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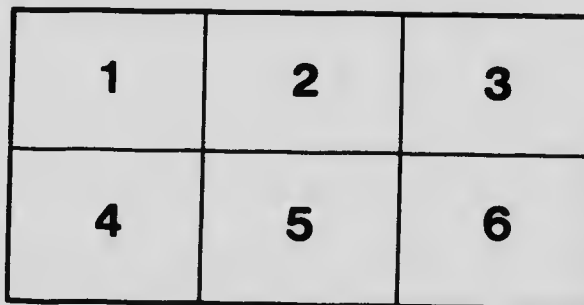
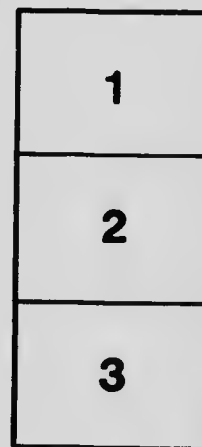
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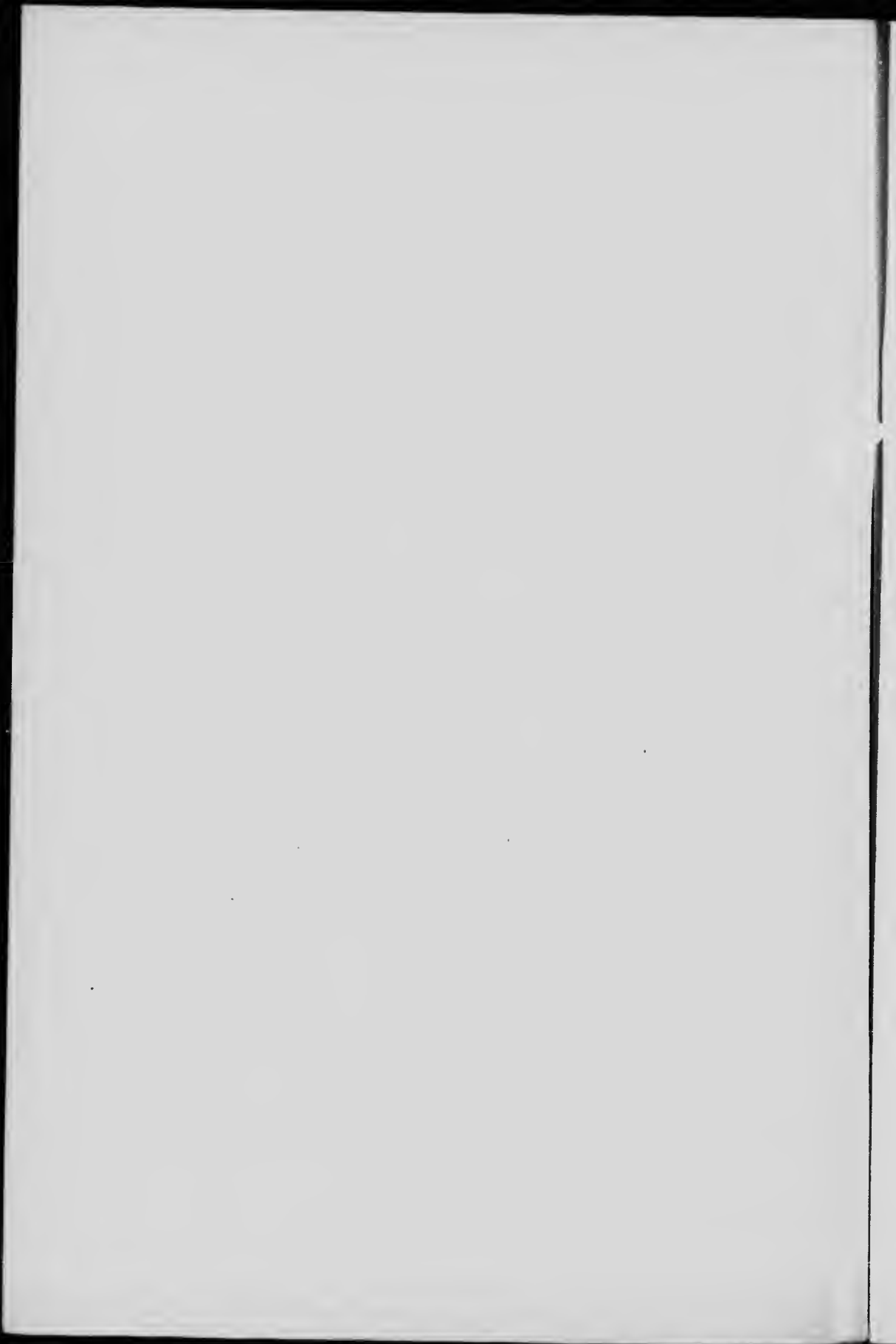
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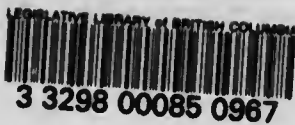
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PRELIMINARY REVIEW AND ESTIMATE
—OF—
MINERAL PRODUCTION FOR YEAR 1911.

—BY—
WM. FLEET ROBERTSON,
Provincial Mineralogist.





TO THE HON. RICHARD MCBRIDE,

Minister of Mines,

British Columbia.

SIR.—With your already expressed approval, I beg to submit herewith a preliminary estimate of the mineral production of the Province for the year 1911, together with some notes on the progress of the mining and metallurgical industries during the year just closed; the information herein presented is, of course, subject to revision.

The object of this preliminary estimate and review is to give, as promptly as possible after the close of the year, an approximate statement of the condition of the mining interests, without waiting until the official returns from the mines have been received, and without the delay that of necessity must take place in carefully preparing the detailed information given each year in the Annual Report of the Minister of Mines.

I have the honour to be,

Sir,

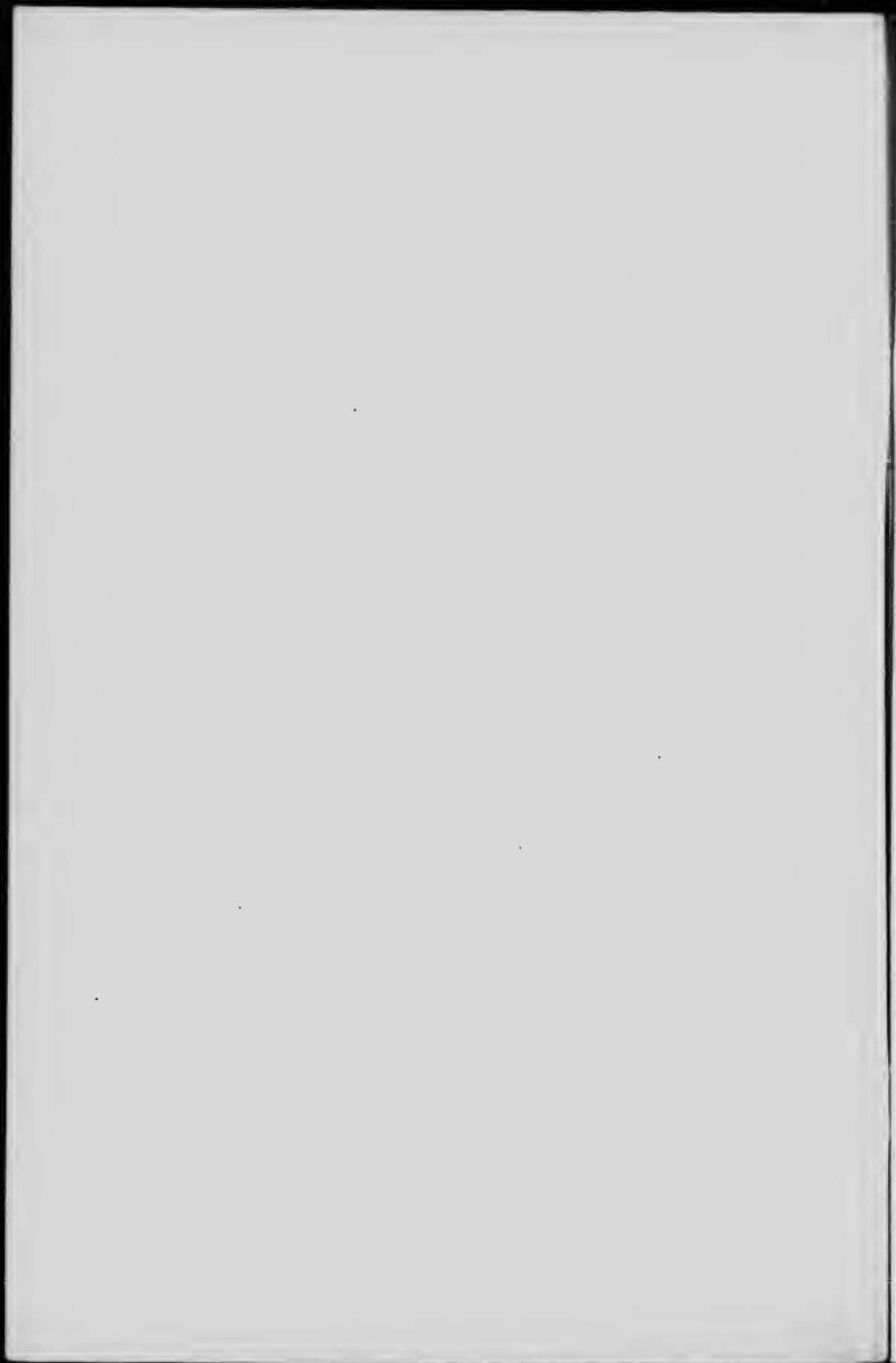
Your obedient servant,

WILLIAM FLEET ROBERTSON,

Provincial Mineralogist.

Bureau of Mines, Victoria, B.C.,

January 31st, 1912.



PRELIMINARY REVIEW AND ESTIMATE

—OF—

MINERAL PRODUCTION FOR THE YEAR 1911.

AS this bulletin has been prepared before receipt of the official reports for the year 1911 of the Gold Commissioners and Mining Recorders of the Province, and the customary returns of mineral production made annually by managers of mines and reduction-works, it must necessarily be regarded as being simply a preliminary review of the progress of the year last past, together with an approximate estimate of the quantities and value of the several mineral products of the Province.

The accompanying table shows an estimated mineral production during 1911 of a total value of \$23,211,816. If the revised statement of production, to be made up after receipt of returns from the operating mines and reduction-works of the Province, shall show this estimate to be approximately correct, as it is believed they will do, it will then be seen that the total value of production in 1911 will be about \$1,165,250 less than that of 1910, and less by a different amount than that of each other year since 1905.

CONDITIONS THAT AFFECTED PRODUCTION IN 1911.

The comparatively large decrease in value here shown is not, however, an evidence of retrogression, for the mining industry of the Province most assuredly continues to make substantial progress, notwithstanding the diminution in production noted here. The curtailment of output is clearly attributable, for the most part if not entirely, to the effects of the strike of coal-mine employees in the Crowstee District, South-east Kootenay. The suspension of work at the mines and coke-ovens lasted for practically two-thirds of the year, and prevented production of coal and coke during that period to an extent that involved a decrease in value from East Kootenay alone of nearly \$3,000,000. If to this be added the decrease in value of production of metals of one copper-producing company alone—as compared with 1910, of \$1,000,000—which was the direct result of cutting off the supply of coke for its blast-furnaces, there will be obtained a total decrease of more than \$4,500,000, which was an immediate consequence of labour difficulties at the Crowstee collieries. There were other temporary obstacles to production being maintained at normal rate, which in much smaller degree also accounted for a decrease in output on minerals last year, but these have either already been overcome or are in a fair way of being removed shortly. Meanwhile a settlement has been made of matters that were in dispute between the coal-mine operators and their employees, and by the end of 1911 output of coal and coke was being gradually restored to its average rate.

PROVINCE'S PROPORTION OF PRODUCTION OF CANADA.

It is of interest to note, in passing, that British Columbia's proportion of the mineral production of the whole of Canada is comparatively large. The aggregate value of the production of this Province to the end of 1911 is,

approximately, \$307,000,000, but since the published official records of that of the whole Dominion do not include production prior to 1886, the present comparison must be confined to the period of twenty-six years—1886-1911. Placing the aggregate for the whole of Canada at \$1,245,000,000 (which allows for 1911 a Dominion total of \$115,000,000, an amount \$10,000,000 greater than that of 1910), and British Columbia's proportion for the same period at \$333,000,000, it follows that this Province has to be credited with nearly 27 per cent. of the value of the mineral production of the whole of Canada in the twenty-six-year period under notice.

It is a striking fact, as indicating the substantial increase in the value of the mineral production of the Province in recent years, as compared with that of only a few years ago, that nearly 37 per cent. of the \$333,000,000 mentioned above as the aggregate of production for twenty-six years is to be credited to five years, 1906-1910, while more than half—about 51.3 per cent.—was produced during the seven years, 1905-1911.

MINERAL PRODUCTION FOR TWO YEARS, 1910-1911.

The following table shows the quantities and value of the several minerals produced in the year 1910, and the estimated production in 1911. It may here be explained that the prices used in calculating the estimated value for 1911 of silver, lead, copper, and zinc are the average prices for the year, as published in *The Engineering and Mining Journal*, New York, less a deduction of 5 per cent. off silver, 10 per cent. off lead, and 15 per cent. off zinc.

	1910		1911		Increase.	Decrease.
	Quantity.	Value.	Quantity.	Value.		
Gold, placer	oz.	\$ 540,000	.....	\$ 468,000	\$	\$ 72,000
“ lode	“	267,701 5,533,380	225,083	4,652,465	.....	880,915
Total gold .....	.....	\$ 6,073,380	.....	\$ 5,120,465	.....	\$ 952,915
Silver	oz.	2,450,241 1,215,016	1,921,301	972,946	.....	272,070
Lead	lb.	34,658,746 1,386,350	27,975,000	1,113,405	.....	272,945
Copper	“	38,243,924 4,871,512	39,500,000	4,890,100	18,588	.....
Zinc	“	4,184,192 192,473	2,600,000	127,400	.....	65,073
Total metalliferous .....	.....	\$13,768,731	.....	\$12,224,316	.....	.....
Coal	tons, 2,210 ft.	2,800,046 9,800,161	2,435,000	8,522,500	.....	1,277,661
Coke	“	218,029 1,308,174	77,500	465,000	.....	843,174
Building materials, etc. ....	.....	1,500,000	.....	2,000,000	500,000	.....
Total value of production, ....	.....	\$26,377,606	.....	\$23,211,816	.....	.....

Summary:—

Decrease in metalliferous minerals	\$1,544,415
“ “ coal and coke	2,120,835
	\$3,665,250
Less increase in building materials, etc.	500,000
Net decrease in year's production	\$3,165,250

Note.—The decrease in the production of coal, coke, lode gold, and copper is directly attributable to the strike in the Crowneast District, and so also, in part, is the decrease in silver, since both gold and silver occur in association with the copper in the ores from the Boundary District, where the great decrease in copper took place. A great part of the decrease in silver and in lead and practically all of the decrease in zinc is accounted for by the continued disadvantage in the Stoenic, brought about by the destruction, in the summer of 1910, of mine and concentrating plants and of the railway-bridges, which facilities have not as yet been replaced. However, as will again be mentioned when dealing with the districts affected by these disabilities, there is a reasonable prospect of their being in large part, if not altogether, removed during the ensuing year.

PRODUCTION OF VARIOUS MINERALS BRIEFLY REVIEWED.

In order to indicate in a general way the sources of the various minerals mined in the Province and to give an idea of some of the conditions that affected their production, the next following comments concerning the several different minerals comprised in the sum total of production are submitted.

Gold.

There appears to have been a decrease of about \$70,000 in the value of placer gold recovered in 1911, and of 42,000 oz., or about \$880,000, in lode gold, as compared with the production of 1910. Regarding these decreases, it may be observed:—

Placer Gold.—Practically all the placer gold comes from the Cariboo and Cassiar Districts, only about one-thirtieth part of the total production coming from the remaining districts of the Province. A rough apportionment of decrease places \$21,000 against Cariboo and \$47,000 against Cassiar. The larger proportion of the decrease seems to have been in Atlin Division of Cassiar District—about \$45,000; next to this is that of Cariboo Division of the district of the same name—about \$18,000; while the yield of Omineca, also in Cariboo District, is estimated at \$5,000 less than in 1910. There is a possibility that Queen's Division of Cariboo did better than in 1910, but this cannot be determined until after the returns shall have been received from the larger operators in that division.

The gravel-washing season was shorter than usual in both Cariboo and Cassiar, hence the smaller total recovery of gold. There is encouragement in the fact that in both districts provision has been, and is being, made for operating on a larger scale in the future.

Placer-mining on a small scale is done in several parts of Fort Steele Division of East Kootenay; in Nelson, Revelstoke, and Trout Lake Divisions of West Kootenay; in Boundary, Shalkamcen, and Yale Districts; and in Lillooet and Clinton, which last-mentioned divisions yield twice as much placer gold as any other of the smaller producing districts.

Lode Gold.—This preliminary estimate makes it appear that less lode gold was produced last year than in any other year since 1907. About one-half of the decrease resulted from suspension of production at two or three Boundary District mines, though this was in part compensated for by larger production by the British Columbia Copper and Hedley Gold Mining Companies respectively. Again, there were several individual decreases in Nelson Mining Division, though in other instances the reverse was the case.

Approximate figures of totals of lode gold from individual districts give an apportionment about as follows: Rossland, 117,000 oz.; Boundary, 51,000 oz.; Shulkameen, 30,000 oz.; Nelson, 20,000 oz.; and Coast, 7,000 oz. Of Rossland mines (which are in Trill Creek Mining Division), the Consolidated Mining and Smelting Co.'s *Centre Star* group produced nearly three-fourths of the total, while the mines of the Le Roi No. 2, Limited, yielded the greater part of the remainder. Hereafter the production of the *Le Roi* (not of *Le Roi No. 2*) will probably be included in that of the *Centre Star* group, for the Consolidated Co. last summer added that mine to its other properties in Rossland camp. In Boundary District the bulk of the gold was from the mines of the British Columbia Copper and Granby Companies respectively, while in Shulkameen the Hedley Gold Mining Co. made a production estimated at the quantity above shown. In Nelson, the *Queen, Granite-Poorman, Nugget, Arlington, Second Relief*, and *Yankee Girl* mines together made up the output of lode gold from that division. On the Coast the *Harble Bay* mine in greatest part, and the Portland Canal Mining Co.'s mine the remainder, were the chief producers.

Silver.

Of the estimated total production of 1,320,000 oz., Sloean mines contributed about 875,000 oz.; East Kootenay, 360,000 oz.; Boundary, 310,000 oz.; Nelson and Rossland, 180,000 oz.; Lardeau, 70,000 oz.; and the Coast, 125,000 oz. It is not unlikely the revised returns will show a somewhat larger production than has been estimated, but the foregoing figures represent what at present seems to be the position. The average price of silver for 1911 was a fraction lower than in 1910. *Engineering and Mining Journal* figures showing 53.304 cents an ounce for 1911 as against 53.486 cents for 1910. The two closing months of 1911, however, saw a rise to an average of 55.312 cents, with a prospect of a further advance. If a higher average price shall be maintained throughout the ensuing year, and production in the Province be increased to the extent it now gives promise of being, the figures, for both quantity and value, should be higher for 1912 than for any other year since 1901, which had a production of 5,151,000 oz., valued at \$2,885,000, and was second only to the record year, 1897, with its output of 5,473,000 oz., valued at \$3,273,000.

The mines that produced silver in considerable quantity were as follows: In the interior parts of Sloean District, the *Rambler-Caribou, Richmond-Enreka*, and *Ruth-Hope*; and in the Sloean Lake section, the *Van Rai, Herwit* (Silverton Mines, Ltd.), and *Stantard*. More than one-half of the production of East Kootenay was from the *Sullivan* mine, and in excess of one-third from the *St. Eugene*. In Nelson Division the *Molly Gibson*, and at Rossland the *Centre Star* group, *Le Roi*, and Le Roi No. 2 Co.'s group, made the output of those regions respectively. In Boundary District the mines of the Granby and British Columbia Copper Companies contributed most of the silver from that part, while in Lardeau the *Silver Cup*, and on the Coast the *Britannia, Harble Bay*, and the Portland Canal Mining Co.'s mine, each added its share.

The Skeena country may be expected to add to the Province's production of silver after railway transportation facilities, now being provided, shall be available; meanwhile in that district a number of mineral claims on which silver-bearing ore has been found are being prospected, and some of them developed. Other Portland Canal properties, too, are among the probable producers of the early future.

Lead.

There appears to have been a considerable falling-off in the production of lead, the average price of which for 1911 was practically the same as for 1910. The most serious decrease was in the output of the *St. Eugene* mine; this amounted to more than 8,000,000 lb. The *Sullivan* increased its output between 2,000,000 and 3,000,000 lb., and to that extent reduced the decrease in quantity from East Kootenay mines as compared with 1910. Approximate figures of production for 1911 are: *St. Eugene*, 6,000,000 lb.; *Sullivan*, 11,000,000 lb. Abusworth Division mines produced but little lead in 1911, whereas in 1910 they contributed about 2,500,000 lb. to the total for that year, the three shippers having then been the *Bluchell*, *Highland*, and *Whitewater* group. The 1911 total from all properties in Abusworth Division is estimated at less than 300,000 lb. Slocan maintained its output, the total from the *Richmond-Eureka*, *Rath-Hope*, and *Rancher-Caribou*, and that from the Slocan Lake section—*Van Rai*, *Standard*, and *Heavill-Lorna Doone*—having together been somewhat higher than the corresponding figures for 1910. Nelson Division had the *Emerald* and *Molly Gibson* mines as its chief producers of lead. There was a relatively small production from the Lardeau District, and still smaller from Portland Canal.

A statement published last autumn showed the total expenditure by the Dominion of bounty on lead to July 1st, 1911—that is, for eight years—to have been \$1,617,020. Of this sum, \$249,370 was paid in the fiscal year ended March 31st, 1911, and \$49,754 for three months to July 1st, 1911. After deduction of \$50,000 appropriated for zinc-ore reduction experiments, there remained, as at July 1st, 1911, of the \$2,500,000 originally voted, an unexpended balance of \$832,980.

Copper.

The estimated increase in the copper production of the Province, as compared with 1910, is about 1,200,000 lb.

The Boundary District made a decreased production this year by about 6,500,000 lb. (the reason for which has been already explained), and West Kootenay (chiefly Nelson Division) also shows a decrease of about 300,000 lb.; but against these decreases is to be placed an increase of about 8,000,000 lb. in the Coast District. The more important copper-producing districts of the Province are the Boundary, Coast, and Roseland; of these, the Coast bids fair to in future make a much larger output of this metal than it has done in recent years, for in both the *Britannia* mine, in New Westminster Division, and the *Hidden Creek* mine, near Goose Bay, Observatory Inlet, very large bodies of copper ore of commercial grade have been opened. No production of copper has yet been made at the latter mine, which was not extensively developed until the year just past, but it is planned to put in reduction-works as soon as all arrangements necessary for smelting ore on a large scale shall have been made. The increase in output of copper at the *Britannia* mine in 1911 as compared with 1910 is believed to have been between 6,000,000 and 7,000,000 lb., but figures of actual output are not yet available. The *Marble Bay* mine, Texada Island, also made a substantial increase in its production of copper, but this was in part offset by a decrease at the neighbouring *Cornell* mine. There is little comment to be made relative to either Boundary or Roseland mines in regard to their copper production, which is being generally well maintained, except when the supply of coke for the blast-furnaces of the

copper-smelteries is interrupted. The New York average price of electrolytic copper for 1911 was a trifle lower than that for 1910—12,370 cents as compared with 12,738 cents—but the former year closed with an average for the month of December of 13,552 cents per pound, which was the highest monthly average since January, 1910. The expectation is that a higher price will rule in 1912, so the outlook for this year is correspondingly brighter.

It may be pointed out that had this increase of 1 cent a pound occurred in the beginning of the year and been maintained throughout, it would have meant an increase in the total value of this year's copper production of about \$400,000, and the copper-mining companies would have benefited to this increased extent.

Zinc.

The smaller output of zinc in 1911 than in 1910 is accounted for by the fact that it was not practicable for either the *Whitewater* group of mines or the *Lucky Jim*, in the Slocan, to ship ore, owing to the absence of transportation facilities, for the Kaslo and Slocan railway-line, half a dozen miles of which was destroyed by forest fire in the summer of 1910, has not yet been reconstructed. Further, the *Whitewater* mill, also burned, has not been replaced. However, much development work has since been done in both mines, so the resumption of shipment of ore will take place whenever it shall be possible to send it out. No zinc concentrate was produced by the *Slocan Star* mill, though it may be expected to resume production in 1912. There are now three mills in Four-mile camp, Slocan lake, equipped for producing a zinc as well as a lead concentrate—namely, those of the *Fan Rai*, Silverton Mines, Ltd., *Alverill-Lorna Doone*, and *Standard*; of these, the *Fan Rai* produced in 1911 concentrate containing more than 2,000,000 lb. of zinc, and the Silverton Mines, Ltd., a much smaller quantity. The *Standard* mill is a new one, the operation of which was only commenced late in the year. No commercial results appear to have yet been obtained from experiments in the reduction of the zinc-lead ores of the Kootenay, neither by the Dominion Department of Mines, experimenting in the East, nor by any process tried in the Province.

Iron.

No iron ore was mined this past year, and the iron mines remain practically in the same condition as in 1910.

Some prospecting has been going on in the vicinity of Quidsum and Buttle lake, on Vancouver Island, and it is stated that a large body of magnetite has been developed there—some eighteen men being employed during the year on development. It was further stated that the quantity of ore, as indicated by tunnels that had been driven, was large; also that the ore runs as high as 68 per cent. in iron and is more than ordinarily free from impurities. So far as known, there was no development of importance at any of the numerous other iron-deposits in the Province.

Coal and Coke.

The net production of coal, estimated at 2,435,000 long tons, is 365,000 tons less than that of 1910. Coke also shows a decrease—of about 140,000 tons; the output in 1911 was only about 78,000 tons as compared with 218,000 tons in 1910. The coal was produced in the several districts in the following approximate proportions: Vancouver Island, 1,785,000 tons; Nicola valley and Shillkameen, 225,000 tons; and South-east Kootenay, 425,000 tons. Practically

all the coke was from the last-mentioned district. The effects of the strike of the coal-mine and coke-oven employees on the production of coal and coke in the Crowsnest District, South-east Kootenay, has already been mentioned; in quantities of products it brought about this position: there was a decrease (net) of 195,000 tons of coal and 140,000 tons of coke. As the net decrease for the whole Province was 355,000 tons, it will be seen that in other districts the decrease from the Crowsnest collieries was in part offset by increases in other parts—in the output of Vancouver Island, Nicola valley, and Similkameen coal-mines.

Of the average yearly value of the mineral production of the Province for the last five years, the production derived from coal and coke has been about 35 per cent. of the whole, while for the year 1911 it was nearly 30 per cent., and this despite the decreased output of the Crowsnest mines. It is true that the output of the collieries for 1911 is considerably less than for 1910, but the year 1910 was the record year in the history of coal-mining in the Province, with a production valued at \$11,108,335. The output for 1911, with its total value of \$8,987,500, in the proportion of \$8,522,500 for coal and \$465,000 for coke, is second only to that of 1910, and is greater than that of any other year.

No branch of the mining industry of British Columbia appears to have a better prospect for expansion and consequent enlargement of production than that of coal-mining. A gratifying feature in this connection is that the promise of extending operations and increasing output is general; that it appears evident that all the coalfields in which there has already been production may be expected to show a steady increase in output. That this is so will be manifest if attention be turned to local conditions in these several fields.

Briefly reviewing these conditions, it may be noted that recent progress has been general. On Vancouver Island, the Western Fuel Company made the largest production in 1911 it has ever made; not only so, but a new mine is being opened, which it is expected will commence production next autumn, and be rapidly developed to a producing-capacity of 1,200 to 1,500 tons a day. At the mines of the Canadian Collieries (Dunsinuir), Limited, there is also evidence of much progress, especially at its Union colliery, in the Comox District, where a new shaft mine is being opened and hydro-electric power for use at the mines is being developed. Production returns for 1911 have not yet been received from the last-mentioned company, but it is expected the output of coal in 1911 was not less than 900,000 long tons. The Pacific Coast Mines, Ltd., increased the output from its Fiddick mine at South Wellington, and further developed its Squash mine in the northern part of Vancouver Island. The Vancouver-Nanaimo Company also made headway, for it arranged to provide shipping facilities at tidewater and to add to its coal-mining plant.

In both the Nicola Valley and Similkameen Districts progress was also noticeable, additions having been made to the coal-mining plants, and the output of coal in 1911 was larger. The Nicola Valley Coal and Coke Company increased its output from 141,000 long tons in 1910 to about 190,000 tons in 1911, and enlarged its coal-handling plant to a capacity of 1,000 tons a day. Three other coal properties in the Nicola valley also had development work done on them in preparation for mining coal on a commercial scale, though as yet their production remains comparatively small. Coal was reached by a long crosscut tunnel on the property of the Columbia Coal and Coke Company, situated between Granite creek and Collins gulch, in the Tulameen valley, and

the work of equipping this mine with plant and machinery is in progress, while railway transportation has already been provided. At Princeton, the Princeton Coal and Land Company has made arrangements with a coal-mining machinery firm to supply a tipples and other equipment, the handling-capacity to be 500 tons of coal a day and the plant to be ready for use early in 1912.

In East Kootenay, apart from the suspension of production while the employees were on strike, there were interesting developments. The Crow's Nest Pass Coal Company opened three or four practically new mines at its Coal Creek colliery, and it is claimed that from these a comparatively large quantity of coal of excellent quality can be mined. This company also did some effective prospecting at its Carbonado colliery, where new seams were found, and the work done on some of the old seams led to the hope that mines can be opened there in ground where the rock-structure is more favourable to mining coal. At the Hosmer colliery, of the Hosmer Mines, Ltd., another level has been made along the outcrop of the coal-seams, about 500 feet above the level of the main entry to the mine, and facilities have been provided for transportation of the coal down to the main incline and thence to the shipping tipples. At the Corbin Coal and Coke Company's colliery an enormous deposit of coal has been opened at the surface, and preparations have been made to work this coal open-cast, literally like a quarry. This most unusual occurrence of coal is situated at an elevation of from 800 to 1,200 feet above the main entry to the mine, in which latter the body of coal is also of great size, having a maximum width of about 300 feet.

There was little change in the situation affecting the large coal-areas of the upper Elk river region of the Crowsnest District, described in the Annual Report of this Department for 1909, for railway transportation has not yet been provided, and until it shall have been there will not be any commercial production of coal in that part of the Province.

Concerning coal in the Skeena country—here, too, there can be no production until after railway transportation shall have become available. Public attention has been directed to what is known as Groundhog basin, where the occurrence of much anthracite coal is known. A Press Bulletin, issued recently by the Geological Survey of Canada, gives information relative to this field, as follows: "Considerable interest has been manifested during the past season in the Groundhog coal-basin, which lies at the head of Skeena river. Probably 600 square miles have been staked and several groups of capitalists are interested in the field. Mr. G. S. Malloch, of the Survey Department, who spent the summer investigating the southern end of the basin on behalf of the Geological Survey, furnishes the following notes on this new coalfield:—

"The coal-measures so far as known have a north westward extent of at least seventy miles, and a width at the southern end of thirty miles. The sediments have a thickness of upwards of 3,000 feet, but contain coal in commercial quantities near the top and bottom only, though there are a few thin seams in the intermediate beds. The upper horizon contains seven seams with thicknesses varying from 2 to 6 feet, and, so far as is known, is limited to an area of twenty square miles. The lower horizon contains at least three seams 4 to 6 feet thick, and extends over most of the area occupied by the coal-measures. The coal is anthracitic in character. Some of the seams are high in ash, but from one of them some excellent analyses have been obtained. The basin is faulted considerably, and there are numerous local flexures associated with the faults. The development of a coalfield of this

character near the Pacific coast would be of great importance to British Columbia. It lies about ninety (nearer 140) miles from tidewater at Stewart, Portland canal, along a possible route for a railway, and about 150 miles from Hazelton on the Grand Trunk Pacific railway."

On Graham island of the Queen Charlotte group prospecting of the coal-measures was done, but no coal was mined for market. A Vancouver company bored for oil on the west side of that island.

Building Materials, etc.

With the considerable growth of the Coast cities there has been a correspondingly increased demand for building-stone, brick, lime, cement, etc. Various quarries from which granite, sandstone, andesite, and other building-stones are obtained had considerable demands made upon them. No marble was quarried at Nootka, but the marble-quarry situated about eight miles from the head of Kootenay lake was reopened and marble again shipped from it. The Vancouver Portland Cement Company, with works on Vancouver Island, made much cement.

SOME FEATURES OF THE YEAR'S OPERATIONS.

The following summary of operations in connection with the mining and metallurgical industries of the Province, while incomplete, will serve to convey a general idea of their extent and of the progress made in the mining districts and their subdivisions:—

CARIBOO DISTRICT.

The estimated decrease in value of the yield of gold from the placer mines of the several mining divisions of Cariboo District is \$23,000, in the proportion of \$18,000 from Cariboo Division and \$5,000 from Omineca. The season of 1911 was a short one for placer-mining in this district. As indicating the shortness of water from the tributary streams that supply water for washing the gold-bearing gravels, it may be stated that the water in the Fraser river, which is the main outlet for the surface waters of Cariboo District, was lower in 1911 than ever before known by those engaged in hydraulic placer-mining in the district. Owing to a cold spring the season opened late; as there was no fall of rain in the autumn, it was not practicable to continue operations after the snow had melted in the summer, hence there was no fall run at the hydraulic mines (with only one important exception).

Cariboo Mining Division.

As in other recent years, the most extensive individual placer-mining operations in this division were those carried on at the mines operated by Mr. John Hopp on Williams creek and tributaries—namely, at Lowhee, Stout's gulch, Forest Rose, and Mosquito creek. Insufficiency of water caused the season's recovery of gold to be small. However, the dam at the Lowhee creek flushing-reservoir was completed, and at Ella lake the height of the dam was increased 20 feet, making 45 feet in all. Other construction-work was also done, to provide for storing an increased quantity of water in the future.

The West Canadian Deep Leads, Ltd., did work on Little Valley creek, and Mr. L. A. Bonner was also engaged in developing a hydraulic property on Lightning creek, above Van Winkle. The Venture and Wormwold Companies both worked on tributaries of Lightning creek, and Mr. H. K. Jones was busy on Donovan and Last Chance creeks. Mr. Lasell worked on China creek and Nugget gulch, tributaries of Antler creek. Messrs. Edwards and Thomson constructed roads and ditches to Sugar creek and put in a small prospecting outfit, with which, it is understood, they did satisfactorily in a preliminary way.

Other parts where operations were carried on were at the old *Waverley* mine, at a Chinese claim on Slough creek, at Brown and Henry's lease on Summit creek, and on Stewart creek. Speaking generally, there was much work done that gives promise of having productive results in the future. Prospecting quartz leads also had attention, but no important discovery in this connection was reported.

Quesnel Mining Division.

While the estimate of production in this division has been kept down to a similar amount to that of 1910, it is not unlikely it may later be found

that there was an increase in 1911, for the report of results of one new enterprise has not yet been received. The most important work done in the division was the completion of the water system and hydraulic equipment of the Quesnel Hydraulic Gold Mining Company, which commenced to run water through its ditches and flumes last August. A description of this company's hydraulic installation was printed in the Annual Report for 1910. Briefly, it is one of the largest and most important enterprises of this nature yet undertaken in this division. The water has been brought from Swift river over a divide to Twenty-mile creek, a tributary of Quesnel river, a total distance of about twenty-two miles. The system was designed to deliver a supply of 3,700 cubic inches of water, and to provide for washing 12,000 to 15,000 cubic yards of gravel daily. An official statement is to the effect that the new water system has been found to work perfectly. "There was practically no interruption from the beginning of operations to the end of the season; despite the universal drought over the whole North-west country, we experienced no diminishing in our water-supply, although we were using 40,000,000 gallons every twenty-four hours." Necessarily, much preliminary washing had to be done in removing overburden, opening gravel-pits, etc., so the main result of the season's work was to put the property in such shape as will permit of a maximum of gravel-washing being done during the 1912 season. Some minor defects having been developed in the paving of the sluiceway, the sluice is being lined with high-carbon steel instead of allorite boulders, which costly improvement is expected to allow of operations being conducted with fewer men employed and a consequent reduction in maintenance charges. Another improvement made is the substitution at the head of the sluice of manganese-steel rolls; these, placed transversely, will act as gold-savers, and their life in the sluice will be much longer than that of the ordinary steel rolls. The outlook for this company appears to be a promising one.

Mr. John B. Hobson practically completed in 1911 the hydraulic installation he commenced in 1910 to bring water to his leases fronting on the North fork of Quesnel river, west of Spanish creek. A diverting dam has been put in on Spanish creek, below the junction of Black Bear and Spanish creeks; the cribbing is 24 feet high and 50 to 60 feet across the creek. A flume, 5 by 4 feet and 1,460 feet long, has been constructed to a penstock, and there is 3,850 feet of pipe, graded 48 to 18 inches, down to the pit. The hydraulic equipment includes a No. 6 motor with 9-inch discharge. A sluice-flume is 6 feet wide, 3 feet deep, and about 400 feet long, constructed on a 6-per-cent grade and paved with 12-inch end-wood blocks. By the close of last season all had been got in readiness for operating in 1912.

General.—Road-construction has been pushed by the Provincial Government, and further substantial improvement in this direction will be made. The northern part of the district is therefore being gradually made more accessible as transportation difficulties are being overcome.

CASSIAR DISTRICT.

Under the comprehensive head of Cassiar District are grouped, for purposes of official record, the following divisions: Atlin, Stikine and Laramie, Skeena, Portland Canal, Bella Coola, Queen Charlotte, and Peace River. The largest and most important work in progress in Cassiar District in 1911 was the continued construction of the Grand Trunk Pacific railway, which will

provide railway transportation facilities for much of the Skeena country and other parts, thence eastward to and beyond the eastern boundary of the Province. A short line of railway was constructed from Stewart, at the head of Portland canal, about fourteen miles inland, to near the *Red Cliff* mine.

The chief mineral product of Cassiar District is placer gold, though this is a condition that is not expected to last much longer, for both lode minerals and coal are being opened with the object of making an output of both in the near future. The estimated value of placer gold recovered in 1911 was \$235,000 as compared with \$283,000 in 1910. As in Cariboo, shortness of water for gravel-washing restricted production.

Atlin Mining Division.

An estimate of the value of gold recovered in 1911 from Atlin creeks is \$230,000, which is \$15,000 less than that of 1910. Between a short hydraulic-filing season and some of the operators having been engaged in making improvements to their hydraulic-filing systems, this decrease is accounted for.

The North Columbia Gold Mining Company, operating on Pine creek under the management of Mr. J. M. Ruffner, made the largest recovery of gold. Beside working its own property, it operated under lease that of the Atlin Consolidated Mining Company (Guggenheims), situated on the north bank of Pine creek. Other creeks on which mining was done were McKee creek, where the Pittsburg-British Gold Company works, with Mr. Clarence M. Hamshaw as manager; Spruce creek, on which the Spruce Creek Power Company and a number of individual miners recover gold each season; and Boulder creek, which is the scene of the activities of the Societe Miniere de la Colombie Britannique Company. On Birch, Ruby, Wright, Otter, Wilson, Lincoln, and other creeks, individual miners did most of the placer-mining.

Quartz-mining.—Little has been heard of quartz-mining in this division in 1911. The *Northern Partnership* and *Gleaner* groups, on the east side of Taku arm, do not appear to have had much work done on them, for reports of rich yields of gold from the former were not made last year, as they were in 1910.

Skeena and Omineca Mining Divisions.

The most important development of the year in the Skeena country was the determination of the fact that the coal-measures of the Groundhog basin and vicinity extend over a much larger area of territory than had previously been known. A brief account of this coal region has already been given. Most of the localities in which silver-lead ores have been found in the Skeena country are in Omineca Mining Division. Commencing with the headwaters of the Telkwa and Morlee rivers, mention might be made of diamond drilling in the coal-measures of this part of the district. These operations were carried on by two companies—namely, the Prince Rupert Coal Fields, Ltd., and the Grand Trunk Pacific or one of its auxiliary organizations. In Dominion basin, work was done on mineral claims on which copper-ore occurs, while at the head of the North fork of Telkwa river some promising silver-lead ores were reported to have been found. On and about Hudson Bay mountain there was much activity, and some promising deposits of silver-lead ore were opened here. The finding of borate deposits was reported from the Babine country. Then, there was development work done on Rochers Debonle's mo. claim, where some good-looking copper and zinc ores occur.

Nearer Hazelton, there are the Nienille mountain, Cariboo mountain, Glen mountain, and Four-mile mountain camps, in all of which there has been a deal of prospecting, with some claims having excellent showings of ore.

Portland Canal and Observatory Inlet.

Portland Canal Mining Division was reported on a year ago; the report, giving detailed information relative to the more prominent mining properties, was printed in the Annual Report for 1910. So far as production of ore is concerned, the year 1911 fell short of expectations. Only one property produced and shipped ore—namely, that of the Portland Canal Mining Company. Development work was done on a number of other mineral claims, but none of these shipped ore.

Portland Canal Mining Co.—Late reports from this company's mine were to the effect that improvement had taken place in the stopes, the ore having been of better grade as stoping was advanced. Weather conditions, however, necessitated the closing of the company's concentrating-mill for the winter. During the year the capacity of the mill was increased to 75 tons a day by the addition of more equipment. Shipments of concentrates made were as follows: To the Tyee Copper Company's smeltery, at Ladysmith, Vancouver Island, 223 tons of iron concentrate, containing value in gold and silver totalling about \$5,000; to the Tacoma smeltery, 1,287 tons of lead concentrate, having a gross value of \$16,376. The lead concentrate was shipped in two consignments; one of these was 940 tons, which averaged gold 0.32 oz. and silver 12.70 oz. per ton, and lead 10.9 per cent. A further shipment of about 700 tons reached Stewart, but the concentrate was frozen in the cars on the dock, so it remains there until it shall become thawed out and be in a suitable condition for shipment. Negotiations are in progress for the amalgamation of this company's property with others in the vicinity.

Red Cliff.—Disappointment was felt at the failure of the Red Cliff Company to ship ore, as for months it had been stated it would do. One of the reasons given for non-shipment was that several hundred tons of rock caved in and became mixed with the high-grade ore in the chute, which meant that the ore would have to be hand sorted at heavy expense and the progress of regular work in the mine be virtually stopped.

Hidden Creek.—This property, situated near Goose bay, Observatory Inlet, was extensively explored by the Granby Consolidated M. S. and P. Co., Ltd., which completed its purchase during the year. Reports of half a dozen mining engineers submitted to the Granby directors were all favourable, although estimates of quantity of ore available varied considerably—from 5,000,000 to 12,000,000 tons of ore "in sight." The company regards the following as a reasonable estimate of average copper content of the ore: Taking the quantity at six to seven million tons, it is believed the average will exceed 2 per cent.; calculating on a tonnage of eight to twelve million tons, it is thought an average of 1.55 to 1.75 per cent. may be depended upon. The ore also contains gold and silver values of about \$1 a ton. The company plans to establish at Goose bay a smeltery to have a capacity of 2,000 tons of ore a day.

Queen Charlotte Division.

Little information has been received concerning the year's mining on Queen Charlotte Islands. On Graham Island, of this group, prospecting for coal and oil has been in progress, but definite results have not yet been

reported, nor has any information been received relative to hydraulic placer-mining on the east coast of this island. Similarly, little is yet known of what was done on Moresby Island, on which many mineral claims have been located. Efforts were made to secure the exploration of iron-ore on Louise Island, but, so far as known, not much development work has yet been done there.

EAST KOOTENAY DISTRICT.

The district of East Kootenay appears to have had the largest total decrease in mineral production of all the districts of the Province. Not only did the strike of the Crowsnest coal-mine employees cause a decrease in output of coal and coke of nearly \$3,000,000 as compared with 1910, but the district had as well an estimated decrease in production of silver to the extent of about 145,000 oz., and of lead of nearly 3,000,000 lb. The cause of the smaller production of coal and coke has already been stated; that of the lessened output of silver and lead was the direct result of the practical exhaustion of the known ore-bodies of the *St. Eugene* mine, the decrease from which was, however, in part offset by an increase in output of these metals by the *Sullivan* mine, owned by the same company. There were only two other mines in Fort Steele Division that shipped ore, but their combined output was not large. From mines in Windermere Division, in central East Kootenay, no production has been reported; from Golden Division, in Northeast Kootenay, the only information received relates to progress at the *Monarch* mine. The total yield of placer gold is placed at a similar small value as that of 1910—\$3,000. The construction of the Kootenay Central railway, from Golden, on the Canadian Pacific main line railway, south to the Crowsnest railway east of Cranbrook, now in active progress, may be expected to lead to a resumption of mining in parts tributary to the upper Kootenay and upper Columbia valleys.

Sullivan Mine.—Much development work was done in 1911, this adding considerably to the available reserve of ore. To facilitate getting ore out of the mine, a tunnel was driven from the shaft, on the 100-foot level, out to the surface on the hillside, and a large ore-sorting house was erected near the outlet of this tunnel. The upper terminal of the aerial tramway from the mine down to the railway was removed to a storage-bin built immediately below the sorting-house. A hydro-electric power plant is nearing completion, power to be developed by three 6-foot Pelton wheels—two connected to a 44-drill compressor and one to a 120-kw. generator. Compressed air will be conveyed to the mine through an 8-inch pipe 5,100 feet long. Beside the body of lead-ore being mined here, there is in the mine an immense quantity of lead-zinc ore awaiting development of a suitable reduction process before it can be mined to profitable account. The *Sullivan* property, like the *St. Eugene*, is controlled by the Consolidated Mining and Smelting Company of Canada, Limited.

Monarch Mine.—The *Monarch* mine, near Field, in the Golden Division, next to the *Blanchet*, on Kootenay lake, is one of the oldest lode mines worked in British Columbia, its first operation dating back to 1885. The Mt. Stephen Syndicate, of Vancouver, has during the last year or two spent about \$50,000 on development work and mine and mill equipment. It is said to have between 20,000 and 25,000 tons of ore blocked out on three sides. An aerial tramway from the mine down to the mill, 1,000 feet below, has been constructed, with ore-bins at its terminals; a water-power, giving 140 horse-power under 280-foot head, has been developed; a compressor supplies air for machine drilling and hoisting. The mill equipment includes crusher, rolls,

troughs, jigs, Delster concentrating-tables, etc., and its treatment capacity is 50 to 60 tons per day. It has been designed for three products—namely, a sorted high-grade lead-silver ore to be shipped crude, a lead-silver concentrate, and a zinc-silver concentrate.

WEST KOOTENAY DISTRICT.

West Kootenay District is the most important in the Province in regard to the production of metalliferous minerals, not only in total value, but also in variety. Much more lead is produced in East Kootenay, and much more copper in the Boundary than in West Kootenay, but taking the total of all the metalliferous minerals—gold, silver, lead, copper, and zinc—West Kootenay is in the lead. Moreover, the prospect is that its production of metals will show a substantial increase during the next few years, probably in each of these metals except, perhaps, in copper. Its chief divisions are dealt with below.

Ainsworth Mining Division.

While production was comparatively small in Ainsworth Division in 1911, much progress was made in the direction of development of its mines. The most gratifying feature to those long interested in Ainsworth camp is that money is now available for development and equipment of several properties either long idle, or worked only intermittently and on a small scale. In particular this observation applies to properties now being worked by the Consolidated M. and S. Co., the Mabry Syndicate of Spokane, and the Silver Hoard Mining Company. Then, there is stated to be reason to look for an early resumption of operations on a group with the *Krao* as its centre, while Mr. A. D. Wheeler has formulated plans for the further development of the *Gallagher* mine. Again, it is understood that the affairs of the old company that owned the *Blurbell* mine, across the lake from the town of Ainsworth, have been wound up, and that the new owners will make the mine again productive on a fairly large scale. In the western part of the division the *Ulica* has made progress and shipped ore, while both The Deep Mine, Limited, and Retallick & Co. were active on properties formerly known as the *Whitewater* group. There was little mining done in 1911 on the South fork of Kaslo creek, but the prospect is encouraging for a decided improvement in 1912.

Slocan and Slocan City Divisions.

Probably in no other part of the Province did the mining industry make more important advances than in the Slocan, the outlook for which is believed to be better now than for many years. The most satisfactory development is not that there were rather larger quantities of certain metals produced during the year under review, but that deep-level mining has amply demonstrated that ore of good grade is to be found at considerable depth in Slocan mines, and in comparatively large quantity. This demonstration has been most marked in the *Rambler-Cariboo* mine, but it has also been made in several other properties in various parts of the district—in the *Surprise* mine above Cody, and in the *Standard*, *Van Rai*, and *Hewitt* mines, all near Silverton, on Slocan lake. There are others in which developments in depth have been satisfactory, but those named are, perhaps, the most striking. A direct and most important result of this development has been that some of the mines, that in earlier years were largely and profitably productive, are to be explored at depth, notably the *Slocan Star* and *Payne* mines. The construc-

tion of a branch railway from near Three Forks to Bear lake, now in progress, will when completed provide much-needed railway transportation for mines in the eastern part of Slovan Mining Division—the *Lucky Jim*, *Rambler-Cariboo*, and others.

Lucky Jim.—After the completion of camp buildings, to replace those destroyed by the fire in 1910, the development of the mine was proceeded with by driving No. 6 level, starting from just above the old K. & N. railway-track; No. 6 is 150 feet below No. 5, on which latter much zinc-ore has been developed, and this ore awaits the completion of the railway to permit of shipments being resumed.

Rambler-Cariboo. Notwithstanding that transportation arrangements were not favourable to shipment of ore, receipts at the Trail smelter from this mine in 1911 were about 1,800 tons, and the quantity of silver and lead recovered was much larger than in 1910. Long shoots of ore of good grade were opened on several levels down to 1,200 feet depth, and as little stoping was done on these levels, there is much ore available for shipment. The 1,100-foot level is being extended in search of ore at that depth. A new concentrating-mill is to be erected near the railway-line now being constructed past McGilgan, and an aerial tramway will connect mine and mill.

The *Riv* and *Rambler-Cariboo Extension* are both being worked under the same management as the *Rambler-Cariboo*. The *Washington*, across the gulch from the *Rambler-Cariboo*, was further developed by Mr. J. L. Retallack, and then closed pending provision of transportation facilities.

Peggy.—Work on a deep-level adit was commenced late in the year. This crosscut is to be driven 3,300 feet with the object of cutting the vein at about 675 feet below the present lowest level of the old workings of this mine.

Slovan Star.—An adit is being driven to cut the vein at a depth that will give 600 feet on the incline below the old workings. The laths have been cleaned out and ore is being taken from them. The concentrating-mill will probably be operated again after a long shut-down. The new Slovan Star Company has also acquired the *Red Star* group.

Kath-Hope.—Upper levels were extended and a lower adit driven 600 feet. About 100 tons of ore was shipped.

Richmond-Kareka. The mine was worked all the year, doing more development and taking out ore, of which 2,300 tons was shipped.

Cody Mines.—The long raise from the 1,100-foot level of the *Surprise* was continued, and at the end of the year was nearly through to the old workings. The *Sunset* was also being developed at depth by a long adit at 250 feet below its lowest old tunnel. On both the *Even* and *Twilight* more ore was found, and both silver-lead and zinc ore was opened in the *Able Five* group.

Stuohart.—Beside opening more ore on both the No. 5 and No. 6 levels, which are 100 feet apart vertically, substantial surface improvements were made. An aerial tramway 8,000 feet long was constructed from the mine down to the mill. A water-supply system was put in and a compressor plant installed, with air-line up to the mine. A concentrating-mill was erected near Silverton, and equipped with appliances for making both silver-lead and zinc concentrates.

Van Rai.—This company started operating its new mill in March, and kept it running the year through. About 33,000 tons of ore was treated, the product being about 227,000 oz. of silver, 2,130,000 lb. of lead, and 2,375,000 lb. of zinc.

Silverton Mines, Ltd.—In addition to doing much more development work on its *Hevill Loma Doona* group, this company treated a lot of ore at its *Wakefield* mill. Beside the ordinary water-concentration operations, one unit of the Elmore Vacuum Process plant was put in, to treat zinc middlings from the flgs.

A number of small mines in Slocan Division and others in Slocan City Division were also worked, but the total output of ore from these was small.

Nelson Mining Division.

An estimate of the production of the mines of this division gives a total of about 20,000 oz. of gold, 45,000 oz. of silver, and 1,000,000 lb. of lead. This shows a gain, as compared with 1910, of about 50,000 oz. of silver and 350,000 lb. of lead. In gold, however, the district shows a decreased production; the producers of gold in considerable quantity were first the *Queen* mine, Sheep creek (by far the largest); the *Vaguel*, in the same camp; the *Granite-Poorman*, near Nelson; the *Arlington*, Erle; and the *Yankee Girl*, Ymir. The *Molly Gibson*, Kokanee creek, produced most of the silver, and the *Emerald*, near Salmo, most of the lead.

Among the more prominent evidences of progress were the improvements made at the *Molly Gibson* and *Mother Lode* mines. At the former, a crosscut tunnel was driven at a level 250 feet below No. 5, which was formerly the lowest level. At the mouth of No. 6 tunnel a site for a new upper terminal for the aerial tramway was excavated in solid rock. Additional water-power was developed and a small compressor put in. Beside this, connection was made with the air-line to the mine and machine drills were substituted for hand drills. Shipment of ore to Trail was resumed, and the Consolidated Company placed the mine in condition to make a larger output of silver-lead ore in the future. The concentrating-mill was repaired, and, beside numerous minor changes made, a Huntington mill was substituted for the old 5-stamp battery.

The erection and equipment of a 10-stamp mill for the *Mother Lode* mine, Sheep creek, was the most noticeable advance made in that camp. The mill was so equipped as to ensure thoroughly modern and effective milling and gold-saving methods in treating the ore from the *Mother Lode* mine, which has been developed down to the 500-foot level, and is stated to have sufficient ore blocked out to keep the mill continuously supplied for three years. The development of the *Queen* at greater depth and more underground work on the *Vaguel* and *Kootenay Belle* mines are also worthy of note. The *Emerald* increased its output of lead-ore. Other occurrences of lead-ores were discovered about Sheep creek and Salmo, and the development of these was undertaken.

About Ymir, much development work was done on the *Wilder* and *Wileor* respectively, and the *Yankee Girl* changed owners with a prospect of its being thoroughly developed in the near future.

In the vicinity of the town of Nelson, the *Granite-Poorman* was the most important property; more ore was put through its 20-stamp mill and a larger production of gold was made. As the year closed some changes were made at the mill with the object of trying to save totals of the platinum group that were reported to have been discovered in ore from this property, but no confirmation of the recovery of such metals has been given. The syndicate that owns the *Silver King* and other groups of claims near Nelson did not do

any mining in 1911. Fire utterly destroyed the old Hall Mines smelting-works at that town. Nothing was done at the Canada Zinc Company's electro-thermic zinc reduction-works, but Mr. A. Gordon French for some time carried on investigations and experiments in connection with the reduction of zinc-lead ores by a process of his own.

Trail Creek Mining Division.

There was not much change in the production of metals by the Rossland mines, which are in Trail Creek Division. About 120,000 oz. of gold, 90,000 oz. of silver, and 3,500,000 lb. of copper is the aggregate of the several producing mines in that camp.

The quantity of ore mined was about the same as that for 1910. Of the metals produced, approximately two-thirds was from the Consolidated Company's *Centre Star* group of mines, which shipped nearly 101,000 tons of ore. The average gold-value of the ore from this group was somewhat higher than for 1910; on the other hand, that of the *Le Roi* and *Josie* was lower.

The development work done in the *Centre Star* group amounted to, in round figures, 12,000 lineal feet, of which about three-fourths was drifting. Nearly 20,000 feet of diamond-drill holes was bored. The only addition made to plant was the substitution of a 150-horse-power high-pressure horizontal return-tubular boiler for two low-pressure boilers. The most important developments were in the bottom of the *War Eagle* mine of this group, where the ore previously partly opened below the 12th level was proved to be a large body, and the average gold-value somewhat higher than had been expected.

The *Le Roi* was purchased by the Consolidated Company last summer. Connections were made with the *Centre Star* mine on various levels, and the motor-haulage system of the latter mine extended into the former. The output of *Le Roi* was about 10,000 tons of ore. The big boiler plant of the *Le Roi* is not now used, the *Le Roi* hoist being operated by air from the *Centre Star* compressor.

In the *Josie* mine of the *Le Roi* No. 2, Limited, one feature of the year was the discovery and development of the Holywell vein on the 300- and 500-foot levels, which has added to the life of this mine. In the deep of the mine, the Rodney vein was developed on the 1,200-foot level, where a comparatively large body of good ore was found. Work was also done on the 1,500-foot level, on which it is expected ore of good grade will be developed. Preparations were made to go still deeper. New stopes were opened in different parts of the mine. Development work totalled nearly 6,000 feet and diamond drilling 15,000 feet. Operations at this company's concentrator were successful, the year's results having been the best yet obtained, and the addition to the profits earned proportionately satisfactory. The company is understood to have paid the customary dividends, totalling for the year 6s. per share on its 120,000 shares.

The *Nickel Plate* shipped 351 tons of ore and the *I. V. L.* (a gold property) 96 tons, averaging nearly 2 oz. gold per ton. In the South Belt, the *Blue Bird* shipped less than 100 tons of silver-lead ore, and work was commenced on the *Richmond*.

The installation of a stamp-mill on the *Inland Empire*, on Grenville mountain, was reported, but no confirmation of this has been received.

Trail Smeltery.—At the Consolidated Mining and Smelting Company's copper and lead smeltery and electrolytic lead-refinery at Trail, the total quantity of ore and concentrates treated was about 330,000 tons, of which 6,000 tons was from Republic, Washington, and the remainder from British Columbia mines. The total gross value of the metals recovered was nearly \$4,886,000, in the following approximate proportions: Gold \$2,774,000; silver, \$774,000; lead, \$835,000; and copper, \$523,000. Two units of the Dwight-Lloyd sliter-roasting machines were put in, and both lead-ores and gold-copper concentrate were roasted. The rearrangement of the Huntington-Hoberlein roasting plant was undertaken, and many minor changes were made to facilitate the handling and sampling of ores.

Other West Kootenay Divisions.

Mining in Revelstoke, Lardem, and Trout Lake Divisions was unimportant on the whole. Hydraulic mining for placer gold was done on streams in the Big Bend District, Revelstoke Division; rather more than 300 tons of silver-lead ore was shipped from the *Beatrice* mine, near Caribou, Lardem Division; while in Trout Lake Division the *Silver Cup* made an output of only 437 tons as compared with 971 tons in 1910, the *Windsor* was developed, and work was also done on claims on Poplar and other creeks south of Trout lake.

BOUNDARY DISTRICT.

There was a comparatively large net decrease in the quantity of ore mined in the Boundary District—about 454,000 tons net, or 26.5 per cent. decrease. This was due mainly to the strike of coal-mine employees in the Crowsnest District, which cut off the supply of coke for the Granby Co.'s furnaces. The decreases were Granby Co.'s mines 402,000 tons and *Snoowhoc* 111,000 tons; the increases were British Columbia Copper Co.'s mines 115,000 tons and Hedley Gold Mining Company 11,000 tons. The net decreases in metals recovered were, approximately: Gold, 21,000 oz.; silver, 147,000 oz.; and copper, 3,532,000 lb. Against the large decrease in the production of the Granby Company, and the much smaller one of the *Snoowhoc*, must be placed the substantial advances of the British Columbia Copper Company (including the New Dominion Copper Company, which it now controls) and the Hedley Gold Mining Company. There were fewer small mines shipping ore in 1911 than in 1910.

Granby Con. M. S. and P. Co.—This company shipped from its mines at Phoenix 405,880 tons of ore, as against 1,074,867 tons in 1910. There was also received at the company's smeltery at Grand Forks more than 1,200 tons of ore from other mines in British Columbia. Operations were resumed in December at the mines and smelting-works after nearly six months' inactivity. No great amount of development work was done during the year, yet it was kept ahead of ore-extraction to the extent necessary for economical working of the mines. The chief exploration work was done with diamond drills, which resulted in adding somewhat to the known reserves of ore. New ore was developed on the *Victoria*, *Etna*, *Knob Hill*, and *Monarch* claims, mainly on the upper levels, so that this ore can be extracted through existing main outlets from the mines. The general manager reported that during the fiscal year ended June 30th, 1911, additional ore amounting to nearly 1,250,000 tons had been blocked out, while the quantity shipped in that period was 957,200 tons, so that the ore in sight had been increased by 291,000 tons, leaving 6,720,000 tons

"estimated in sight." The aggregate quantity of ore produced by, and shipped from, this company's mines at Phoenix during all years to the end of 1911 is approximately 7,250,000 tons. The ore continues to be about the average grade, though much lower in metal contents than that mined ten years ago; however, it is now practicable to mine and smelt at a profit ore that would then have been thrown on the dump. The additions to plant and buildings in 1911 were chiefly those requisite to replace at the mouth of No. 3 tunnel those destroyed by fire in 1910. Construction material used in several of the new buildings are fire-proof—brick, concrete, and iron.

At the Grandy Co.'s smelting-works there was little new construction or additions to plant, other than a slag-disposal plant which was put in and was ready for operation by the end of September. The main features of this are: Granulation of the slag by water; fluming of granulated slag to centrally situated storage-bins; dewatering of slag and carrying it on conveyor-belts up an incline to a maximum height of 100 feet above the level of the present slag-heap, and distributing it there. It is estimated this change will provide dump-room for from 5,000,000 to 10,000,000 tons of slag. It is noteworthy that in his report for the last fiscal year the general manager stated that "notwithstanding the lower tonnage shipped (450,733 tons as against 1,175,548 tons) and the disadvantages under which it was mined by starting and closing the operation of the mines at various periods, the cost of mining was only 1 cent per ton greater than the year previous, while the cost of smelting was reduced 3 cents per ton." The smelting costs were the lowest ever reached by this company, and are stated to compare favourably with any in the world. Late in the year the settlers below the blast-furnaces were changed from water-jacketed to dry, with larger settlers, retaining the two-settler arrangement. Copper losses were low—less than 5 lb. total; an average silica slag of 45 per cent. was run.

The mining and smelting costs of the large companies in the Boundary are extremely creditable to the managements and render possible the treatment of such low-grade ores.

The Grandy Company's mining costs for crushed ore f.o.b. cars was 84 cents a ton, and the smelting, from ore to pig copper, was less than \$1.20 a ton, on a tonnage of 900,000 tons. Railway transportation is not included in this. The British Columbia Copper Co.'s costs under somewhat differing conditions and on a smaller tonnage of 352,000, for fiscal year, were equally creditable, viz.: Mining 90 cents a ton f.o.b. cars, and the smelting costs was \$1.48.

British Columbia Copper Co. This company increased its production of ore by about 25 per cent. thus making the output from its mines (including those of the New Dominion Copper Company, which it also operates) about 750,000 tons. More than half this ore came from the *Mother Lode* mine, and the greater part of the remainder from the *Raahide* mine. The *Wellington* group and adjoining *Uchelstan* in one part of the district, and the *Emma* in another, together shipped between 10,000 and 50,000 tons. The company also obtained about 15,000 tons from its mines in the State of Washington.

The most important work done in the company's own mines in 1911 was in connection with the method of breaking down and extracting ore inaugurated in the *Mother Lode* mine the previous year by Mr. E. Hibbert, mine superintendent, and continued in 1911. This consisted of dividing the ore-body into a series of transverse slopes of a maximum width of 25 feet and breaking the ore down in large quantities. An idea of the extent of these

stopes may be obtained from the following brief particulars of one blast, in preparing for which 2,433 holes, averaging approximately 14 feet each in depth, were drilled. The explosive charge consisted of 425 boxes of 40-per-cent. dynamite (equals 10½ tons), and 2,525 electric detonators, low tension No. 7, were used. Connection was finally made to a 550-volt circuit. The result of this blast was to break down more than 100,000 tons of ore.

Despite the high cost of Pennsylvania coke imported during the eight months that the Crowsnest coke was not obtainable, the company operated three blast-furnaces at its smelting-works at Greenwood, except that in November the smallest one was cut out until Canadian coke should be again obtainable, the settlement of the strike having been then assured.

The British Columbia Copper Company was active last year in its endeavours to secure more mines. The *McKinley* and *Riverside* groups, in Franklin camp, Grand Forks Division; the *Voigt* group near Princeton, Shulkameen; and the *L. H.* group, in the neighbourhood of Silverton, beside some claims near Greenwood in the vicinity of the *Mother Lode* mine, were bonded under option of purchase, should the results of development work warrant their acquirement. A group of fifteen claims in Washington, a few miles from Grand Forks, was also bonded. In addition to this varied exploration work, diamond drilling was done on the New Dominion Copper Co.'s *Montezuma* claim, near Phoenix.

The company's relations with the miners' and smelters' unions were harmonious throughout the year, consequently there were not any labour troubles to interrupt operations at mines or smeltery.

Consolidated M. and S. Co..—This company continued to work the *Snowshoe* mine under lease until April, and then closed it after having shipped in 1911 nearly 31,000 tons of ore, as compared with 142,600 in 1910. This alone will account for a decrease in production of copper of 1,800,000 lb. The *Snowshoe* lease has since been abandoned. Some 2,200 tons of ore was shipped from the *Phoenix Amalgamated*, but at the then price of copper the grade of ore was too low for profitable working. Ore received at Trail from the company's No. 7 mine was 775 tons during the first quarter of the year; none was shipped afterward. Development work was continued until suspension for the winter. The ore-sorting plant was completed and ore-bins were erected at the lower end of the tramway.

General.—The small shippers were *Lightning Peak*, *Fife*, and *Elkhorn*. No information was received concerning the *Jewel*, in connection with which gold-mine a 15-stamp mill was erected and equipped in 1909 and a cyanide plant put in. The Greenwood-Phoenix Co.'s crosscut tunnel was extended to a total distance from the portal of about 3,000 feet, and the Argo Co. also drove a long prospecting tunnel.

Hedley Gold Mining Company.

A brief summary of this company's work and results in 1911 follows: Development work consisted of drifting, 655 feet; sinking, 425 feet; and raising, 235 feet; total, 1,315 feet. Diamond drilling totalled 3,160 feet. The quantity of ore milled was about 57,000 tons, of an average value of \$12.10 per ton; the percentage of extraction for the year was 92 per cent. Four quarterly dividends were paid by the company, amounting together to 25 per cent. on the issued capital of \$1,200,000. At the close of the year the lower levels of the company's mines were looking well, with large reserves of ore in sight, and the outlook for 1912 is accordingly bright.

Aper Group.—This property was taken under bond and option of purchase by Mr. T. W. Plekard and associates, who commenced work on it last autumn and have been continuing it through the winter.

SIMILKAMEEN DIVISION.

The British Columbia Copper Co. last autumn took under bond and option of purchase sixty-three mineral claims situated on Copper mountain, a few miles from Princeton. Some of these are being explored, and it was the company's intention to continue prospecting and development for several months, which work was commenced at four different places. There are numerous other mineral claims in this division.

Buildings for a cement-manufacturing industry have been erected at East Princeton; railway connection is being made to these works, and plant and machinery obtained.

Princeton Coal and Land Co.—This company's coal-mine at Princeton has been opened by a slope and counter, with three levels east and one west, together representing about 4,000 feet of development. Numerous crosscuts bring the total up to considerably more than a mile of underground workings. In the summer of 1900 a tippie structure with straight-bar screens was erected, and a 50-horse-power boiler and hoist put in. This plant had a capacity of only about 100 tons a day, so in 1911 it was decided to install a modern coal-handling and screening plant, to be in running order by the end of January, 1912. The new plant and other equipment include the following: Rotary dump; shaker screens for lump, egg, and nut coal; two picking-belts; Victor box-car loader; compressor with capacity of 744 cubic feet of free air per minute; Hardy coal-cutting machines; two 75-horse-power boilers; machine-shop, with full equipment of power and hand tools; 80-ton railway-track scales, etc. New buildings were bath-house for miners, blacksmith-shop, store-house, and stables. Cost of new equipment will be approximately \$100,000. The output of coal in 1911 was about 23,000 tons, as compared with nearly 12,000 tons in 1910.

Other Coal Companies.—The United Empire Company further developed its coal property. The Osyoos Company opened a seam of coal at least 60 feet in width. The Princeton Collieries, Ltd., put down a slope nearly 1,000 feet. The Columbia Coal and Coke Company drove a long crosscut tunnel on its coal lands situated between Granite creek and Collins gulch, and prepared for putting in equipment for mining and handling coal, but no particulars were received. The V. V. & E. railway was extended from Princeton up the Tulameen river, so as to provide transportation facilities for the Columbia Co.'s Coalmont colliery.

General.—Drilling to determine the depth of the gravel-beds along the Tulameen river was continued. Following the discovery early in the year by the Geological Survey of minute diamonds in chromite rock from Olive mountain, Tulameen, the river-gravel in the vicinity was prospected for diamonds in the wash. Work was also done in connection with endeavors to find more placer gold and platinum.

NICOLA VALLEY.

No metalliferous mining of importance was reported from Nicola valley. It was stated that a deposit of gypsum had been found and shipments made from it. Coal was developed on several properties, but the only information received was concerning the operations of the Pacific Coast Colliery Company

and the Nicola Valley Coal and Coke Company. On the property of the former, No. 1 slope and No. 2 shaft, as described in the 1910 Annual Report, have both been further developed.

Nicola Valley Coal and Coke Co.—This company erected and equipped a new tipples; put in a coal-washery and some new machinery; extended the railway-trackage; much improved the outlets from its mines, and found, by means of diamond drilling, important extensions of its coal-deposits. Its output of coal was about 200,000 tons, as against 141,000 tons in 1910.

The capacity of the new tipples is 1,000 tons per day of ten hours. It is a frame-constructed tipples, complete with coal-screening appliances, picking-conveyors, slack-conveyors, car-hauls, etc. The washery is a 50-ton raw coal per hour Stewart coal-washing plant, with storage-bins of frame construction. Power for tipples and washery is supplied by 10- by 16-inch twin-coupled heavy-duty throttling steam-engines capable of 90 horse-power. A Christy box-car loader, mounted on hand-operated portable truck, expedites loading coal on railway-cars.

Other additions were three 72-inch by 18-foot horizontal return-tubular steam-bollers; 14- by 18-inch air-compressor, simple steam compound for No. 2 mine; air-receiver 48 inches by 10 feet; three double-cylinder steam-holds; ventilating-fan for No. 2 mine, and engine for driving same; buildings for fan and compressor; steam-pump, capacity 800 gallons per minute, and three-quarters of a mile of pipe for water-supply extension; wagon weigh scales; steam locomotive, steel rails, etc.

New Railway.—Beside extension of transportation facilities by the Canadian Pacific Railway Company, another company was busily engaged in railway-construction work in the district during the year, with the object of providing direct railway communication between Nicola and Boundary Districts.

KAMLOOPS AND YALE.

In Kamloops Division, boring for coal along the route of the Canadian Northern railway in the North Thompson valley was continued and, it was reported, coal was found in places.

Among the copper properties the most noteworthy result was the shipment last summer from the *Iron Mask* mine of twenty-one cars of concentrate to the Tyee Copper Co.'s smeltery at Ladysmith. No information was received as to other metalliferous mining in this division.

The highly coloured newspaper reports of Steamboat mountain proved to be unreliable, though some prospecting in that locality and contiguous country has been continued. As a matter of fact, there was little actual lode-mining done, so far as known to this office, in Kamloops, Ashcroft, or Yale Divisions; nor was much productive placer-mining for gold reported.

LILLOOET DISTRICT.

There does not appear to be much to add to the detailed report of this district published in the Annual Report for 1910.

Individual placer-mining was carried on in several parts of the district, and some hydraulic mining was also done, but the total recovery of gold was not large.

In lode-mining, development was carried on on the *Coronation* group, *Lorne*, *Pioneer*, *Wayside*, and other properties, but no particulars have been received.

The *Loric* ran some 84 tons through its stamp-mill, recovering gold to the extent of \$17 per ton of ore milled.

THE COAST DISTRICT.

Britannia Group.—The most momentous advance yet made in the Coast District in relation to the development of its metalliferous resources was that at the *Britannia* mines, the result of work done under the management of Mr. R. H. Lach during the years 1910-1911. It is stated that there is now in sight in these mines a large tonnage of ore that may be expected to average 3 to 4 per cent. copper. A rough estimate places the quantity at fully 1,000,000 tons, and it is believed the development of the early future will considerably increase the available reserves of commercial ore. More than 100,000 tons was extracted in 1911; most of this was passed through the graded crushing and concentrating mill. Extraction was reported to be good for chalcopyrite ore—about 80 per cent. A full-sized working unit of the Elmore Vacuum Process plant gave excellent recoveries, indicating that treatment of fines and slimes, following hand-sorting and jigging, will bring the total extraction of value to a higher percentage. More than 100,000 tons of ore was milled, and the concentrate produced contained between 8,000,000 and 9,000,000 lb. of copper and comparatively small value in silver. The shipments averaged about 14 per cent. copper.

Texada Island.—The operations of the Tacoma Steel Company at its *Marble Bay* mine constituted the chief mining progress on Texada Island in 1911. Shipments from this mine totalled 22,500 tons of ore, averaging about 5 per cent. copper, and fair gold and silver value beside. The ore is chiefly bornite, which has been mined on various levels down to 1,200 feet deep, and it is stated that it has been found lately on the newly opened 1,360-foot level.

The *Corsett*, of the *Van Anda* group, worked by the Tyee Copper Company under lease, shipped 1832 tons of ore to Ladysmith. Little other metal-mining was done on the island. Negotiations for the purchase of the Puget Sound Iron Company's iron property did not result in a change of ownership, nor was any work done on it. The Tacoma Steel Company continued making and shipping lime from its kilns at the north end of the island.

Another company—of which Mr. B. A. Lasell, of Vancouver, is the manager—has been operating a limestone-quarry at Blubber bay, and has shipped a large quantity of lime and also a considerable quantity of magnesia-limestone to the paper-mill at Powell river.

Oil for Fuel in Smelting.—Demonstrations of the suitability of oil for fuel in smelting copper-ore were made by Mr. Thomas Kiddie at the old smeltery at Van Anda. From a short report of the last run made by Mr. Kiddie the following excerpt has been made: "We used 157 gallons of oil in 2.33 hours, and 60 gallons for heating-up, or 217 gallons in all. This gives an average of 14.6 gallons of oil per ton of material smelted, equal to 43.8 cents per ton of ore. The rate of smelting was 110 tons per twenty-four hours. . . . After certain changes shall have been carried out, the cost of oil consumed per ton of material smelted should approximate 30 to 35 cents per ton of ore."

General.—Practically no metalliferous mining was done on Vancouver Island in 1911. Among other prospecting was that by the Mercury Mines Company, of Victoria, which is investigating the occurrence of small quantities of chunabar on the west coast of the island.

The opening of an iron-ore deposit at upper Qulnsum has already been mentioned. Railway construction, some completed and other in progress, may be expected to encourage more prospecting.

During 1911 there was smelted at the Tyeo Copper Company's works at Ladysmith 37,300 tons of ore, from which was produced 6,755 tons of matte of a value (less refining charges) of \$761,850.

Of work on the various Islands higher up the coast little is known at present, save that late in the year the Surf Inlet Gold Mines, Ltd., sent from Vancouver to Princess Royal Island a party of men to do development work, under the direction of Mr. Fred M. Wells, on the company's *D. L. S.* group, on which two well-defined quartz veins containing gold are stated to have been previously opened and partially explored.

COAL-MINING ON THE COAST.

The coal-mining industry of the Coast District has already been briefly referred to, so the summary given will not be repeated here. Suffice it that the opinion be expressed that the production of coal may be expected to steadily increase. As indicating the growing demand for coal in the Coast District of British Columbia, the distribution of the output of the Western Fuel Company's colliery last year may be cited, as follows: In British Columbia, 59 per cent.; California, 32 per cent.; other foreign parts, 9 per cent. It should be noted, too, that at every producing colliery on Vancouver Island preparations are being made for enlarging the output of coal, while in two or three instances new properties are being opened.

CONCLUDING NOTES.

Just a few figures in conclusion. The aggregate value of the mineral production of British Columbia for all years to the end of 1911 is approximately \$397,000,000. The greater progress of recent years may be better recognized if some comparisons be made. The aggregate value of production for fifty years, 1852-1901, was \$172,242,000; for ten years, 1902-1911, it was about \$224,800,000. These figures show that nearly 57 per cent. of the aggregate production of sixty years was made during the ten years last past, leaving but a little more than 43 per cent. for the fifty years that went before. It is, therefore, plainly evident that in the last decade there has been progress of a marked character. Bringing comparison nearer to the present time, it may be shown, further, that the proportion of the last five years, 1907-1911, is \$123,000,000, as against \$101,000,000 for the five-year period 1902-1906. It is a striking fact that, of the value of the mineral production for the whole period of sixty years for which figures are on official records, about 31 per cent., or nearly one-third, is the production of the last five years. This, surely, is convincing evidence of the substantial and accelerating progress of the mining industry of British Columbia.

VICTORIA, B.C.:

Printed by WOLGAM H. CULLIN, Printer to the King's Most Excellent Majesty.

1912.

