said tube and provided with an annular recess communicating with said openings, a fluid inlet pipe in communication with said recess and means for controlling the quantity of fluid admitted to the recess.

776,531—Mine Car Coupling. Marshall G. Moore, Johnstown, Pa. A car coupling comprising links and clevises or their equivalent, one or more of said members being twisted about the longitudinal axis thereof, whereby said coupling works freely into its slack position, thus forming a short hanging loop.

776,662—Concentrator. Henry E. Horn, Denver, Colo., assignor to the Brush Belt Concentrator Company, Denver, Colo. A concentrator provided with an endless travelling belt or apron and adjustable means engaging the belt or apron from above to form a transverse valley or depression therein, comprising a shaft, vertically-adjustable boxes in which the latter is journaled, and a number of separated wheels mounted on the shaft and engaging the upper part of the belt from above between the head and tail extremities of the belt, the latter being mounted to give its upper portion a downward inclination from the head of the machine and actuated to cause it to travel upwardly.

777,472—Dumping Coke Car. Frank S. Ingoldsby and Joseph R. Bowling, St. Louis, Mo., assignors to the Ingoldsby Automatic Car Company, St. Louis, Mo., a corporation of West Virginia. A coke car, sides having trusses comprising upper and lower chords, a metal sheathing secured to the lower portion of said trusses, and slats completing the sides above the sheathing.

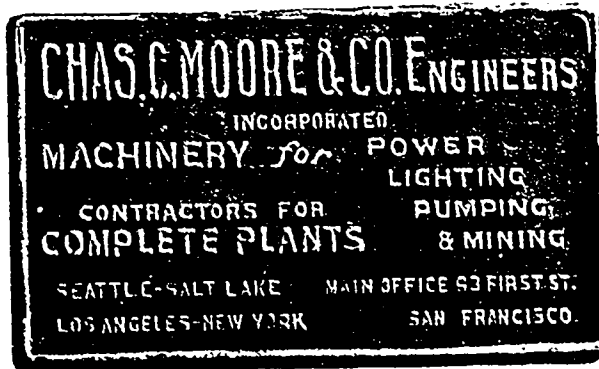
777,247—Concentration of Mineral from Ores. Arthur E. Cattermole, Henry L. Sulman and Hugh F. Kirkpatrick-Pickard, London, England. A process which consists in mixing the ore-pulp with a soap solution and a mineral acid so as to liberate from the soap the organic acid which coats the desired mineral particles but not the gangue, agitating the mixture so as to agglomerate the coated mineral particles into granules and separating the granules from the non-coated gangue.

777,233—Amalgamator. Elizabeth P. Wilkins, Baltimore, Md. The combination with a receptacle of a cylinder adapted to rotate therein, a stand-pipe rigidly engaged in and projecting below the bottom of said cylinder, a worm conveyor in said stand-pipe projecting below the bottom thereof, inwardly-directed beaters on the bottom and sides of said receptacle and outwardly directed beaters on the bottom and sides of the cylinder arranged staggering therewith.

777,498—Blast Furnace. John Coyne, Allegheny, Pa. The combination of a blast furnace having an outlet for the normal escape of gas, an explosion chamber connected to the furnace and means within said chamber for separating the gases from dust.

771,171—Conveyor. Lawrence Abraham, New York, N.Y. The combination with a travelling conveyor, of frames secured to said conveyor, a plurality of shelves movably secured to each of said frames, means for causing said shelves to discharge their contents at predetermined points, and a connection between two shelves carried by the same frame for causing one of said shelves to act as a stop to limit the movement of the other shelf at the moment of discharge.

777,112—Apparatus for Cleaning the Gases of Blast Furnaces, Generators, etc. Emil Kratochvil, Kralup, Dvur, Austria-Hungary. The combination of a suitable casing, a hori-



zontal rotatable shaft through said casing, a series of disks on said shaft, a plurality of pins on the faces of said disks, a water supply pipe, branches leading from said pipe having nozzles directed toward said disks, a water outlet for said casing and gas inlet and outlets in said casing.

777-227—Crushing Machine. Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Newton Centre, Mass. assignors to Sturtevant Mill Company, Portland, Me., and Boston, Mass., a corporation of Maine. A rocking-jaw crushing machine, the combination with a U-shaped machine frame open at its rear end and having side parts provided with projections to form buttresses for toggles, of a fixed or normally stationary jaw mounted in said frame, a co-operating rocking jaw, a rucking jaw frame also mounted in said machine frame and carrying said rocking jaw, toggles interposed between the rear parts of said rocking jaw frame and the said buttresses of said machine frame, and means for operating said rocking jaw frame.



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