# ANNUAL REPORT

OF THE

# MINISTER OF MINES

FOR THE

## YEAR ENDING 31st DECEMBER,

## 1904,

BEING AN ACCOUNT OF

## MINING OPERATIONS FOR GOLD, COAL, ETC.,

IN THE

## PROVINCE OF BRITISH COLUMBIA.


Printed by authority of the Legislative Assembly.

VICTORIA, B. C.:
Printed by RICHARD WOLFENDEN, I.S.O., V.D., Printer to the King's Most Excellent Majesty.
1905.

# REPORT

OF THE

# MINISTER OF MINES,

# 1904.

———o———

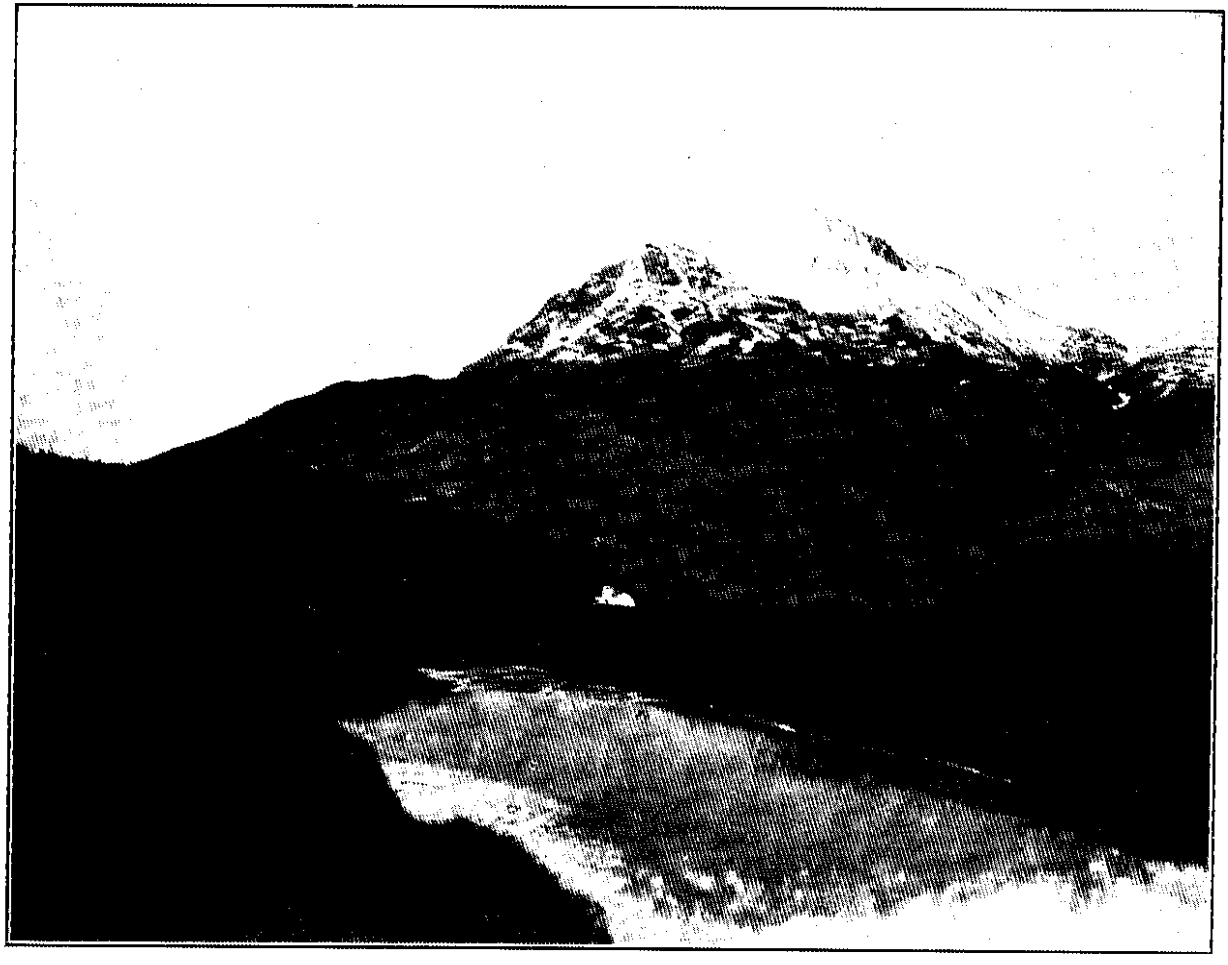
*To His Honour the Honourable Sir* Henri Gustave Joly de Lotbinière, K.C.M.G.,
*Lieutenant-Governor of the Province of British Columbia.*

May it please Your Honour:

The Annual Report of the Provincial Mineralogist upon the Mining Industries of the Province for the year 1904 is herewith respectfully submitted.

RICHARD McBRIDE,
*Minister of Mines.*

*Minister of Mines' Office,*
*February, 1905.*



LOOKING DOWN HOBOE CREEK FROM LAVERDIERE GROUP SOUTHERN END OF ATLIN LAKE.

# REPORT OF BUREAU OF MINES,

—BY—

## WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

———o———

*To the Hon. Richard McBride,*
*Minister of Mines.*

Sir,—I have the honour to submit herewith my Annual Report on the Mining Industry of the Province for the year ending December 31st, 1904.

The statistical tables give the total mineral output of the Province to date, and show in considerable detail the actual mineral production of the past year, as based on smelter or mill returns; also a summary of the production of each of the last four years, thus illustrating by comparison the progress made in productive mining during this period.

To facilitate comparison with information previously given, I have retained, as closely as was possible, the general form already established for such tables and for the Report.

I have the honour to be,
Sir,
Your obedient servant,
William Fleet Robertson,
*Provincial Mineralogist.*

*Bureau of Mines, Victoria, B. C.,*
*February 18th, 1905.*

# MINERAL PRODUCTION OF BRITISH COLUMBIA.

## METHOD OF COMPUTING PRODUCTION.

In assembling the output for the lode mines in the following tables, the established custom of this Bureau has been adhered to, viz.: The output of a mine for the year is considered that amount of ore for which the smelter or mill returns have been received during the year. This system does not give the exact output of the mine for the year, but rather the amounts credited to the mine on the company's books during such year.

For ore shipped in December the smelter returns are not likely to be received until February in the new year, or later, and have, consequently, to be carried over to the credit of such new year. This plan, however, will be found very approximate for each year, and ultimately correct, as ore not credited to one year is included in the next.

In the Lode Mines tables, the amount of the shipments has been obtained from certified returns received from the various mines, as provided for in the "Inspection of Metalliferous Mines Act, 1897." In calculating the values of the products, the average price for the year in the New York Metal Market has been used as a basis. For silver 95 per cent., and for lead 90 per cent., of such market price has been taken. Treatment and other charges have not been deducted.

TABLE I.—Total Production for all Years up to and including 1904.

| | |
|---|---|
| Gold, placer | $66,803,403 |
| Gold, lode | 31,451,956 |
| Silver | 21,716,870 |
| Lead | 12,559,139 |
| Copper | 21,381,791 |
| Coal and Coke | 68,274,893 |
| Building stone, bricks, etc | 3,900,000 |
| Other metals | 113,799 |
| Total | $226,201,851 |

TABLE II.—Production for each Year from 1890 to 1904 (inclusive).

| | |
|---|---|
| 1852 to 1889 (inclusive) | $71,981,634 |
| 1890 | 2,608,803 |
| 1891 | 3,521,102 |
| 1892 | 2,978,530 |
| 1893 | 3,588,413 |
| 1894 | 4,225,717 |
| 1895 | 5,643,042 |
| 1896 | 7,507,956 |
| 1897 | 10,455,268 |
| 1898 | 10,906,861 |
| 1899 | 12,393,131 |
| 1900 | 16,344,751 |
| 1901 | 20,086,780 |
| 1902 | 17,486,550 |
| 1903 | 17,495,954 |
| 1904 | 18,977,359 |
| Total | $226,201,851 |

# TABLE

SHOWING MINERAL PRODUCTION

OF

BRITISH COLUMBIA.

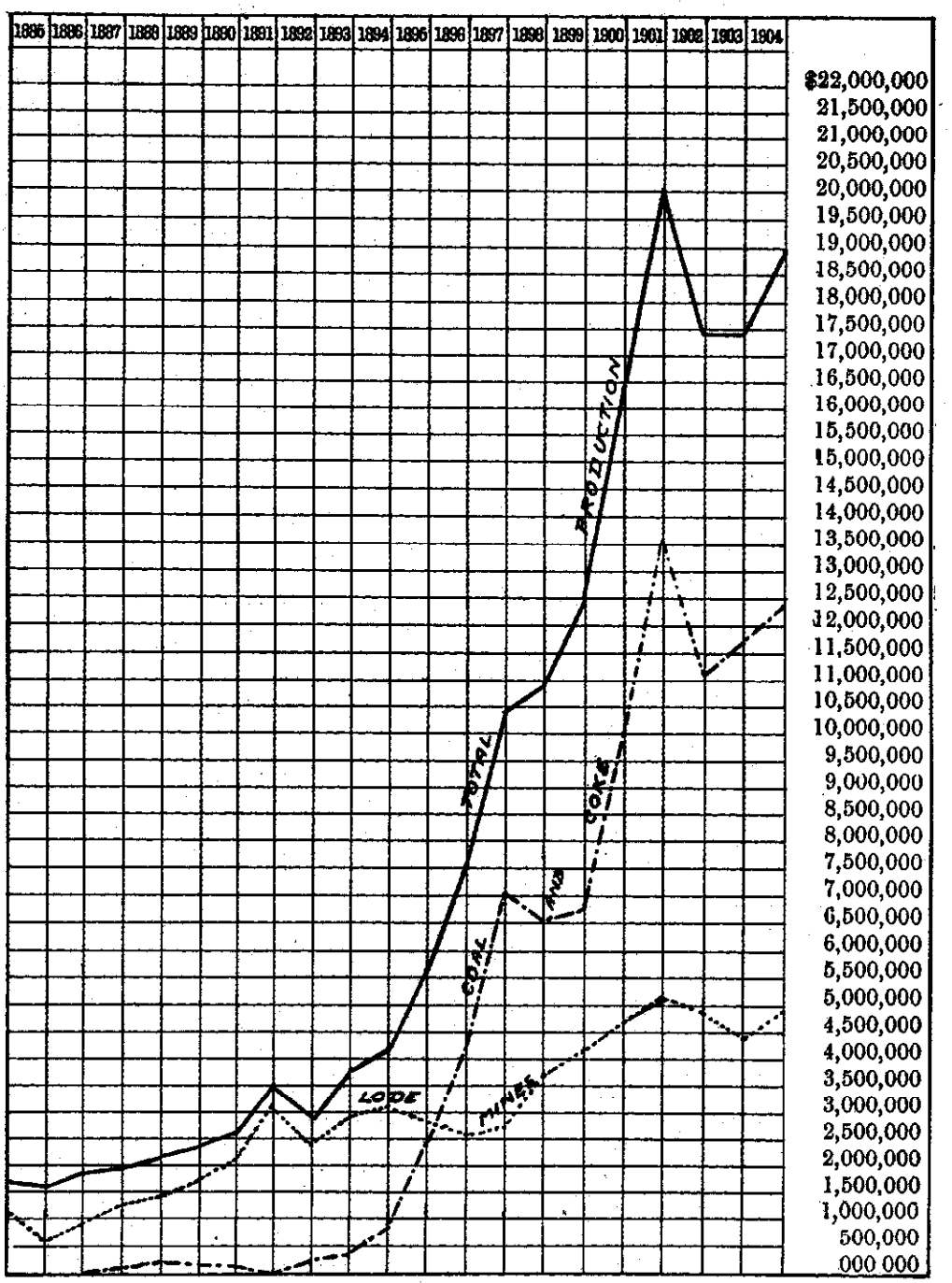


Table IV. gives a statement in detail of the amount and value of the different mineral products for the years 1902, 1903 and 1904. As it has been impossible as yet to collect accurate statistics regarding building stone, lime, bricks, tiles, etc., these are estimated.

## TABLE IV.

AMOUNT AND VALUE OF MINERAL PRODUCTS FOR 1902, 1903 AND 1904.

| | Customary Measure. | 1902. | | 1903. | | 1904. | |
|---|---|---|---|---|---|---|---|
| | | Quantity. | Value. | Quantity. | Value. | Quantity. | Value. |
| Gold, placer | Ounces. | 53,657 | $ 1,073,140 | 53,021 | $ 1,060,420 | 55,765 | $ 1,115,300 |
| " lode | " | 236,491 | 4,888,269 | 232,831 | 4,812,616 | 222,042 | 4,589,608 |
| Silver | " | 3,917,917 | 1,941,328 | 2,996,204 | 1,521,472 | 3,222,481 | 1,719,516 |
| Copper | Pounds | 29,636,057 | 3,446,673 | 34,359,921 | 4,547,535 | 35,710,128 | 4,578,037 |
| Lead | " | 22,536,381 | 824,832 | 18,089,283 | 689,744 | 36,646,244 | 1,421,874 |
| Coal | Tons, 2,240lbs | 1,397,394 | 4,192,182 | 1,168,194 | 3,504,582 | 1,253,628 | 3,760,884 |
| Coke | " " | 128,015 | 640,075 | 165,543 | 827,715 | 334,102 | 1,192,140 |
| Other materials | | | 480,051 | | 531,870 | | 600,000 |
| | | | $ 17,486,550 | | $17,495,954 | | $18,977,359 |

## TABLE V.

PRODUCTION OF MINERAL BY DISTRICTS AND DIVISIONS.

| NAME. | DIVISIONS. | | | DISTRICTS. | | |
|---|---|---|---|---|---|---|
| | 1902. | 1903. | 1904. | 1902. | 1903. | 1904. |
| CARIBOO DISTRICT | | | | $ 540,395 | $ 475,200 | $ 474,600 |
| Cariboo Mining Division | $ 340,395 | $ 314,400 | $ 313,000 | | | |
| Quesnel " | 160,000 | 132,000 | 150,000 | | | |
| Omineca " | 40,000 | 28,800 | 11,600 | | | |
| CASSIAR DISTRICT | | | | 426,636 | 480,368 | 558,573 |
| KOOTENAY, EAST, DISTRICT | | | | 1,477,466 | 1,951,128 | 3,210,573 |
| KOOTENAY, WEST, DISTRICT | | | | 7,806,399 | 6,603,981 | 5,806,070 |
| Ainsworth Division | 272,967 | 219,818 | 168,023 | | | |
| Nelson " | 818,494 | 653,457 | 466,683 | | | |
| Slocan " | 1,608,827 | 1,126,986 | 1,236,858 | | | |
| Trail Creek " | 4,938,395 | 4,308,458 | 3,760,866 | | | |
| Other parts | 167,716 | 295,262 | 173,640 | | | |
| LILLOOET DISTRICT | | | | 31,429 | 31,283 | 34,583 |
| YALE DISTRICT | | | | 2,843,537 | 3,714,422 | 4,190,281 |
| Osoyoos, Grand Forks & Greenwood Divisions | 2,782,263 | 3,654,234 | 4,110,366 | | | |
| Similkameen Division | 2,700 | 2,000 | 2,500 | | | |
| Yale " | 58,574 | 58,188 | 77,415 | | | |
| COAST DISTRICTS (Nanaimo, Alberni, W. Coast V. I., Victoria) | | | | 4,360,688 | 4,239,572 | 4,702,679 |
| | | | | $17,486,550 | $17,495,954 | $18,977,359 |

## PLACER GOLD.

Table VI. contains the yearly production of placer gold to date, as determined by the returns, sent in by the banks and express companies, of gold transmitted by them to the mints, and from returns sent in by the Gold Commissioners and Mining Recorders. To these yearly amounts one-third was added up to the year 1878, from then to 1895 and from 1898 to 1904, one-fifth, which proportions are considered to represent, approximately, the amount of gold sold of which there is no record. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals, as it would be insignificant.

TABLE VI.—YIELD OF PLACER GOLD PER YEAR TO DATE.

| | | | | | |
|---|---|---|---|---|---|
| 1858.... | $ 705,000 | 1874.... | $ 1,844,618 | 1890.... | $ 490,435 |
| 1859.... | 1,615,070 | 1875.... | 2,474,004 | 1891.... | 429,811 |
| 1860.... | 2,228,543 | 1876.... | 1,786,648 | 1892.... | 399,526 |
| 1861.... | 2,666,118 | 1877.... | 1,608,182 | 1893.... | 356,131 |
| 1862.... | 2,656,903 | 1878.... | 1,275,204 | 1894.... | 405,516 |
| 1863.... | 3,913,563 | 1879.... | 1,290,058 | 1895.... | 481,683 |
| 1864.... | 3,735,850 | 1880.... | 1,013,827 | 1896.... | 544,026 |
| 1865.... | 3,491,205 | 1881.... | 1,046,737 | 1897.... | 513,520 |
| 1866.... | 2,662,106 | 1882.... | 954,085 | 1898.... | 643,346 |
| 1867.... | 2,480,868 | 1883.... | 794,252 | 1899.... | 1,344,900 |
| 1868.... | 3,372,972 | 1884.... | 736,165 | 1900.... | 1,278,724 |
| 1869.... | 1,774,978 | 1885.... | 713,738 | 1901.... | 970,100 |
| 1870.... | 1,336,956 | 1886.... | 903,651 | 1902.... | 1,073,140 |
| 1871.... | 1,799,440 | 1887.... | 693,709 | 1903.... | 1,060,420 |
| 1872.... | 1,610,972 | 1888.... | 616,731 | 1904.... | 1,115,300 |
| 1873.... | 1,305,749 | 1889.... | 588,923 | | |
| | | | Total..... | | $66,803,403 |

TABLE VII.—PRODUCTION OF LODE MINES.*

| YEAR. | GOLD. | | SILVER. | | LEAD. | | COPPER. | | TOTAL VALUES. |
|---|---|---|---|---|---|---|---|---|---|
| | Oz. | Value. | Oz. | Value. | Pounds. | Value. | Pounds. | Value. | |
| | | $ | | $ | | $ | | $ | $ |
| 1887 | ..... | ..... | 17,690 | 17,331 | 204,800 | 9,216 | ..... | ..... | 26,547 |
| 1888 | ..... | ..... | 79,780 | 75,000 | 674,500 | 29,813 | ..... | ..... | 104,813 |
| 1889 | ..... | ..... | 53,192 | 47,873 | 165,100 | 6,498 | ..... | ..... | 54,371 |
| 1890 | ..... | ..... | 70,427 | 73,948 | *Nil.* | *Nil.* | ..... | ..... | 73,948 |
| 1891 | ..... | ..... | 4,500 | 4,000 | *Nil.* | *Nil.* | ..... | ..... | 4,000 |
| 1892 | ..... | ..... | 77,160 | 66,935 | 808,420 | 33,064 | ..... | ..... | 99,999 |
| 1893 | 1,170 | 23,404 | 227,000 | 195,000 | 2,135,023 | 78,996 | ..... | ..... | 297,400 |
| 1894 | 6,252 | 125,014 | 746,379 | 470,219 | 5,662,523 | 169,875 | 324,680 | 16,234 | 781,342 |
| 1895 | 39,264 | 785,271 | 1,496,522 | 977,229 | 16,475,464 | 532,255 | 952,840 | 47,642 | 2,342,397 |
| 1896 | 62,259 | 1,244,180 | 3,135,343 | 2,100,689 | 24,199,977 | 721,384 | 3,818,556 | 190,926 | 4,257,179 |
| 1897 | 106,141 | 2,122,820 | 5,472,971 | 3,272,836 | 38,841,135 | 1,390,517 | 5,325,180 | 266,258 | 7,052,431 |
| 1898 | 110,061 | 2,201,217 | 4,292,401 | 2,375,841 | 31,693,559 | 1,077,581 | 7,271,678 | 874,781 | 6,529,420 |
| 1899 | 138,315 | 2,857,573 | 2,939,413 | 1,663,708 | 21,862,436 | 878,870 | 7,722,591 | 1,351,453 | 6,751,604 |
| 1900 | 167,153 | 3,453,381 | 3,958,175 | 2,309,200 | 63,358,621 | 2,691,887 | 9,997,080 | 1,615,289 | 10,069,757 |
| 1901 | 210,384 | 4,348,603 | 5,151,333 | 2,884,745 | 51,582,906 | 2,002,733 | 27,603,746 | 4,446,963 | 13,683,044 |
| 1902 | 236,491 | 4,888,269 | 3,917,917 | 1,941,328 | 22,536,381 | 824,832 | 29,636,057 | 3,446,673 | 11,101,102 |
| 1903 | 232,831 | 4,812,616 | 2,996,204 | 1,521,472 | 18,089,283 | 689,744 | 34,359,921 | 4,547,535 | 11,571,367 |
| 1904 | 222,042 | 4,589,608 | 3,222,481 | 1,719,516 | 36,646,244 | 1,421,874 | 35,710,128 | 4,578,037 | 12,309,035 |
| To'l | 1,532,383 | 31,451,956 | 37,858,888 | 21,716,870 | 334,936,372 | 12,559,139 | 162,722,529 | 21,381,791 | 87,109,756 |

* The information as to production in the earlier years is obtained from the "Mineral Statistics and Mines" for 1896, Geological Survey of Canada.

TABLE VIII.—COAL AND COKE PRODUCTION PER YEAR TO DATE.

COAL.

| YEARS. | TONS (2,240 lbs). | VALUE. |
|---|---|---|
| 1836-64 | 133,500 | $ 535,012 |
| 1865 | 32,819 | 131,276 |
| 1866 | 25,115 | 100,460 |
| 1867 | 31,239 | 124,956 |
| 1868 | 44,005 | 176,020 |
| 1869 | 35,802 | 143,208 |
| 1870 | 29,843 | 119,372 |
| 1871-2-3 | 148,549 | 493,836 |
| 1874 | 81,547 | 244,641 |
| 1875 | 110,145 | 330,435 |
| 1876 | 139,192 | 417,576 |
| 1877 | 154,052 | 462,156 |
| 1878 | 170,846 | 512,538 |
| 1879 | 241,301 | 723,903 |
| 1880 | 267,595 | 802,785 |
| 1881 | 228,357 | 685,071 |
| 1882 | 282,139 | 846,417 |
| 1883 | 213,299 | 639,897 |
| 1884 | 394,070 | 1,182,210 |
| 1885 | 265,596 | 796,788 |
| 1886 | 326,636 | 979,908 |
| 1887 | 413,360 | 1,240,080 |
| 1888 | 489,301 | 1,467,903 |
| 1889 | 579,830 | 1,739,490 |
| 1890 | 678,140 | 2,034,420 |
| 1891 | 1,029,097 | 3,087,291 |
| 1892 | 826,335 | 2,479,005 |
| 1893 | 978,294 | 2,934,882 |
| 1894 | 1,012,953 | 3,038,859 |
| 1895 | 939,654 | 2,818,962 |
| 1896 | 896,222 | 2,688,666 |
| 1897 | 882,854 | 2,648,562 |
| 1898 | 1,135,865 | 3,407,595 |
| 1899 | 1,306,324 | 3,918,972 |
| 1900 | 1,439,595 | 4,318,785 |
| 1901 | 1,460,331 | 4,380,993 |
| 1902 | 1,397,394 | 4,192,182 |
| 1903 | 1,168,194 | 3,504,582 |
| 1904 | 1,253,628 | 3,760,884 |
| Total | 21,243,018 tons. | $64,110,578 |

COKE.

| | | |
|---|---|---|
| 1895–6 | 1,565 | $ 7,825 |
| 1897 | 17,831 | 89,155 |
| 1898 (estimated) | 35,000 | 175,000 |
| 1899 | 34,251 | 171,255 |
| 1900 | 85,149 | 425,745 |
| 1901 | 127,081 | 635,405 |
| 1902 | 128,015 | 640,075 |
| 1903 | 165,543 | 827,715 |
| 1904 | 238,428 | 1,192,140 |
| Total | 832,863 tons. | $ 4,164,315 |

## TABLE IX.—PRODUCTION IN DETAIL OF THE

| DISTRICT. | YEAR | TONS. | GOLD—PLACER. | | GOLD—LODE. | | SILVER. | | COPPER. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Ounces | Value. | Ounces. | Value. | Ounces. | Value. | Pounds. | Value. |
| | | | | $ | | $ | | $ | | $ |
| **Cariboo** | | | | | | | | | | |
| Cariboo Division | 1901 | | 13,980 | 279,600 | | | | | | |
| | 1902 | 21 | 17,000 | 340,000 | 19 | 393 | 4 | 2 | | |
| | 1903 | | 15,720 | 314,400 | | | | | | |
| | 1904 | | 15,650 | 313,000 | | | | | | |
| Quesnel " | 1901 | | 12,000 | 240,000 | | | | | | |
| | 1902 | | 8,000 | 160,000 | | | | | | |
| | 1903 | | 6,600 | 132,000 | | | | | | |
| | 1904 | | 7,500 | 150,000 | | | | | | |
| Omineca " | 1901 | | 955 | 19,100 | | | | | | |
| | 1902 | | 2,000 | 40,000 | | | | | | |
| | 1903 | | 1,440 | 28,800 | | | | | | |
| | 1904 | | 580 | 11,600 | | | | | | |
| **Cassiar** | | | | | | | | | | |
| Atlin Lake Division | 1901 | 8 | 15,000 | 300,000 | | | | | | |
| | 1902 | | 20,000 | 400,000 | | | | | | |
| | 1903 | | 22,000 | 440,000 | | | | | | |
| | 1904 | | 26,500 | 530,000 | | | | | | |
| All other Divisions | 1901 | | 1,140 | 22,800 | 5 | 103 | 82 | 46 | | |
| | 1902 | 100 | 800 | 16,000 | 474 | 9,797 | 224 | 111 | 6,258 | 728 |
| | 1903 | 67 | 1,750 | 35,000 | 244 | 5,043 | 53 | 27 | 2,249 | 298 |
| | 1904 | 303 | 575 | 11,500 | 786 | 15,833 | 185 | 99 | 8,900 | 1,141 |
| **East Kootenay** | | | | | | | | | | |
| Fort Steele Division | 1901 | 62,934 | 630 | 12,600 | | | 718,451 | 402,333 | | |
| | 1902 | 3,621 | 1,650 | 33,000 | | | 114,506 | 56,738 | | |
| | 1903 | 983 | 1,000 | 20,000 | | | 28,537 | 14,491 | | |
| | 1904 | 76,895 | * 1,000 | 20,000 | | | 560,186 | 314,923 | | |
| Windermere-Golden | 1901 | 838 | 40 | 800 | | | 34,181 | 19,141 | 3,272 | 527 |
| | 1902 | 260 | | | 16 | 331 | 27,918 | 13,833 | 8,048 | 936 |
| | 1903 | 808 | | | 17 | 352 | 59,006 | 29,963 | 2,730 | 361 |
| | 1904 | 365 | 50 | 1,000 | | | 20,964 | 11,186 | 6,472 | 701 |
| **West Kootenay** | | | | | | | | | | |
| Ainsworth Division | 1901 | 5,938 | | | 63 | 1,312 | 324,913 | 181,951 | | |
| | 1902 | 4,939 | | | 5 | 103 | 320,719 | 158,916 | 9,537 | 1,109 |
| | 1903 | 24,332 | | | 33 | 682 | 103,678 | 55,187 | | |
| | 1904 | 14,569 | | | 2 | 41 | 90,004 | 48,026 | | |
| Nelson " | 1901 | 109,226 | | | 32,868 | 679,340 | 377,167 | 211,213 | 1,609,449 | 257,671 |
| | 1902 | 77,810 | | | 25,116 | 519,148 | 273,870 | 135,703 | 491,144 | 57,120 |
| | 1903 | 76,923 | 100 | 2,000 | 20,114 | 415,756 | 190,003 | 96,453 | 346,218 | 45,822 |
| | 1904 | 74,442 | * 150 | 3,000 | 14,100 | 291,447 | 196,795 | 106,077 | 220,500 | 23,258 |
| Slocan & Slocan City | 1901 | 25,493 | | | 244 | 5,043 | 2,276,359 | 1,274,705 | | |
| | 1902 | 21,153 | | | 353 | 7,297 | 2,223,810 | 1,101,898 | | |
| | 1903 | 12,412 | | | 257 | 5,312 | 1,466,931 | 744,908 | 181 | 24 |
| | 1904 | 70,296 | | | 160 | 3,307 | 1,540,170 | 821,836 | | |
| Trail Creek " | 1901 | 283,360 | | | 132,333 | 2,735,323 | 970,460 | 543,458 | 8,333,446 | 1,342,518 |
| | 1902 | 329,534 | | | 162,146 | 3,351,558 | 373,101 | 184,871 | 11,867,807 | 1,356,966 |
| | 1903 | 360,786 | | | 145,353 | 3,004,446 | 209,537 | 106,403 | 8,652,127 | 1,145,109 |
| | 1904 | 312,981 | | | 133,095 | 2,751,074 | 181,830 | 97,024 | 7,119,876 | 912,768 |
| All other Divisions (Revelstoke, Trout Lake, Lardeau.) | 1901 | 930 | 100 | 2,000 | 234 | 4,837 | 133,774 | 74,913 | | |
| | 1902 | 1,692 | 100 | 2,000 | 652 | 13,477 | 241,584 | 119,705 | 1,000 | 116 |
| | 1903 | 5,430 | 100 | 2,000 | 2,417 | 49,959 | 392,854 | 199,237 | 3,294 | 436 |
| | 1904 | 26,494 | * 50 | 1,000 | 3,615 | 74,722 | 148,201 | 79,080 | | |
| **Lillooet** | | | | | | | | | | |
| | 1901 | 4,150 | 1,304 | 26,080 | 1,079 | 22,303 | | | | |
| | 1902 | 2,882 | 1,372 | 27,440 | 193 | 3,989 | | | | |
| | 1903 | 3,652 | 1,291 | 25,820 | 264 | 5,457 | 12 | 6 | | |
| | 1904 | 40 | 1,725 | 34,500 | 4 | 83 | | | | |
| **Yale** | | | | | | | | | | |
| (Grand Forks, Greenwood and Osoyoos Divisions.) | 1901 | 396,210 | 250 | 5,000 | 37,388 | 772,810 | 241,489 | 135,234 | 14,511,787 | 2,337,849 |
| | 1902 | 521,402 | 250 | 5,000 | 42,745 | 883,539 | 219,708 | 108,910 | 14,955,582 | 1,739,334 |
| | 1903 | 697,284 | 150 | 3,000 | 50,358 | 1,040,900 | 320,749 | 162,876 | 18,485,542 | 2,446,561 |
| | 1904 | 801,925 | * 150 | 3,000 | 55,505 | 1,147,288 | 245,155 | 130,815 | 22,066,407 | 2,828,913 |
| Similkameen Div'n. (Vernon.) | 1901 | | 234 | 4,680 | | | | | | |
| | 1902 | | 135 | 2,700 | | | | | | |
| | 1903 | | 100 | 2,000 | | | | | | |
| | 1904 | | † 125 | 2,500 | | | | | | |
| Yale Division (Ashcroft, Kaml'ps.) | 1901 | 3,374 | 2,272 | 45,440 | 18 | 370 | 74 | 41 | 39,920 | 6,431 |
| | 1902 | 3,783 | 2,350 | 47,000 | 6 | 124 | 542 | 269 | | |
| | 1903 | 22 | 2,520 | 50,400 | 3 | 62 | 15 | 8 | 6,409 | 848 |
| | 1904 | 1,906 | 1,560 | 31,200 | 183 | 3,783 | 625 | 334 | 328,380 | 42,098 |
| **Coast & other Districts** (Nanaimo, Alberni, W. Coast V. I., Victoria). | 1901 | 27,965 | 600 | 12,000 | 6,152 | 127,162 | 74,483 | 41,710 | 3,115,872 | 501,967 |
| | 1902 | 31,802 | | | 4,766 | 98 513 | 121,841 | 60,372 | 2,496,681 | 290,364 |
| | 1903 | 103,524 | 250 | 5,000 | 13,771 | 284,. | 220,329 | 111,883 | 6,861,171 | 908,076 |
| | 1904 | 81,383 | * 150 | 3,000 | 14,612 | 302,030 | 203,366 | 110,117 | ,593 | 764,149 |
| **Miscellaneous** (other metals, building stone, brick, etc.) | 1901 | | | | | | | | | |
| | 1902 | | | | | | | | | |
| | 1903 | | | | | | | | | |
| | 1904 | | | | | | | | | |
| TOTALS | 1901 | 920,416 | 48,505 | 970,100 | 210,384 | 4,348,603 | 5,151,333 | 2,884,745 | 27,603,746 | 4,446,963 |
| | 1902 | 998,999 | 53,657 | 1,073,140 | 236,491 | 4,888,269 | 3,917,917 | 1,941,328 | 29,636,057 | 3,446,673 |
| | 1903 | 1,286,176 | 53,021 | 1,060,420 | 232,831 | 4,812,616 | 2,996,204 | 1,521,472 | 34,359,991 | 4,547,585 |
| | 1904 | 1,461,609 | 55,765 | 1,115,300 | 222,042 | $4,589,606 | 3,222,461 | $1,719,518 | 35,710,128 | $4,576,037 |

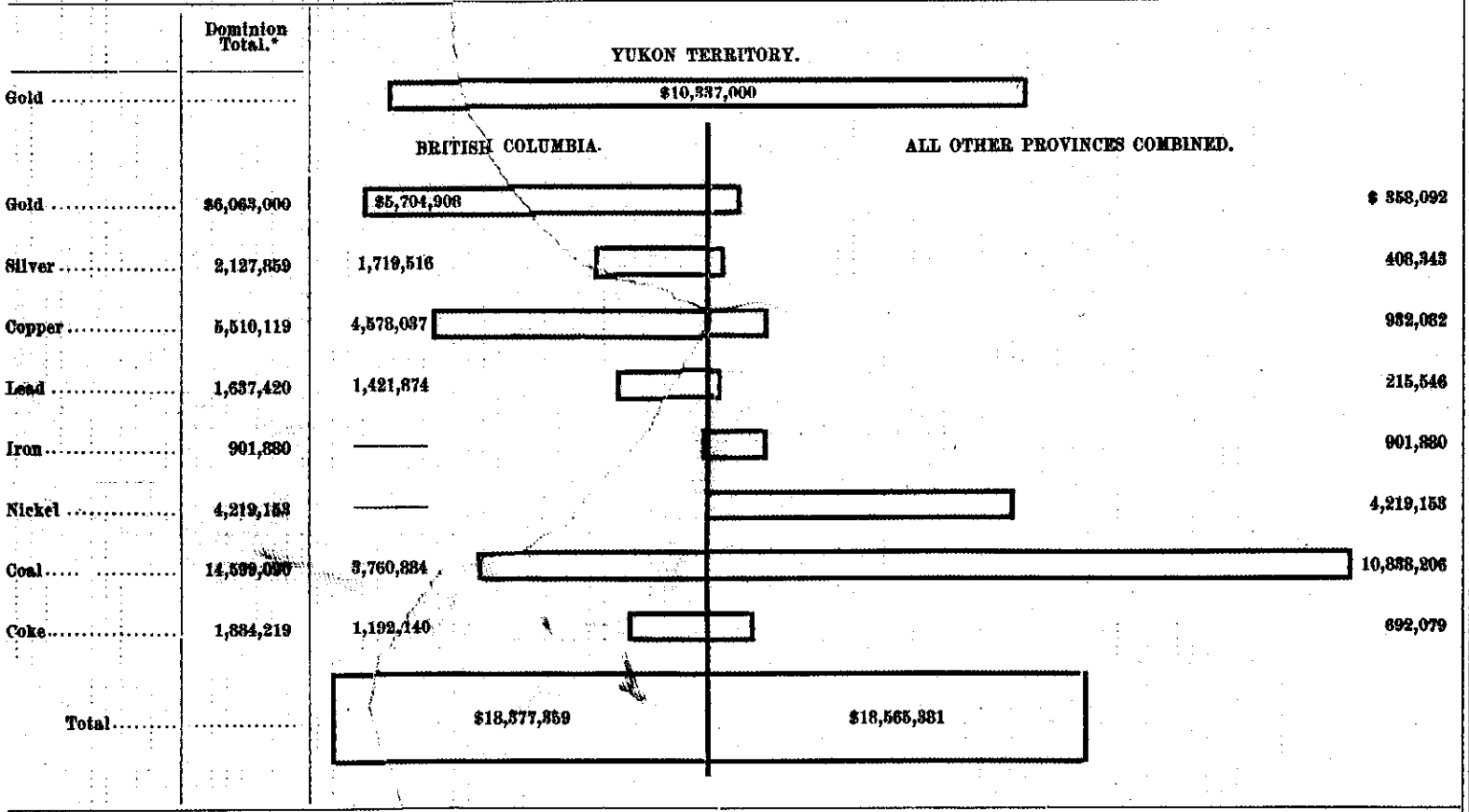
* Estimated. † Platinum, in 1904, $420 (included in Placer Gold).

## METALLIFEROUS MINES FOR 1901, 1902, 1903 AND 1904.

| LEAD. | | TOTALS FOR DIVISIONS. | | | | TOTALS FOR DISTRICTS. | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pounds. | Value. | 1901. | 1902. | 1903. | 1904. | 1901. | 1902. | 1903. | 1904. |
| | $ | $ | $ | $ | $ | $ | $ | $ | $ |
| ..... | ..... | ..... | ..... | ..... | ..... | 538,700 | 540,395 | 475,200 | 474,600 |
| ..... | ..... | 279,600 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 340,395 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 314,400 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 313,000 | ..... | ..... | ..... | ..... |
| ..... | ..... | 240,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 160,000 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 132,000 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 150,000 | ..... | ..... | ..... | ..... |
| ..... | ..... | 19,100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 40,000 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 28,800 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 11,600 | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | 322,949 | 426,636 | 480,368 | 558,673 |
| ..... | ..... | 300,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 400,000 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 440,000 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 530,000 | ..... | ..... | ..... | ..... |
| ..... | ..... | 22,949 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 26,636 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 40,368 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 28,573 | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | 1,592,668 | 222,778 | 128,797 | 1,180,833 |
| 29,129,128 | 1,127,036 | 1,541,969 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 3,017,756 | 110,450 | ..... | 200,188 | ..... | ..... | ..... | ..... | ..... | ..... |
| 717,479 | 27,357 | ..... | ..... | 61,845 | ..... | ..... | ..... | ..... | ..... |
| 21,071,236 | 817,564 | ..... | ..... | ..... | 1,152,487 | ..... | ..... | ..... | ..... |
| 775,016 | 30,226 | 50,694 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 204,652 | 7,490 | ..... | 22,590 | ..... | ..... | ..... | ..... | ..... | ..... |
| 951,296 | 36,273 | ..... | ..... | 66,949 | ..... | ..... | ..... | ..... | ..... |
| 401,022 | 15,559 | ..... | ..... | ..... | 23,446 | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | 8,159,662 | 7,716,899 | 6,498,981 | 5,808,076 |
| 3,788,412 | 147,748 | 331,011 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 3,083,089 | 112,839 | ..... | 272,967 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4,299,727 | 163,949 | ..... | ..... | 219,818 | ..... | ..... | ..... | ..... | ..... |
| 3,031,648 | 119,956 | ..... | ..... | ..... | 168,023 | ..... | ..... | ..... | ..... |
| 2,470,350 | 96,344 | 1,244,568 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1,680,948 | 61,523 | ..... | 773,494 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1,072,542 | 40,396 | ..... | ..... | 600,967 | ..... | ..... | ..... | ..... | ..... |
| 976,570 | 37,801 | ..... | ..... | ..... | 466,683 | ..... | ..... | ..... | ..... |
| 15,025,759 | 586,004 | 1,885,752 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 13,651,144 | 499,632 | ..... | 1,603,827 | ..... | ..... | ..... | ..... | ..... | ..... |
| 9,880,469 | 376,742 | ..... | ..... | 1,126,986 | ..... | ..... | ..... | ..... | ..... |
| 10,611,227 | 411,716 | ..... | ..... | ..... | 1,236,858 | ..... | ..... | ..... | ..... |
| 1,045 | 45 | 4,621,299 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 4,893,395 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 4,255,958 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 3,760,866 | ..... | ..... | ..... | ..... |
| 391,844 | 15,282 | 97,032 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 885,784 | 32,418 | ..... | 167,716 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1,144,239 | 43,630 | ..... | ..... | 295,262 | ..... | ..... | ..... | ..... | ..... |
| 466,520 | 18,838 | ..... | ..... | ..... | 173,640 | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | 48,383 | 31,429 | 31,283 | 34,583 |
| ..... | ..... | 48,383 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 31,429 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 31,283 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 34,583 | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | 3,307,948 | 2,787,356 | 3,707,552 | 4,190,291 |
| 2,397 | 93 | 3,259,996 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 15,706 | 480 | ..... | 2,737,263 | ..... | ..... | ..... | ..... | ..... | ..... |
| 23,531 | 897 | ..... | ..... | 3,654,234 | ..... | ..... | ..... | ..... | ..... |
| 9,021 | 350 | ..... | ..... | ..... | 4,110,366 | ..... | ..... | ..... | ..... |
| ..... | ..... | 4,680 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 2,700 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 2,000 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 2,500 | ..... | ..... | ..... | ..... |
| ..... | ..... | 52,282 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 47,393 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 51,818 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 77,415 | ..... | ..... | ..... | ..... |
| ..... | ..... | 682,839 | ..... | ..... | ..... | 682,839 | 449,249 | 1,809,606 | 1,179,295 |
| ..... | ..... | ..... | 449,249 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 1,809,606 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 1,179,295 | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | 417,238 | 480,051 | 531,870 | 600,000 |
| ..... | ..... | 417,238 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | 480,051 | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | 531,870 | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | 600,000 | ..... | ..... | ..... | ..... |
| 81,582,906 | 2,002,733 | $15,070,382 | ..... | ..... | ..... | $ 15,070,382 | ..... | ..... | ..... |
| 22,536,891 | 824,832 | ..... | $12,654,293 | ..... | ..... | ..... | $ 12,654,293 | ..... | ..... |
| 18,089,283 | 689,744 | ..... | ..... | 13,163,657 | ..... | ..... | ..... | $13,163,657 | ..... |
| 36,646,244 | $1,421,874 | ..... | ..... | ..... | $14,024,335 | ..... | ..... | ..... | $14,024,335 |

# TABLE X.

## Showing Comparative Mineral Production for 1904 of British Columbia and Other Provinces of the Dominion.




* Figures taken from "Geological Surveys, Summary of Mineral Production of Canada in 1904."

# PROGRESS OF MINING.

The mineral output of the Province for the past year shows, as to the gross value of the product, a distinct gain over the preceding year, and, as a matter of fact, is the greatest ever made by our mines, except that of 1901. This gross value for 1904 is $18,977,359, and represents an increase over 1903 of $1,481,405, or about 8.5 %.

An analysis of the returns for the whole Province shows, however, that this increase has not been general or equal in the various districts, or as to the various minerals produced. The placer gold output shows an increase of $44,880, which is mainly attributable to one district, Atlin, the other districts only about holding their own; while in those districts where the placer gold is obtained from the river bars, exposed only at lowest water, there is this year a marked falling off in production, since the spring opened up early and the gradual melting of the snow in the mountains prevented any extremes of high or low water, so that the bars were not exposed and, therefore, could not be worked in the manner.

The districts showing an increased output this year, named in the order of precedence, were East Kootenay, the Boundary, the Coast, and the Slocan, while the greatest decrease was in the Rossland camp, this being accounted for by changes in the management of some of the producing companies, and by experiments as to the best methods of treatment of the low-grade ores of the camp being conducted; these temporarily retarded the output.

The tonnage of ore actually being mined in the Province has perhaps a more direct bearing upon the general business prosperity of the local community than have the values produced, inasmuch as it represents the amount of work actually taking place, and in this respect the year 1904 shows a very greatly increased output of ore, amounting to 1,461,609 tons, an increase over the preceding year of 175,433 tons, or nearly 14 %.

To say that this increase was made chiefly by the Boundary, East Kootenay and Slocan Districts, scarcely does these districts full justice, for not only have they made the increase shown, but they have also offset decreases in certain other districts.

In discussing the increase in tonnage of ore mined it must be remembered that the tonnage mined in 1903, than which that of 1904 is greater by 14 %, was itself greater than that of the preceding year (1902) by about 29 %, so that, looking back two years, we find the present tonnage output has increased in these two years about 46 %.

The number of mines shipping in 1904 was 142, as against 125 in 1903, an increase of 17, of which 15 were in the silver-lead district. These, however, shipped less than 100 tons each during the year. Of these 142 mines shipping, there were only 76 that shipped 100 tons during the year 1904, as against 74 in 1903, indicating that there has been no material addition to the larger shippers, such increase as has been made in the number of shipping mines being confined to the smaller high-grade properties, and being in reality largely due to the introduction of the "tribute system" of mining. The total number of men employed during the year in these shipping mines is almost exactly the same as in 1903, viz.: 3,306 as compared with 3,303.

The following table shows the number of metalliferous mines which shipped ore during the past year, together with the location of these mines and the number of men employed both above and below ground:—

TABLE SHOWING DISTRIBUTION OF SHIPPING MINES IN 1904.

| | Tons of Ore Shipped. | No. of Mines Shipping. | No. of Mines Shipping over 100 tons in 1904. | MEN EMPLOYED IN THESE MINES. | | |
|---|---|---|---|---|---|---|
| | | | | Below. | Above. | Total. |
| CASSIAR: | | | | | | |
| Skeena | 303 | 2 | 1 | 7 | 9 | 16 |
| EAST KOOTENAY: | | | | | | |
| Fort Steele | 76,895 | 2 | 2 | 199 | 75 | 274 |
| Windermere | 365 | 5 | 1 | 19 | 9 | 28 |
| WEST KOOTENAY: | | | | | | |
| Ainsworth | 14,569 | 12 | 4 | 70 | 20 | 90 |
| Nelson | 74,442 | 17 | 12 | 150 | 115 | 265 |
| Slocan | 70,296 | 48 | 18 | 425 | 192 | 617 |
| Trail | 312,991 | 13 | 11 | 573 | 211 | 784 |
| Other Divisions | 26,494 | 10 | 6 | 99 | 130 | 229 |
| LILLOOET | 40 | 1 | ..... | 3 | 1 | 4 |
| YALE: | | | | | | |
| Boundary | 801,925 | 20 | 14 | 439 | 276 | 715 |
| Ashcroft-Kamloops | 1,906 | 2 | 1 | 40 | 20 | 60 |
| COAST | 81,383 | 10 | 6 | 119 | 105 | 224 |
| Total | 1,461,609 | 142 | 76 | 2,143 | 1,163 | 3,306 |

In explanation of the table, it should be said that in its preparation, a mine employing 12 men for four months is credited in the table with four men for 12 months, so that the total given is less than the actual number of individuals who worked in mines during the year.

The "labour employed to the ton of ore mined" forms some criterion of the total cost of mining in a camp, since the cost of labour is in a more or less constant proportion to such total cost. In this respect it is interesting to note in the various districts the number of tons of ore mined to each man employed. An analysis of the above table shows, approximately, that, taking the Province as a whole, there were 443 tons of ore mined for each man employed about the mines. In this respect, however, the districts vary very materially, since in the Slocan district the figures show 114 tons mined to the man in the year, in the Nelson district 280 tons, in the Trail creek (Rossland) district 400 tons, and in the Boundary 1,121 tons.

Such generalisation, of course, does not apply exactly to any one mine, but only to the district, and in the first two districts mentioned the mines vary in character so greatly, some having high-grade shipping ores, and others low-grade concentrating ores, that care must be taken not to carry such average figures too far.

TABLE SHOWING NON-SHIPPING MINES AND NUMBER OF MEN EMPLOYED, 1904.

| DISTRICT. | Number of Mines. | Men employed under ground. | Men employed above ground. | TOTAL. |
|---|---|---|---|---|
| AINSWORTH | 7 | 32 | 14 | 46 |
| BOUNDARY (Gd. Forks, Kettle R., Osoyoos) | 4 | 7 | 4 | 11 |
| COAST | 2 | 5 | 5 | 10 |
| LARDEAU AND TROUT LAKE | 3 | 15 | 2 | 17 |
| LILLOOET | 1 | 14 | 7 | 21 |
| NELSON | 3 | 15 | 3 | 18 |
| SLOCAN (Slocan, Slocan City) | 3 | 6 | 6 | 12 |
| EAST KOOTENAY (Fort Steele) | 1 | ..... | 6 | 6 |
| YALE | 2 | 6 | 12 | 18 |
| | 26 | 100 | 59 | 159 |

RED MOUNTAIN, ON INTERNATIONAL BOUNDARY, NEW WESTMINSTER M. D.

With reference to the preceding statistical tables of the mineral production of the Province, the following is a summary of their contents:—

Table I. shows the total value, to the end of 1904, of each mineral product that has been mined in the Province. Of these, the total product of our coal mines this year, for the first time in the history of the Province, ranks first, amounting to $68,274,893, closely followed by placer gold at $66,803,403, while there has been produced of gold from lode mines $31,451,956. It is deemed proper to make a distinction here between placer and lode gold production, as the methods of mining this same metal are affected by conditions so totally different.

Comparing the production of the different metals or minerals, we find that the value of the gold produced, from all sources, is greater than that of any other metal or mineral, the combined production of gold, placer and lode, amounting to $98,255,359. Silver comes next, with a production of $21,716,870, followed by copper, with $21,381,791, and lead, with $12,559,139.

Table II. shows the total production that the mines of the Province made during each year from 1890 to 1904, and shows again for 1904 an increase over the preceding years. The production for 1904 had a gross value of $18,977,359, which amounts to over $100 per capita for the entire population of the Province, and the Table shows a steady rise since 1894 from $4,225,717 to the present figures, a proportionate increase of about 450 % in these 10 years.

Table III. presents in graphical form the facts contained in the figures of the preceding Table, and also shows by diagram the production for the past 20 years of our lode and coal mines. It will be noted that the lines representing these outputs are rising steadily and rapidly.

Table IV. gives the amount, in the customary units, and the values of the various mineral products which go to form the total production of the past year, and also, for purposes of comparison, the same data for the two preceding years. The Table shows in the placer gold production for 1904 an increase over the preceding year of $54,880, while in the production of lode gold there is a decrease of $223,008. The production of copper shows a small increase, while the lead production has been doubled, thanks to the Dominion Government bounty.

Among "other minerals" is included building stone, brick, lime, pottery, &c.; also zinc and iron ores, the latter used as a flux, of which no definite statistics are obtainable or standard of value fixed, and these have consequently to be estimated as closely as possible.

Table V. shows the mineral production of the various mining districts into which the Province is divided. The West Kootenay District produces a greater amount than any other, followed, in order of importance, by the Coast, Boundary and East Kootenay Districts. It must be noted that in the output of the Coast and East Kootenay Districts are included the products of the coal mines within their respective boundaries, and, further, that the Coast District includes the three cities of Victoria, Vancouver and Nanaimo, where the greater part of the building material of mineral origin is used. Of the individual camps, the Boundary has been the greatest producer as to values, and has mined more ore than all the rest of the Province combined, its tonnage of ore mined during the past year being over 800,000 tons.

Table VI. gives the statistics of production of the placer mines of the Province since 1858. This branch of mining it was that first brought British Columbia into notice as a mineral Province. Starting in 1858, the output of the placer mines increased, until, in 1863, it was nearly $4,000,000, the highest point reached, when the output gradually and regularly diminished until, in 1893, it was only $356,000. A turn for the better then set in—due, primarily, to the introduction of hydraulic methods—until the output was in 1899 $1,344,900, due to the newly discovered Atlin gold fields, and for the last five years it has averaged over $1,168,000 a year, being for the past year $1,115,300.

Table VII. shows the amount and value of the various metals produced by the lode mines of the Province since 1887, when this class of mining was begun in a small way. The Table shows that our lode mines have produced to date $87,109,756 worth of metals, of which there was produced in 1904 $12,309,035, an amount greater than that in 1903 by $737,668.

Table VIII. gives the production of the collieries of the Province from 1836 to 1904. The total output to date amounts to 21,243,018 tons of coal, having a value of $64,110,578, and 832,863 tons of coke, valued at $4,164,315, making a total valuation for the output of the collieries $68,274,893. In these figures the coal used in making coke is not included in the coal output, being represented by the coke produced. The coal output for 1904 was 1,253,628 tons of coal, valued at $3,760,884, and 238,428 tons of coke, valued at $1,192,140, the value of the total product being $4,953,024.

Table IX. gives in detail the production of the metalliferous mines (not including coal) for the years 1901-2-3 and 4, showing the tonnage of ore mined in each district, together with the quantity of its metallic contents and its gross market value. The total tonnage of ore mined during the year was 1,461,609 tons. This tonnage was mined in the various districts in the percentage of the whole, as given :—

| | | | | |
|---|---|---|---|---|
| Boundary, | 54.9 | % of tonnage and | 30.0 | % of values. |
| Trail creek, | 21.3 | " | 28.0 | " |
| Coast district, | 5.6 | " | 8.8 | " |
| Fort Steele M. D., | 5.2 | " | 8.6 | " |
| Nelson, | 5.1 | " | 3.5 | " |
| Slocan, | 4.8 | " | 9.2 | " |

Tables X. and XI. give, respectively for 1903 and 1904, a graphic comparison of the mineral products of British Columbia, as compared with the production of similar products by all the other Provinces of the Dominion combined. Table X. shows that in 1904 British Columbia produced of the metals and coal practically as great an amount as did all the other Canadian Provinces combined.

## COAL.

The producing collieries of the Province are located on Vancouver Island and on the western slope of the Rockies, near Crow's Nest Pass, in the extreme south-eastern portion of the Province. The former are operated by two companies, the Western Fuel Co., at Nanaimo, and the Wellington Colliery Co., at Ladysmith and Union (Comox), while the eastern collieries are all operated by one company, the Crow's Nest Pass Coal Co. The conditions surrounding these two coal fields are so different that they must be considered separately.

The gross output of coal from the mines was 1,685,698 tons, of which 1,071,337 tons were sold as coal, 159,651 tons were used under companies' boilers, etc., 432,070 tons were used in making coke, and 22,640 tons were added to stock piles. The amount of coke produced was 238,428 tons, of which 229,618 tons were sold, and 8,810 added to stock.

The Vancouver Island Collieries mined 1,023,013 tons of coal, which was disposed of as follows :—

| | |
|---|---|
| Sold as coal | 784,169 tons. |
| Used by company | 135,034 " |
| Used to make coke | 81,170 " |
| Added to stock | 22,640 " |
| | 1,023,013 " |

The coke produced amounted to 19,371 tons, of which 12,934 tons were sold, and 6,647 tons were added to stock.

Of the coal sold, 53 per cent. was exported to the United States, practically all to California, while 20 per cent. of the coke sold found the same market. The local market is slow of growth, so the export market must be looked to for any expansion of business. In 1902, 75 per cent. of Vancouver Island coal went to California, in 1903 about 45 per cent., and in 1904 about 53 per cent., which would indicate that the worst is already known of the competition of the California fuel oil.

The two companies have "pooled" their California sales under one selling agent, which should steady the trade.

The local Coast market in 1904 consumed some 13,000 tons more coal, but about 9,000 tons less coke, than in the preceding year.

The Crow's Nest Pass Coal Co. at its three collieries, Michel, Coal Creek and Carbonado, mined in 1904 662,685 tons of coal, of which there was sold as coal 287,168 tons, and of this 168,980 tons was consumed in Canada and 118,188 tons exported to United States. Of the remainder of the output, 24,617 tons were consumed by the operations of the Company and 350,000 tons converted into coke, of which there was produced 218,857 tons, and of this 119,004 tons was consumed by British Columbia smelters, and 97,690 tons exported to United States.

The distance of these mines from the Coast has as yet prevented any but the interior markets being available, and as three new coal companies have this past year begun shipping from mines just outside of British Columbia, in Alberta, these companies have shared the market with the C. N. P. Coal Co., with the result that these British Columbia mines show this year a decrease in coal sold of 32,791 tons, which is, however, more than made up for by an increase of 66,930 tons in the coke sales.

The consumption of coke from these mines by British Columbia smelters has remained at about the same amount as last year, but the export of coke has increased from 27,758 tons in 1903 to 97,690 tons in 1904, chiefly by the opening up of markets in Montana through the completion of the branch of the Great Northern Railway into Morrissey. The Company's ovens have not been run at full capacity, nor all the time, so that the limit of the present available market seems to have been reached, but there is every indication that it will be held during the coming year.

The following Table indicates the markets in which the coal and coke output of the Province was sold:—

| Coal. | Coast. | Crow's Nest Pass. | Total. |
|---|---|---|---|
| Sold for consumption in Canada.....(Tons—2,240 lbs.) | 368,764 | 168,980 | 537,744 |
| " export to United States..... " | 414,248 | 118,188 | 532,436 |
| " " other countries..... " | 1,157 | ..... | 1,157 |
| Coke. | 784,169 | 287,168 | 1,071,337 |
| Sold for consumption in Canada..... " | 10,333 | 119,004 | 129,337 |
| " export to United States..... " | 2,591 | 97,690 | 100,281 |
| " " other countries..... " | ..... | ..... | ..... |
| | 12,924 | 216,694 | 229,618 |

## GOLD.

**Placer Gold.**

The placer gold mining industry of the Province this past year produced $1,115,300 in gold, an increase of about 5 % over the preceding year, thanks to a successful season in the Atlin camp. In this camp, gauged by the royalties paid in, the "individual" miners produced in 1904 about 45 % of the product of the camp, while in 1903 the individual miner paid 75 % of the royalty, the change indicating the replacement of individual by company work, even in this camp. The output of the camp was about $530,000, an increase of 20 % over the preceding year, a most encouraging showing, especially as the dredge, from which so much was expected, failed mechanically to handle the dirt. The two hydraulic companies which started up last summer made very creditable productions and promise to do better next year.

In the Dease Lake District the output this year was only about one-third of what it was the previous year, as the most important property in the camp did not produce this past season, being engaged exclusively in installing a new and larger plant.

In the Cariboo District the placer output was almost exactly the same as last year, the Barkerville camp being just the same, while a deficit in the Omineca section was just about balanced by an increased production in the Quesnel Forks section, where the Consolidated Cariboo Company, although only having water to sluice 88 days, produced $90,000 of gold.

In the Fraser river section, placer mining is chiefly carried on on the river bars at extreme low water, the results this year have been very disappointing, as the usual very low water did not occur, since the winter's snow starting to go very early went gradually, with no extremes of high or low water, so these bars could not be worked to the usual extent.

**Hydraulic Gold Mining.**

The company operating in this manner on the largest scale is the Consolidated Cariboo, which, as already noted, produced $1,000 a day while able to work with a head of water. It has been amply illustrated that the water supply is the measure of the output, and that to increase the latter must be done by first increasing the former. This, the company has decided to do, and will, this coming year, expend a large amount for further ditches and water. There have been operated in Atlin two very successful small hydraulic enterprises, and near Barkerville about the same number, which have paid very well this past season.

**Dredging for Gold.**

Dredging for gold has not, as yet, been a commercial success, despite all attempts to solve this problem. The difficulties are mechanical, but, therefore, none the less difficult to surmount. Many of the propositions which have been started have had ground sufficiently rich to pay very handsomely, if the conditions were right—that is, freedom from boulders or hard clay cement, a dredgible bedrock, and the gold not in too fine a state of division. The dredge in Atlin attempted to handle dirt that proved too tough for it, and from reports it would appear that the Lillooet dredge was too weakly constructed to stand the work, and the constant stoppages for repairs interfered with what promised to be a very successful run.

**Steam Shovels.**

As yet the only attempt made in this Province to work a placer gold-property with a steam shovel was in Fort Steele Mining Division, and described in the Report for 1903. The conditions there were scarcely favourable and the shovel was not equipped with an auxiliary elevator to take the gravel from the shovel to the sluice, which appears to be a requisite. This was to have been provided for this shovel but is not yet in place, and the machine has not been worked this past season.

Preparations have been made for the placing of one, or more, steam shovels on ground in the Atlin district this coming summer, notably by the British America Dredging Co., on its leases at Tar Flat; and the Northern Mines, Limited (of Vancouver), on ground recently

acquired on Spruce creek. In both these cases the character of the ground and its gold contents have been thoroughly and satisfactorily tested by individual workers, although the top burden was so deep as to prevent any profit being made from this class of work, but the ground appears admirably suited for working by mechanical means.

Gold from Lode. Mining.

The greater part of the gold obtained from lode mining in British Columbia is found in connection with other metals and only separated or collected by smelting, probably not 5 % of the product being obtained from stamp mills. The lode gold product for 1904 was $4,589,608, and was $223,008 less than in 1903, due to the diminished output of the Rossland and Nelson districts. In the former district the tonnage of ore mined is about 5 % less and the gold contents about 8 % less than last year. In the Nelson Mining Division there has been less ore mined and the values per ton were, on the average, lower. In the Boundary District the tonnage of ore mined has increased about 30 %, and the gross gold contents is this year about 10 % greater than it was the previous year. In the Coast District the tonnage of gold-bearing ore has been 20 % less than the previous year, yet, for all that, the gold contents show an increase of about 8 %.

## SILVER AND LEAD.

It has been customary in these Reports to consider silver and lead together, since in this Province about 80 % of the silver produced is obtained from silver-lead ores, the remaining 20 % being chiefly found associated with copper.

The total silver production for the past year was 3,222,481 ounces, valued at $1,719,516. About 50 % of this production came from the Slocan District, and about 25 % from Fort Steele District, the two lead-producing centres, while the other 25 % was produced in all the other parts of the Province. This output is 226,277 ounces greater than was made in 1903—an increase of about 7 %—and is chiefly attributable to the re-opening of the St. Eugene mine, in East Kootenay, the resumption of work in this mine being the direct result of the bounty on lead mined, offered by the Dominion Government, without which assistance the St. Eugene cannot be profitably operated. In the Fort Steele Mining Division there were mined in 1903 less than 1,000 tons of ore, while in 1904 there were mined 76,895 tons, from which was recovered about two-thirds of the lead output of the Province.

The total lead output was 36,646,244 lbs. of lead, of which 21,071,236 lbs. was produced in East Kootenay, 10,611,227 lbs. in Slocan, and 3,091,648 lbs. in Ainsworth Mining Division.

## COPPER.

There has been a further advance made in the production of copper, the output this year being 35,710,128 lbs., valued at $4,578,037, an increase of about 4 % over the preceding year, which makes this output of copper the greatest ever made by the Province.

The product was obtained in the following districts:—

| | | |
|---|---|---|
| Boundary | District | 22,066,407 lbs. |
| Rossland | " | 7,119,876 " |
| Coast | " | 5,960,593 " |
| Yale-Kamloops | " | 328,380 " |
| Nelson | " | 220,500 " |
| Various Districts | | 14,372 " |
| | | 35,710,128 " |

The average assays of the ores of the various camps, based upon copper recovered, were as follows:—Boundary Camp, 1.38 % copper; Rossland, 1.12 %, and Coast District, 3.68 %.

## OTHER MINERALS.

Iron Ore.

There has been no ore mined for iron-making this past year, as the only iron blast furnace on the North-West Coast, that on Puget Sound, has not been operated. Formerly, the lead smelters mined iron ore (magnetite) at Kamloops for fluxing purposes, but this has been discontinued, as ores have been found nearer home which, although not carrying so high a percentage of iron, contained small values in copper, gold or silver, which rendered them more desirable.

Zinc.

Zinc ores have been receiving a great deal of attention during this past year, more particularly those of the Slocan District, but, with the exception of the ore from the *Ivanhoe* mine, Sandon, it could not be learned that any important amount of ore had been sold before the close of the year. In the Slocan District zinc blende occurs with the galena ores, sometimes in considerable quantity, and usually associated with iron carbonates. Most of the concentrating mills have now been equipped so as to separate out a "zinc concentrate" from the jigs and tables. These concentrates will run from 38 to 48 % zinc (as zinc blende), but will carry as impurities, considered from the standpoint of a zinc ore, from 2 to 5 % of lead, as galena, from 5 to 15 % of iron, as pyrite and carbonate, and from 20 to 45 ounces of silver to the ton, with the balance gangue matter, usually highly silicious.

Most of the zinc smelting works which are prepared to buy zinc ores are now using the Belgian furnace, in which the ore is mixed with coal or other reducing agent, placed in a clay retort, the reduced zinc being distilled off and caught in a condenser. Iron and lead are highly objectionable in this process, inasmuch as they flux with and destroy the retorts, adding greatly to the cost of the process. For this reason crude Slocan concentrates have not found a ready market, and to remove these objectionable impurities two "zinc enrichment" plants are under construction, in addition to the Payne mine magnetic separator. It is believed that these impurities can be so removed, to such an extent at least as to render them non-injurious, but the question of the silver still remains to be solved, for, as far as could be observed, it is directly included in, and a part of, the zinc blende, and can not be separated, save by smelting or some other form of disintegration of that mineral.

While this silver cannot be considered as detrimental to the ore as a zinc ore, it is very difficult to separate and save the silver, and but a partial recovery can be made at the best; consequently, the price offered by ore buyers seems very low for the silver contents. For this reason it has so far been found advisable by all the producers to throw as much zinc into the lead concentrates as the lead smelter will accept without a penalty, in which case the producer gets no pay for his zinc, but gets a price for its silver contents which more than recoups him for his loss of zinc. These conditions apply to zinc smelting as it is usually carried on. There are, however, two or three newer processes not very widely known, which are especially adapted to such ores, but operators of these concerns are naturally only prepared to give enough for the ore to outbid the regular zinc smelter. An electric process is being developed in Vancouver which has considerable promise and which can be utilised in small units, and this may help to solve the problem by the local treatment of the concentrates.

The ore from the "Lucky Jim" mine, of the Slocan, is a zinc ore, low in silver, with iron and lead as occasional impurities. About 2,000 tons of this ore were shipped to Kaslo about the end of 1904, but the sales had not been completed by the close of the year.

There are zinc ore properties on Quatsino Sound and also near Vancouver, but so far no shipments have been made and little development has been done.

**Platinum.** The production of platinum has this year been confined to Granite creek, in the Similkameen, and this creek produced only 35 ounces, valued at $12 an ounce, recovered from the sluice-boxes in washing for placer gold. As far as can be ascertained, platinum has not as yet been found "in place" in British Columbia, although its occurrence is wide-spread in the gravel of the placer gold deposits throughout the Province.

In the Report of 1902 the occurrence of platinum in considerable quantity was noted at several points on the Quesnel river, Cariboo District. These occurrences were the subject of a special investigation by a representative of an Eastern firm interested in the metals, but with what results has not been learned.

Mr. Hobson, in his report of last year's operations of the Consolidated Cariboo Company, an extract from which will be found on page 41 of this Report, notes the occurrence of platinum, osmiridium, and also of palladium, in the heavy concentrates from his sluice-boxes, and he is preparing to put in a system of undercurrents to collect all of these heavy concentrates.

In the Thibert creek hydraulic workings, platinum has previously been noted, but this company did no sluicing this past season. Mr. Hamfield, the manager, in his report, speaking of work planned for next season, says:—"Since definite measures are to be taken towards the saving of the osmiridium which is known to exist in the deposit to an appreciable amount."

**Building Stone.** In a comparatively young country, with lumber as plentiful as it is in British Columbia, the use of stone for building purposes is relatively too expensive, except in the cities, where wooden buildings are prohibited within the fire limits. In the Interior there has been comparatively little stone construction going on, and the quarrying of stone for such purposes cannot be said to exist as an industry. When stone is required, a few men are put to work on one of the innumerable rock exposures simply to quarry out sufficient stone to meet immediate demands.

On the Coast, the three largest cities of the Province have created a market for building stone, and several quarries have been opened up on the islands of the Gulf of Georgia, which afford exceptionally easy opportunities for opening up of quarries, as the rock faces open up right from deep water, permitting of the stones being loaded directly on to boats. Most of these quarries will be found described in the body of this Report, under the heading "Stone Quarries of Coast." The stones quarried are granite, sandstone, and an andesite very much resembling sandstone in appearance. An export market for stone is being slowly but surely established in the American cities on Puget Sound and in California.

**Brick.** Red bricks are manufactured in small yards all over the Province, for local consumption, the distribution of brick clay being so general as not to necessitate any large brick-making centre, although very extensive yards are in operation near Vancouver and New Westminster. The manufacture of fire brick has been carried on at Comox, by the Wellington Colliery Co., from fire-clay occurring in connection with the coal seams, and also at Victoria by the B. C. Pottery Co., from clay derived from the same source. This latter company has also entered extensively into the manufacture of drain and sewer pipe, tiles, etc., for which there appears to be a good local market.

**Oil Shales.** It was noted in last year's Report that apparently a large deposit of shale carrying oil had been discovered in the Beaver valley, near Harper's Camp, Cariboo. Further samples of this shale and a small flask of oil retorted from it were obtained through Mr. Carew-Gibson, of 150-Mile House. These the Bureau sent to Dr. T. R. Marshall, of London, England, with the request that he turn them

over for analysis and report to some chemist who had experience with the oil shales of Great Britain. Dr. Marshall handed these to Mr. Arthur King, whom he considered expert in this matter, and reports as follows:—

"As Mr. Arthur King's report was scarcely detailed enough, with no geological or general references, I have re-written it and signed it myself.

"REPORT ON SAMPLES OF SHALE AND CRUDE OIL FROM NEAR HARPER'S CAMP, CARIBOO DISTRICT, B. C.

"*Examination of Crude Oil.*

"The crude oil was maintained at a temperature of 100° C. until there was a complete separation of the oil from water and soluble constituents. Unfortunately, only about 100 cubic centimetres separated out, which would only yield by fractional distillation, fractions in such small quantities that detailed examination of individual portions would be impossible. A volume of two litres is the smallest practical quantity to operate on. However, in this case, the oil is of very low commercial value for the following reasons:—

"1. The oil is liquid at the ordinary temperature and has a very offensive smell. The fact that it is liquid at the ordinary temperature shows that it does not contain a practical amount of the solid paraffins, which is a very important source of profit. The oils from Central Ohio and Indiana, Kentucky and Kansas fields contain paraffin wax, but the oils generally found in Texas and California contain asphaltum base.

"2. The specific gravity is .972, which denotes that the oil is very dense and is only fit for lubricating purposes. This dense oil is scarcely worth refining, as it would only give about 50 % of finished products and these would have very little market value. A passable oil should yield about 75 % of finished products.

"For purposes of comparison, it may be stated that a fairly good oil has usually a specific gravity of .890 to .895, usually under .895.

"*Examination of Sample of Shale from Harper's Camp.*

"The shale itself is worthless for commercial purposes, and from the geological point of view must be considered only as an indication that oil shales exist. Further prospecting may result in an oil find or discovery of rich shale, but not having examined the ground personally, it is impossible to venture an opinion. The shale on distillation yielded only a crude product, which floated on the aqueous portion and represented only 3 % of the weight of the shale. A shale, to be of commercial value, should yield not less than 8 % of crude oil.

"In Colorado and Utah there are extensive strata of silt now hardened to shale, yielding by distillation about 20 gallons of crude oil per ton of shale. The time may come when these immense deposits may have commercial value.

"In conclusion, I may say that neither of the samples have commercial value, but must be considered only in the light of valuable local indications. It may be that locally the more volatile constituents have evaporated into the air, and that shale and oil from more deep seated sources will prove of value. Whether or not a valuable find may be discovered can be determined only by careful geological examination of the district, in conjunction with actual prospecting."

Within the past few months Mr. R. H. Alexander, of Kamloops, writing from Lytton, sent to the Bureau for examination a sample of black shale, which proved to be oil-bearing and very similar to those of Harper's Camp. As was noted in last year's Report, shales of a similar character were found in Calder creek, a tributary of the Flathead. As far as can be learned, no actual development took place in the Flathead oil district during 1904.

## GENERAL DEVELOPMENTS OF THE YEAR.

The year 1904 has been devoid of any sensational features in the way of new discoveries or remarkable development, but the year has brought increased output from the well-known mines rather than the opening up of new producing properties.

In the Boundary District the tonnage of ore mined has increased 15 %, and this has called for increased equipment on the part of all the large companies owning their own smelting plants. These, realising that the oxidised ores found in the upper portions of the original ore-bodies were liable to be replaced at a greater depth by sulphides, have "taken time by the forelock" and secured, by means of purchase or consolidation, all available deposits carrying oxidized iron in excess, securing thereby a supply of such ore for fluxing purposes.

The average contents of the ore mined in the Boundary for the past year was 1.38 % copper, $1.44 in gold, and 0.3 oz. in silver, to the ton, based upon the statistics of the district. To mine and smelt in British Columbia an ore of this grade at a profit, it must be done on a very large scale and with the best appliances, and the ores must be self-fluxing or nearly so. That a profit has been made argues that all these conditions have existed, and, further, that the plants have been most economically run.

The company operating upon the largest scale in the district is the Granby Consolidated Mining, Smelting and Power Co. The control of this company recently passed into the hands of New York capitalists, and under the new directorate still further additions have been made to both the mine and smelter plants, while additional railway facilities have been acquired through an extension of the tracks of the Great Northern Railway Co.'s system. From the company's *Old Ironsides* and *Knob Hill* there were mined over 544,000 tons, while the company has been operating several other properties under bond and on shares, for the purpose of obtaining their fluxing or oxidized ores.

The B. C. Copper Co. has made important improvements at the mine, and as most of the ore is now being quarried, the company will be able to even further reduce the cost of mining. The mine produced last year about 175,000 tons of ore, and this output should be materially increased next year. The company acquired a three-quarter interest in the *Emma* mine which last year shipped over 36,000 tons of iron ore carrying small values, and used as flux by this company and by the Nelson Smelter, which owns the other quarter interest in the mine. The company's smelter treated during the year, including customs ore, etc., some 210,484 tons of ore, containing 36,403 oz. of gold, 118,419 oz. of silver and 5,081,743 lbs. of copper.

The Montreal and Boston Co. has been re-organised and consolidated with the *Brooklyn-Stemwinder*, *Rawhide*, *Athelstan-Jackpot*, *Sunset* and *Morrison* mines, thereby insuring a large and steady supply of ore, which it will be possible so to adjust as to make a self-fluxing mixture, an arrangement which should be of great benefit to all the parties of the consolidation.

In the vicinity of Greenwood there are four small high-grade properties which have been developed and have produced several hundred tons of ore, running from $50 to $75 in gold and silver, for which a ready market is found at the local smelters. More attention has been given of late to this class of small high-grade deposit, and with very promising results.

The general costs of mining and smelting in the Boundary District have been reduced to a figure lower than hoped for, and now compare favourably with any work done elsewhere.

In the Rossland Camp the year has been to a certain extent unsatisfactory, from the standpoint of production. It has been a period of experimenting with methods of concentration, which, as pointed out last year, has become a necessity, since, as a greater depth is reached, large bodies are found of lower-grade ore, requiring treatment by concentration.

The Rossland Power Co.'s Concentrator, located between Rossland and Trail, has been completed. This plant was erected to treat *War Eagle* and *Centre Star* ores, and several thousand tons of ore from these mines were sent to the mill for concentration, but, after a trial run of several weeks, the mill closed down early in December, for the purpose of making some changes in the plant, found necessary by experiment.

The LeRoi No. 2 mill, described fully in last year's Report—a combination of hydraulic concentration and "Elmore process" oil concentration—has been working all year, but it is recently reported that the Elmore process has been temporarily discontinued.

The Consolidated White Bear Mining Co. has, during the past year, erected an "Elmore plant" much larger than that of the Le Roi No. 2, and equipped with labour-saving devices which it is believed will materially reduce the cost of operation. This plant was started up only late in the year and definite results cannot yet be expected.

The Velvet-Portland Co., on Sophie mountain, has erected a small hydraulic concentrator, to see what can be done with the ores of that mine.

It will be seen, therefore, that the efforts to arrive at a method of concentration are general throughout the camp, and, from all reports, have been so far successful. If only a portion of the product of the camp is concentrated, the iron-copper sulphides thus obtained would materially assist in fluxing the excess silica in the unconcentrated ores, thereby further reducing the cost of the subsequent smelting. Much importance is attached to these experiments, as their success will materially affect the future of the Rossland camp.

In the Slocan district the most important feature to be observed in connection with mining was the effect that the lead bounty would have in stimulating lead mining, and it must be admitted that, as far as increasing actual production is concerned, the results have not been so great as was anticipated. There has been an increased amount of development going on, which seems attributable to the "bounty," the effect of which will be felt later.

The utilisation of the zinc-blende recovered as a bye-product in the concentration of galena ores has had a great effect on the prosperity of many of the mines and, as the cleaner separation of the zinc concentrates has been accomplished, a profitable market seems assured for the product in the future.

Nothing requiring special note has occurred in the Nelson Division this past year, unless it be the successful prospecting done on Summit creek, in the eastern part of the division—noted in the body of this Report—and the opening up and equipping of the *May* and *Jennie*, a large, low-grade gold property in the western part of the division.

The development in the *Ymir* mine has not been successful. The *Silver King*, operated under contract, did very well on a small scale, and will be worked next year jointly by the company and the contractor.

The *Hunter V.*, a new company, has been most successful and has cleared more than expenses this first year.

In the East Kootenay district there are two or three companies installing plants to work, by mechanical means, placer ground in the immediate vicinity of ground formerly worked by individual miners. These enterprises have not as yet progressed far enough to have obtained definite results. In this district the effect of the "lead bounty" has been most beneficial, and may be said to be directly responsible for the production of 21,000,000 pounds of lead and 600,000 oz. of silver, which could not have been produced without it, while the product for 1905 promises to be at least 50 per cent. greater.

The coal mines are the important factors in the production of this district, and are described elsewhere in the Report; their output has greatly increased, and chiefly through the export of the products. Prospecting has developed further coal fields in this section, farther up the Elk river than the present mines, the general situation being, as described by one of the prospectors—"There is coal to burn in East Kootenay."

In the Windermere district mining has been very much at a standstill, as it is there firmly believed that the Kootenay Central Railway will soon be built, and as this would revolutionise mining conditions, present work has been largely confined to development.

In the Atlin district there has been a more than usually successful placer mining season. The work has been confined to the known field, chiefly in developing the "old channel," and installing plants to take the place of individual workings. The district is fully described by the Provincial Mineralogist in the body of this Report.

In the Liard division productive mining has been practically dormant, owing to the principal companies being fully occupied in enlarging their plants, a serious undertaking in a district so devoid of transportation facilities.

In the Skeena division, as anticipated last year, the settlement of the Alaskan Boundary has led to the active development of several high-grade gold properties, which have considerable promise. No market has, as yet, materialised for the sulphur ores of the mines on the Ecstall river, and these properties have lain idle.

The coal fields of Queen Charlotte islands have been the subject of serious negotiations this past season, but, as far as can be learned, no further development of the properties has taken place, and the drilling to prove the coal nearer the centre of the field has not yet begun.

On Princess Royal island the *Princess Royal Group* shipped 300 tons of ore, running over $50 in gold to the ton, with a little silver and copper, and two other companies are actively developing, with a prospect of shipping in the near future.

In the Telkwa valley the development of what promises to be important deposits of semi-anthracite coal has attracted much attention, while in the same section prospecting has disclosed mineral properties from which some exceptionally fine samples of copper ores have been brought out.

As this district is supposed to be on the line of the approaching Grand Trunk Pacific Railway, it will, this coming season, be pretty thoroughly investigated by prospectors and those in search of land.

On Texada island, in the Nanaimo District, the *Marble Bay* mine has been continuously worked and has made a large output. The *Van Anda* mines have been under bond to an English syndicate, which has been seriously hunting for extensions of the old ore-bodies, but with indifferent success, as the syndicate is about to suspend operations and turn the properties over to the original company. The iron mines have not shipped or been worked this past year.

In the New Westminster Division, the copper properties on Howe Sound, owned by the Britannia Copper Syndicate, have been equipped with a tramway and accessories and a most extensive concentrating plant, which is now approaching completion, should be ready to operate by the middle of the coming summer.

On the West Coast of Vancouver Island there are no new developments to report. The copper properties at Yreka, on Quatsino Sound, have lain idle. In the same vicinity several new claims have been developed but are not yet producing; among these is a zinc blende property. At Sidney inlet the *Prince Group* has lain idle. The *Indian Chief Group* shipped a small quantity of ore, but later was also idle.

In the Mount Sicker District, on Vancouver Island, the Tyee Company has had a successful year as far as shipments is concerned, but has experienced a cave in the mine which retarded operations, and has not as yet been successful in the search for ore below the 300-foot level.

The adjoining property, the *Richard III.*, has been unable to find a further ore lens than the one first struck.

The *Lenora* has been the subject of negotiations on the part of the receiver, which are not yet completed. No work has been done at the mine.

A small copper property has been opened up a few miles from Ladysmith, and is now shipping very fair ore. On some four or five properties development has been satisfactory, and it is probable some of them will ship this coming year.

The Camp McKinney mines have stopped for an indefinite period, and at Fairview the *Stemwinder* mined and milled about 1,200 tons of $4 to $5 gold quartz.

At Hedley City, in the Osoyoos Division, the *Nickel Plate* mine having completed its system of tramways and mill, mined and treated about 10,000 tons of ore, yielding values of from $12 to $15 a ton, chiefly in gold. Other properties in the vicinity are being developed very successfully, and will undoubtedly ship as soon as a railway is built into the district.

At Summit camp—near the summit of the Hope mountains—in the western part of the Similkameen Division, development has been carried on on a number of claims, with results which have attracted much attention to the camp. This coming season will probably bring to two or three of these sufficient "ore in sight" to justify some means of transportation being provided.

In the Nicola district continued development is reported as having been carried on on the mineral properties of the Aspen Grove camp, and in the other claims of the district.

The coal fields near Nicola have, this past year, received a great deal of attention and prospecting, with the result that the field has been found to extend beyond the limits formerly supposed to bound it. As yet the development is superficial, but the quality of the coal is even better than was expected. The following analyses by the Provincial Government Assay Office, from samples brought in by Mr. Alex. Faulds—late manager for Wellington Colliery Company—from one of the properties examined by him, gives an idea of the quality of the coal found:—

NICOLA VALLEY COALS.

*Analysis of Coal made for Mr. Alex. Faulds.*

| | Moisture. | Ash. | Fixed Carbon. | Volatile matter. | Coking qualities. |
|---|---|---|---|---|---|
| No. 1.—From upper bench in tunnel or coal gulch. | 4.5 | 9.3 | 55.5 | 30.7 | Coke not very firm. |
| No. 2.—Middle bench in tunnel, 120 feet in .. ... | 5.38 | 3.6 | 61.2 | 29.82 | Firm coke. |
| No. 3.—Bottom bench in tunnel seam in coal gulch | 4.46 | 5.9 | 59.2 | 29.44 | Firm coke. |
| No. 4.—Upper bench from Rat Hole ..... | 2.99 | 7.7 | 63.9 | 25.41 | Firm coke. |
| No. 5.—From bench from Rat Hole, 50 feet in.... | 2.85 | 12.28 | 61.06 | 23.81 | Firm coke. |

## SMELTING AND REFINING WORKS.

### Coast.

The *Tyee Smelter*, at Ladysmith, V. I., is the only smelter in operation on the Coast. It is provided with one copper matting furnace of a capacity of about 300 tons a day, and has been making a matte running from 40 to 50 % copper, which matte is sent to Tacoma for refining. This smelter, being unable to secure sufficient ore, has been able to run only about 20 days in the month. The smelter buys all custom ores offering.

The Crofton smelter, at Crofton, V. I., owned by the Northwestern Smelting and Refining Co., has been idle for a couple of years through lack of ore supplies. The plant consists of one large rectangular copper matting furnace, a small circular remelting furnace and a Garretson blast furnace; also a "trough" converter plant. The capacity of the plant is from 500 to 600 tons of ore a day.

There are also on the Coast, and competing for coast ores, a smelter at Tacoma, Wash., U. S. A., equipped with both lead and copper smelting and refining plants; at Everett, Wash., a lead smelting plant; and on Prince of Wales Island, Alaska, a copper smelting plant has recently been erected, but has been unable to start through lack of ore.

### Boundary District.

At Grand Forks the Granby Co. has a large and "up-to-date" copper smelting and bessemerizing plant, which treated this past year about 600,000 tons of ore.

At Greenwood the B. C. Copper Co. has a large copper plant of same character, which treated 210,000 tons of ore during 1904.

At Boundary Falls, a few miles south of Greenwood, the Montreal & Boston Copper Co. has at present a large copper matting plant, and is preparing to install a bessemerising plant.

These three companies all purchase custom ores, and as they are all extending their plants they are quite able to handle all ores offering.

### West Kootenay.

At Trail, the Canadian Smelting Works, connected with the Canadian Pacific Railway Co., conducts both a copper and a lead custom smelter, to which have been added, within the past couple of years, a lead refining plant and a lead sheet and pipe manufacturing plant. This is the only refining plant of any kind in the Province.

At Nelson, the Hall Mining & Smelting Co. conducts a copper and lead custom smelting works.

These two plants are capable of handling easily all the lead and copper ores offering in the Kootenays.

At Pilot Bay, on Kootenay Lake, the Pilot Bay Smelter, a lead smelting plant, has remained idle for about eight years.

A small blast furnace for lead ores was erected at Ferguson, in the Trout Lake Division, but it has never made an output.

### East Kootenay.

In Marysville, Fort Steele Mining Division, the Sullivan Mining Co. has just completed a one-stack lead-smelting plant, to treat the ores from its own mines, which are too low-grade to admit of transportation to Nelson or Trail.

# BUREAU OF MINES.

—o—

## WORK OF THE YEAR.

The work of the Bureau of Mines increases, of necessity, year by year, and this growing activity is due to the following causes:—The extension of the mining area of the Province, with the proportional increase in the number of mines; the increasing desire of the outside public for the free information which the Bureau supplies with regard to the various mining districts and camps; and the appreciation by the prospector of the fact that he may obtain, gratis, a determination of any rock or mineral which he may send to the Bureau.

The routine work of the office, beginning with the preparation and publication of the Report for the year just ended, followed by the examination in the field of as many of the mines and mining districts as the season would permit, together with the work of the Laboratory and the instruction of students, fully occupied the staff for the year. The staff of the Bureau consists of the Provincial Mineralogist, the Provincial Assayer, and a junior assistant in the Laboratory, with the temporary assistance of a clerk during the publication of the Report. In connection with inquiries for information and the collection of statistics, about 1,700 letters were sent out, with approximately the same number received.

In addition to the work performed in the office, the Provincial Mineralogist this last year spent 160 days in the field examining various mining districts, taking notes to be later written up for publication, while the Provincial Assayer was in the field for 40 days, making a special examination, with a view to a report, of the stone quarries of the coast, and examining mining properties in the New Westminster and Yale Districts.

**Provincial Mineralogist.**

The Provincial Mineralogist left Victoria for his summer's work in the field, on June 10th, proceeding direct to Nelson, where ten days were spent attending the trial of the Crow's Nest Pass Coal Co., with respect to the explosion of May, 1902, listening to the evidence of the eminent coal mining experts from England, the United States, and elsewhere.

On June 23rd the Ymir District was visited, as were most of the producing and many of the non-producing camps of the Nelson Mining Division.

Later, the Ainsworth Mining Division was visited and a special inspection and report made of Hamill creek.

On July 26th the Provincial Mineralogist started on a tour of inspection of the Slocan City and Slocan Mining Divisions, which work occupied him until September 7th, when a hurried trip was made to the lead mines of East Kootenay, in the vicinity of Cranbrook.

On September the 14th, in response to a telegram from the Department, a special trip to, and report on, Woodbury creek in the Ainsworth Mining Division was made.

Returning to Victoria on September 21st, after a stay of four days, the Provincial Mineralogist left on September 26th for Atlin, by the steamer "Princess May," returning to Victoria on October 26th, and leaving again on October 30th for Howe sound, returning to Victoria on November 3rd.

On November 22nd he was ordered to proceed to Morrissey, to investigate an outburst of gas in that colliery, whereby 14 men were suffocated; from whence he returned to Victoria on December 5th.

From December 5th to 10th an examination for Assayers' Certificates of Competency, under the "Bureau of Mines Act," was held in the Government Laboratory, at which the Provincial Mineralogist and the Provincial Assayer, together with Mr. Harris, of the Hall Mines Smelter, Nelson, were the examiners.

After that date, the Provincial Mineralogist began and was occupied in the preparation for publication of the notes taken in the field, the collection and preparation of statistics for the year, and the routine work of the office.

## ASSAY OFFICE.

The following is a summary of the work of the Assay Office of the Bureau for the year 1904, as reported by the Provincial Assayer, Mr. Herbert Carmichael:—

During the year 1904, there were made by the staff in the Government Assay Office, 1,099 assays or quantitative determinations, which is an increase of 379 over the number made during the previous year. Of these, a number were for the Bureau of Mines, or for the Department, for which no fees were received. The fees collected by the office were as follows:—

| | |
|---|---|
| Fees from assays and chemical determinations | $ 234 00 |
| " melting and assaying gold dust and bullion | 218 00 |
| " assayers' examinations | 450 00 |
| Total cash receipts | $902 00 |
| Determinations and examinations made for other Government Departments for which no fees were collected | $200 00 |
| Value of assaying done | $1,102 00 |

**Free Determinations.**

In addition to the above quantitative work, a large number of qualitative determinations or tests were made in connection with the identification and classification of rocks or minerals sent to the Bureau for a report. Of these no count was kept, nor were fees charged therefor, as it is the established custom of the Bureau to examine and test qualitatively without charge samples of mineral sent in from any part of the Province, and to give a report on the same. This has been done for the purpose of encouraging the search for new or rare minerals and ores, and to assist prospectors and others in the discovering of new mining districts, by enabling them to have determined, free of cost, the nature and probable value of any rock they may come across. In making these free determinations, the Bureau asks that the locality from which the sample was obtained be given by the sender, so that the distribution of mineral over the Province may be put on record.

**Purchase of Gold Dust by Government.**

The Provincial Government has undertaken to purchase any gold dust which may be presented at the Treasury, and to pay therefor within 24 hours, in cash, to the full extent of its assay value, as is done at the United States Mint Assay Office at Seattle and the Dominion Government Assay Office at Vancouver. This enables the miner arriving with gold dust to dispose of it promptly at the highest market price, and as the local banks will always make an advance on a certificate of deposit of dust with the Government, he is enabled also to obtain immediately funds sufficient for his wants. In connection with these purchases, the Assay Office of the Bureau has to melt and assay all lots of gold dust presented. The assaying is done by two assayers working independently, whose results must check, thus preventing error and assuring to the depositor full returns for his dust.

It is interesting to note that advantage is being taken of this provision, and that the number of such depositors is increasing. The number of separate lots of gold dust brought in for melting and assay in 1904 was 171, an increase over last year, having a total value of $103,693, as against $152,675 in 1903, indicating that the office is being more used by the small operator or individual miner.

**Special Analyses.**

In addition to the regular routine of the laboratory, a number of special analyses have been made, and among these may be mentioned a series of analyses of samples of coal taken from the new shaft being sunk at Cumberland, and samples from the new coal field being developed in the Nicola Valley. The results of these analyses are given elsewhere in the Report. A series of analyses was also made of samples of soil from the alkaline lands occurring in the Okanagan valley, for the purpose of devising some means of rendering them fit for cultivation. This work is being further prosecuted.

There are each year a number of reported finds of rare or unusual minerals from different parts of the Province, which, upon being traced up and investigated, are in most instances found to be incorrect. These misleading reports have been traced, in a number of instances, to faulty methods of chemical examination, or to carelessness on the part of the assayer making the investigation.

As an example of this may be mentioned the repeated reports of finds of nickel from all parts of the country. Since the nickel of Ontario occurs in a pyrrhotite, many specimens of this mineral in British Columbia have also been suspected of carrying nickel, and have been tested for it by methods bound to give misleading results. For example, when much iron and a supposedly small amount of nickel are present in an ore, a method is adopted of separating the iron by a precipitation as a basic acetate. This effects only a partial separation of the iron, some of which goes through the filter into the solution supposed to carry the nickel, and when, to precipitate the nickel, the re-agent is added to this solution, a precipitate is produced which is deemed to be nickel, when in reality it is only iron which has escaped the previous imperfect separation.

Or again, in the precipitation of the nickel as a hydrated oxide, even if other metals have been carefully removed, the use of chemicals rendered impure by the presence of alumina, will result in the precipitation of a hydrate of alumina which may very readily be mistaken for nickel.

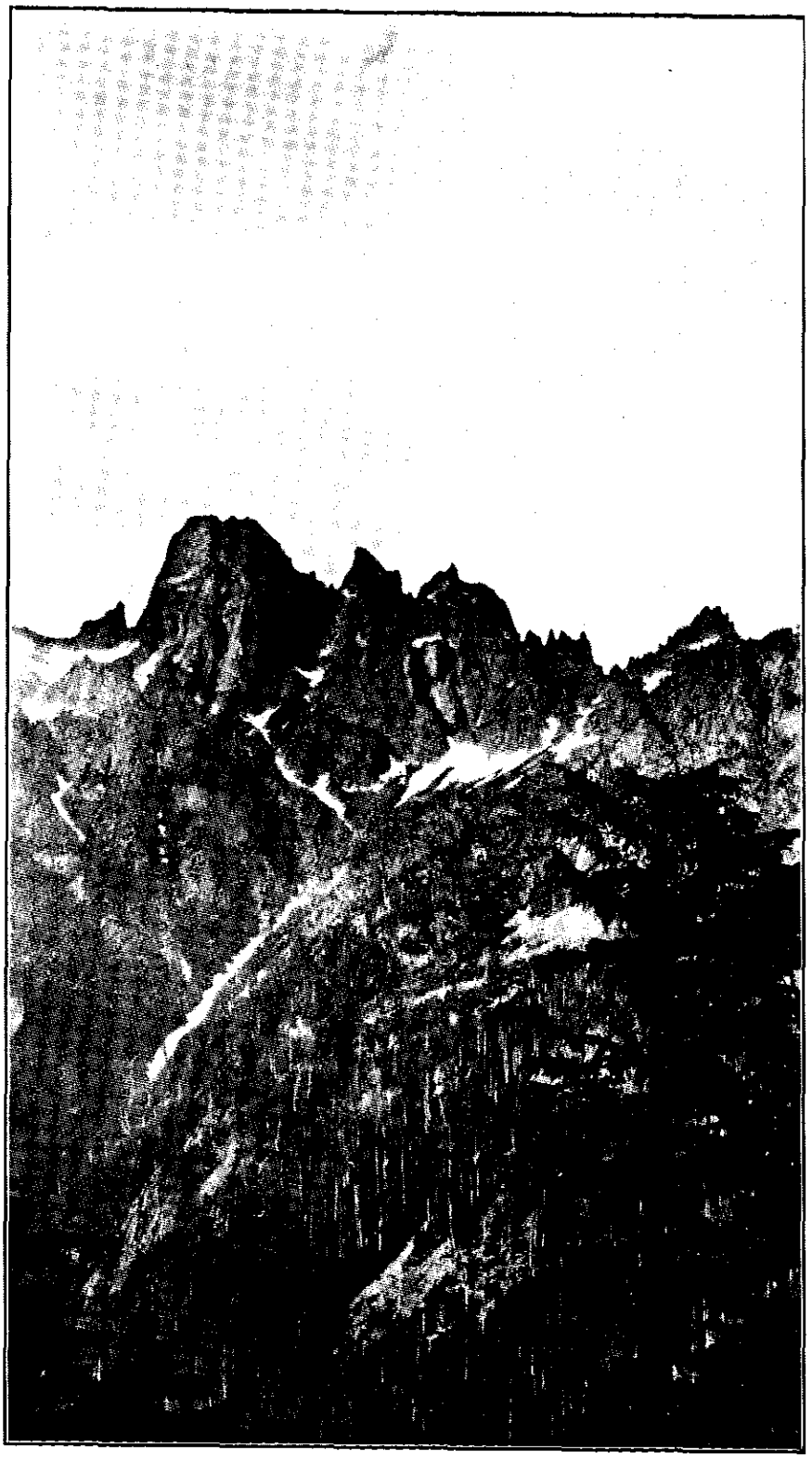
Tin, bismuth and tellurium have also been reported where they did not exist; while copper assays, vitiated by the presence of molybdenum, are quite common.

A standard chemical method for the determination and separation of molybdenum is in course of preparation in the laboratory, and it is hoped will be prepared for publication at no distant date.

**Instruction to Students.**

A course of instruction in assaying and blowpipe mineralogy is given each year in the laboratory to such students as may apply. This past year five students have been taking the course. Several students who in former years have taken the course are now occupying important positions as assayers at mines and smelters.

The Mineral Museum of the Bureau contains a large collection of the ores of the Province, which, through additions made to it year by year, is gradually becoming very complete, although as yet the districts of Lillooet, Arrow Lake and Lardeau are poorly represented. These collections have been found of material use to the students mentioned, and to others, who spend much time in studying them.



TAMIHY MOUNTAIN, SLESSE CREEK, NEW WESTMINSTER, M. D.
(On International Boundary.)

## EXAMINATIONS FOR ASSAYERS.

Report of H. Carmichael, Secretary of Board of Examiners.

I have the honour to submit, as Secretary, the Annual Report of the Board of Examiners for Certificates of Competency and Licence to Practise Assaying in British Columbia, as established under the "Bureau of Mines Act Amendment Act, 1899."

The Act requires that at least two examinations shall be held each year, and such have duly taken place. The first took place at Nelson, in the laboratory of the Hall Mining and Smelting Co., kindly loaned for the purpose, beginning on May 9th, 1904, at which eight candidates presented themselves for examination, of which number two succeeded in passing the required examination, and it was duly recommended to the Minister of Mines that Certificates be issued to them.

The second examination was held in Victoria in the Government Laboratory, beginning on December 5th, 1904, at which four candidates were examined, but all of these failed to reach the standard required.

In addition to the two above mentioned, the Board, during the year, recommended the granting of eight certificates under section 2, sub-section 2, of the Act, all of which Certificates have been duly issued by the Minister of Mines in compliance with such recommendation.

The following is a list, up to December 31, 1904, of those to whom Certificates of Competency have been issued :—

### List of Assayers holding Provincial Certificates of Efficiency under the "Bureau of Mines Act Amendment Act, 1899."

*(Only the holders of such certificates may practise assaying in British Columbia.)*

*Under section 2, sub-section (1).*

| | |
|---|---|
| Austin, John W. | |
| Ayres, E. A. | Trail. |
| Baker, C. S. H. | |
| Barke, A. C | |
| Bishop, Walter | Grand Forks. |
| Buchanan, James | Trail. |
| Campbell, Colin | New Denver. |
| Carmichael, Norman | Ainsworth. |
| Church, George B. | |
| Clarke, Roy H. | Spokane, Wash. |
| Cobeldick, W. M. | |
| Comrie, George H. | Rossland. |
| Collinson, H. | Ladysmith. |
| Crerar, George | Boundary Falls. |
| Cruickshank, G. | Rossland. |
| Davis, A. B. C. | |
| Day, Athelstan | Duncans. |
| Dedolph, Ed. | Nelson. |
| Dockrill, Walter R. | Vancouver. |
| Farquhar, J. B. | Vancouver. |
| Gooding, L. E | Bingham, Utah, U.S. |
| Haseltine, R. S | Idaho. |
| Hawkins, Francis | Sandon. |
| Hurter, C. S. | Ladysmith. |
| John, D. | Ferguson. |
| Kitto, Geoffrey B | Mount Sicker. |
| Lang, J. G. | Greenwood. |
| Ley, Richard N. | Nelson. |
| Marsh, Richard | Rossland. |
| Marshall, William S. | Ladysmith. |
| Mitchell, Charles T. | Grand Forks. |
| McFarlane, James A | Ferguson. |
| Nicholls, Frank | Nelson. |
| Nicholson, Charles F | |
| O'Sullivan, John | Vancouver. |
| Perkins, Walter G | Basin, Montana, U. S. |
| Pickard, T. D. | Hedley. |
| Robertson, T. R | |
| Rombauer, A. B | Butte, Montana. |
| Segsworth, Walter | |
| Sim, Charles John. | |
| Snyder, Blanchard M. | Grand Forks. |
| Sundberg, Gustave | Prince of Wales Isd. |
| Tally, Robert E. | Spokane, Wash. |
| Thomas, Percival W. | Rossland. |
| Tretheway, John H. | |
| Turner, H. A. | Boundary Falls. |
| Vance, John F. C. B | Vancouver. |
| Vans Agnew, Frank | Siberia. |
| Wales, Roland T. | |
| Watson, William J. | Ladysmith. |
| Welch, J. Cuthbert | Boundary Falls. |
| Whittaker, Dalbert E | Victoria. |
| Widdowson, E. Walter | Ymir. |
| Williams, W. A. | Grand Forks. |

LIST OF ASSAYERS HOLDING CERTIFICATES OF EFFICIENCY.—*Concluded.*

*Under section 2, sub-section (2).*

Archer, Allan .....Ymir.
Bryant, Cecil M.....Vancouver.
Blaylock, Selwyn G .....Trail.
Cavers, Thomas W .....
Clothier, George A .....Moyie.
Cole, Arthur A .....Rossland.
Coulthard, R. W.....Fernie.
Cowans, Frederick .....Vancouver.
Dixon, Howard A .....Toronto, Ontario.
Galbraith, M. T.....
Gilman, Ellis P .....Vancouver.
Green, J. T. Raoul .....Blairmore.
Guess, George A .....Trail.
Gwillim, J. C.....Kingston, Ontario.
Heal, John H.....
Hilliary, G. M .....Idaho, U. S.
Holdich, Augustus H.....
Johnston, William Steele ....
Kaye, Alexander.....Rossland.
Lay, Douglas .....McGuigan.
Lewis, Francis B.....
Merrit, Charles P .....
Musgrave, William N .....
Mussen, Horace W .....Siberia.
McArthur, Reginald E .....
McFarlane, James ..... Australia.
McLellan, John .....Camborne.
McMurtry, Gordon O.....Rossland.
McNab, J. A .....Trail.
McVicar, John.....
Maclennan, F. W .....Rossland.
Noble, David T .....Trail.
Outhett, Christopher .....Kamloops.
Shannon, S .....Ferguson.
Stevens, F. G.....Mexico.
Sullivan, Michael H.....Trail.
Thomson, H. Nellis.....Anaconda, Montana.
Turnbull, John M.....Trail.
Twinning, Leslie A. C .....Ferguson.
Watson, A. A ..... Vernon.
Watson, Henry .....
Wright, Richard.....Rossland.
Wynne, Lewellyn C..... Rossland.

*Under section 2, sub-section (3).*

Carmichael, Herbert .....Victoria.
(Provincial Assayer).
Harris, Henry ..... Nelson.
(Asst. Supt. Smelter.)
Kiddie, T. (Supt. Smelter)...Ladysmith.
Sutton, W. J .....Victoria.
McKillop, Alexander .....Nelson.
Pellew-Harvey, Wm .....London, England.
Robertson, Wm. F .....Victoria.
(Provincial Mineralogist).
Marshall, Dr. T. R.....London, England.

PREVIOUSLY ISSUED UNDER THE "BUREAU OF MINES ACT, 1897," SECTION 12.

Pinder, W. J. B .....Dawson, Y. T.
Thompson, James B .....Vancouver.

## EXAMINATIONS FOR COAL MINE OFFICIALS.

During the year 1904 the regulations regarding the qualifications and examinations of officials employed in coal mines have been completely revised and at the same time made much more stringent and thorough.

The "Coal Mines Regulation Act" now provides that all officers of a coal mining company having any direct charge of work underground, shall hold Government Certificates of Competency, which are to be obtained only after passing an examination before a duly qualified Board, appointed for the purpose of holding such examinations, and known as the Managers' Board.

The certificates granted on the recommendation of such Board, and the requirements for same, are as follows :—

FIRST CLASS CERTIFICATE (or Manager's Certificate).

Such a certificate must be held by every manager or "chief officer having the control and daily supervision of any coal mine" in British Columbia. The statutory requirements for this certificate, in addition to such examination and qualifications as may be imposed by the Board of Examiners, are, that the candidate for examination shall be at least 25 years of age, a British subject, and have had at least 5 years' experience in or about the practical working of a coal mine.

Second Class Certificate (or Overman's Certificate).

Such certificate must be held by any person "who has the daily charge of the underground workings of a coal mine under the control and daily supervision of the manager, and next in charge under such manager."

Aside from the requirements of the Board of Examiners, a candidate for such certificate must have had "at least 5 years' experience in or about the practical working of a coal mine."

Third Class Certificate.

This certificate must be held by every shiftboss, fireboss, or shotlighter in a coal mine in British Columbia, and besides the examination by the Board, calls for 3 years' practical experience.

Experience in a coal mine outside of the Province may be accepted by the Board. Any certificate is considered to include that of any lower class.

In addition to the examinations and certificates already specified as coming under the Managers' Board, the Act further provides that every coal miner shall be the holder of a certificate of competency as such. By "miner" is meant "a person employed underground in any coal mine to cut, sheer, break or loosen coal from the solid, whether by hand or machinery."

Examinations for a miner's certificate are held each month at each colliery by a Board of Examiners, known as the Miners' Board, and consisting of an official appointed by the owners, an examiner elected by the miners of that colliery, and an examiner appointed by the Government.

Examinations were held by the Managers' Board, simultaneously at Fernie and Nanaimo, on January 19th to 21st, 1904, under the former regulations, and an examination under the present regulations has been appointed for February, 1905.

The following is the registered list of those to whom Certificates of Competency have been issued by the Managers' Board, the Secretary of which Board is Archibald Dick, Inspector of Mines, Nanaimo:—

First Class Certificates.—Service Certificates Issued Under Section 39, "Coal Mines Regulation Act, 1877."

John Bryden, Victoria.
*James Gillispie.
Edward G. Prior,
Thomas A. Buckley.
*John Dick.
Archibald Dick, Government Inspector of Mines.
James Dunsmuir, Victoria.
James Cairns, Comox, farmer.

CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL MINES REGULATION ACT, 1877."

| Name. | Date. |
|---|---|
| Shepherd, Francis H. | March 5th, 1881. |
| Gibson, Richard | " 5th, " |
| *McGregor, William | " 5th, " |
| Honobin, William | May 1st, 1882. |
| *Muir, Archibald | " 1st, " |
| Little, Francis D | " 1st, " |
| Martell, Joshua | " 1st, " |
| *Scott, Robert | " 1st, " |
| Chandler, William | December 21st, 1883. |
| Priest, Elijah | " 21st, " |
| McGregor, James | January 18th, 1888. |
| Randle, Joseph | " 18th, " |
| *Dickinson, Urick Evan | " 8th, 1889. |
| Matthews, John | " 8th, " |
| *Jones, John Bunyan Louis | " 8th, " |
| Norton, Richard Henry | August 26th, " |
| Bryden, Andrew | December 30th, " |
| Russell, Thomas | April 20th, 1891. |
| Sharp, Alexander | October 27th, " |
| *Lindsay, William Alfred | March 4th, 1892. |
| Kesley, John | " 4th, " |
| Wall, William H. | May 30th, 1896. |
| Morgan, Thomas | " 30th, " |
| Wilson, David | " 30th, " |
| Smith, Frank B | " 30th, " |
| *Jamieson, Robert | " 30th, " |
| Bradshaw, George B. | June 12th, 1899. |
| Simpson, William G | " 12th, " |
| *Fisher, Robert | November 5th, " |
| Hargreaves, James | February 5th, 1991. |
| Drinnan, Robert G. | " 5th, " |
| Browitt, Benjamin | August 3rd, " |
| Stockett, Thomas, Jr | " 3rd, " |
| Pearson, Robert | " 3rd, " |
| Cunliffe, John | " 3rd, " |
| *Lamb, Robert B | " 3rd, " |
| Evans, Daniel | " 3rd, " |
| McEvoy, James | October 17th, 1902. |
| Wilson, A. R | " 17th, " |
| Simister, Charles | " 17th, " |
| Colville, Andrew | " 17th, " |
| Budge, Thomas | " 17th, " |
| Mills, Thomas | " 17th, " |
| Faulds, Alexander | " 17th, " |
| Richards, James A. | " 17th, " |
| McLean, Donald | January 21st, 1904. |
| Wilkinson, Geo. | " 21st, " |
| Wright, H. B. | " 21st, " |
| Coulthard, R. W. | " 21st, " |
| Roaf, J. Richardson | " 21st, " |
| John, John | " 21st, " |
| Manley, H. L. | " 21st, " |

*Dead.

# CARIBOO DISTRICT.

## CARIBOO AND QUESNEL MINING DIVISIONS.

Report by John Bowron, Gold Commissioner.

I have the honour to submit for your information my thirtieth annual report upon the mines and mining operations in Cariboo District for the past year.

The phenomenally dry season has been most disastrous to the successful working of our hydraulic mines, by which method three-fourths of the gold yield of the district is at present produced; consequently, the output has been much less than it would have been under normal weather conditions. Although the snowfall of the winter 1903-4 (a source from which most of the hydraulic claims have to depend for their water supply) was fairly good, a warm spell in March caused most of the snow to melt and run off before the hydraulic season had commenced, and the remainder disappeared suddenly in a most extraordinary manner, without creating any freshet whatever, a circumstance quite unprecedented.

I have but little to report in the way of new discoveries of gold; in fact, nothing worthy of note, if I except a reported discovery recently made at Horsefly, the particulars of which I am not at present informed.

A large part of the available labour of the district, of which there has been a visible decrease during the past year, continues to be absorbed in work of construction upon our larger enterprises which have not yet reached the producing stage. The actual commencement of railway construction to our north will doubtless reverse this condition of affairs, and will also, it is generally believed, prove a veritable panacea for all our ills, not alone from the increase in population which it will bring, but more especially from the fact that capitalists, who now decline to take the long and tedious 280-mile stage journey, will, with greater transportation facilities, visit our mines personally, and will doubtless, many of them, be induced to invest, with the result that much of our dormant wealth will be brought to light.

I much regret I am as yet unable to report the extensive works at Slough creek, Willow river and La Fontaine, as having reached the condition of producing mines, but there is certainly a well-founded hope that I shall be able to do so another year; the present status of these mines I shall speak of later.

It will be noted that, notwithstanding the decreased population and the absorption of a very large part of the available labour on non-productive work, not to mention the fact that, by the drought, much time was lost, there has been a small but satisfactory increase in the gold product of the district over that of 1903.

## QUESNEL MINING DIVISION.*

In the Quesnel or southern division of the district, notwithstanding the scarcity of water, the Consolidated Cariboo Hydraulic mine produced somewhat more than last year, although having less than one-half the normal water supply. This company now finds it necessary to provide against a similar contingency in the future, by adding to its already extensive ditch

*See also Report of Mining Recorder, page 50.

systems, upon which, it is understood, a large expenditure is contemplated the coming year. I regret my inability to speak more definitely of the operations of this company, but Manager Hobson regards it as his first duty to report to his company, after which he promises to send in his report, but the same has not yet come to hand.

NOTE BY PROVINCIAL MINERALOGIST.—Through the courtesy of Mr. J. B. Hobson, the Provincial Mineralogist has been permitted to make the following extracts from his report to his directors as to the operations during the season 1904:—

"The past season again turned out a most disappointing one, for the reason that the fall precipitation and winter snow failed to afford the quantity of water expected at the opening of the season. The lack of the usual summer precipitation and the heavy evaporation from the reservoir lakes caused by the unusually hot, dry weather that prevailed throughout the summer months, worked a great reduction in the season's water supply, and left only sufficient to operate the mine 88 days and 16 hours—from the 15th of April to the 2nd September—out of a possible season of 212 days.

"Washing gravel from the main bank with water from the reservoir lakes commenced on the 9th May, and continued for a period of 38 days and 19½ hours, ending on the 23rd June. During the progress of the run, 103,389$\frac{1}{10}$ miner's inches of water was used to wash out 920,000 cubic yards of top gravel and indurated volcanic mud, from which was recovered 3,425.09 ounces of gold, valued at $58,358.09, an average yield of 6$\frac{34}{100}$ cents per cubic yard; the duty attained for the water used being about 8$\frac{89}{100}$ cubic yards per miner's inch.

"The second run commenced immediately after the moving of the hydraulic plant and advancement of sluices—on the 16th July,—and continued for a period of 33 days and 16½ hours, ending with the exhaustion of the water supply on the 2nd September. During the progress of the run, 81,500 miner's inches of water was used to wash out 407,817 cubic yards of top gravel and indurated volcanic mud, from which was recovered 1,552$\frac{15}{100}$ ounces of gold, valued at $26,508.12, an average yield of 6$\frac{5}{10}$ cents per cubic yard; the duty attained for water used being about 5 cubic yards per miner's inch.

"SUMMARY OF THE SEASON'S MINING OPERATIONS.

| | | | |
|---|---|---|---|
| "Total time occupied in washing in Pit No. 1 | 88 days, 16 hours. | | |
| Total quantity of water used | 225,198 miner's inches. | | |
| Quantity of top gravel, clay and slide rock washed: | | | |
| Winter accumulation of ice and slide rock from rims. | 120,986 | cubic yards. | |
| Gravel from face of bank, Bench No. 3 | 1,327,817 | " | " |
| Bedrock gravel | 638 | " | " |
| Bedrock cut in N.E. rim for pipe lines | 6,700 | " | " |
| Bedrock cuts for advancement of sluices | 5,200 | " | " |
| Total quantity washed | 1,461,341 | " | " |
| Average duty of water per miner's inch | 6$\frac{49}{100}$ | " | " |
| Average yield per cubic yard washed | 5$\frac{88}{100}$ cents. | | |
| Average daily product for water used | $969.27. | | |
| Gold product for season | 5,037$\frac{89}{100}$ ounces. | | |
| Value of gold | | $ 85,936 | 30 |
| Value of gold recovered prior to 1904 | | 1,122,798 | 36 |
| Total product of mine from 1894 to date | | 1,208,734 | 66 |

The receipts and expenditures attending the operation of the Company's mines for the season will be found distributed in detail in the following statements:—

"Operating Expenses.

| | |
|---|---|
| Mining | $30,815 05 |
| Explosives | 21,148 20 |
| Sluice maintenance | 6,493 09 |
| South Fork ditch maintenance | 5,786 34 |
| Morehead ditch maintenance | 4,401 72 |
| Camp maintenance, fuel, etc. | 1,288 91 |
| Mine and camp light maintenance | 605 73 |
| Waggons and harness maintenance | 212 67 |
| Telephone maintenance | 109 51 |
| Roads and trails | 64 47 |
| Stationery and printing | 138 13 |
| Postage and telegraph | 410 67 |
| Legal expenses | 15 00 |
| Lands and leases (lease rentals) | 2,048 75 |
| Licence | 110 00 |
| Insurance | 803 00 |
| Office expenses | 1,684 77 |
| Bullion expense (royalty, insurance, etc.) | 3,624 50 |
| Management | 6,712 41 |
| Stable expense | 541 08 |
| Tools and implements (loss for season) | 519 03 |
| Horses (loss for season) | 400 00 |
| Quicksilver (loss for season) | 490 72 |
| Total | $88,423 75 |

"Receipts.

| | |
|---|---|
| Gold recovered for season | $85,936 30 |
| Profit on stores sold | 3,891 78 |
| Total | $89,828 08" |

As has been previously pointed out in Mr. Hobson's Reports, and by the Provincial Mineralogist in the Report for 1902 (page 81), the bedrock in the pit does not rise at a grade as steep as has been found necessary to run the sluices; consequently, as the pit advanced, the present sluice, which is as low as it can be, eventually arrived at the elevation of the bedrock. This sluice can be extended for a long distance yet to remove the upper benches and top burden, but the lower bench, lying on bedrock, will have to be removed by a shorter sluice system, which Mr. Hobson proposes to make by running a tunnel from the Quesnel river, through the rim-rock, a narrow ridge dividing the ancient and modern channels.

"Sluice Tunnel.

"The sluice tunnel required for the second outlet from the mine to the dumps into the South Fork of the Quesnel river, when completed will be 1,200 feet in length; the dimensions of the tunnel are 10 feet by 10 feet in the clear, and large enough to accommodate a sluice 7 feet wide by 3 feet deep, and a walk 2 feet 6 inches wide placed on one side for the sluice tenders. The wet and loose condition of the surface rock on steep side-hill delayed the starting of the work until late in the spring; considerable difficulty was encountered in driving through the loose ground, which required timbering with heavy sets placed 3 feet apart for a distance of 63 feet; when the loose ground was passed, two shifts of miners were set to work with two No. 15 Gardner electric drills, and advanced the tunnel 197 feet in hard rock, making the total distance driven to the close of the season 260 feet, at an average cost of $12 per foot. Better

progress was made as the men became more familiar with the use of the electric machines, their duty improving gradually until the advance of tunnel increased from 21 feet to 38 feet per week. At this rate of progress the tunnel can be completed in time for use before the close of the season of 1905.

"It is intended to take up the bed-rock deposits of the 4th bench by hydraulic elevator during the progress of next season's operations, and the high-grade of the deposits, as shown by the working tests made at the close of the season of 1903, which showed an average value of about $1.50 per cubic yard, assures good results from the elevator.

"By reference to the following tabulated statement it will be noted that the gold product is dependent mainly upon copious precipitation and an abundant supply of water:—

"PRODUCT OF MINE SINCE COMPLETION OF WATER SUPPLY SYSTEM IN 1898 COMPARED WITH PRECIPITATION.

| Year. | Precipitation in inches. | Water used in miner's inches. | Time Run. | Cubic Yards Gravel Washed. | Product. |
|---|---|---|---|---|---|
| 1899 | $28\frac{855}{1000}$ | 353,056 | 144 days, 8 hours | 1,952,535 | $ 92,678 93 |
| 1900 | $30\frac{667}{1000}$ | 460,878 | 171 " 13 " | 1,843,938 | 350,085 77 |
| 1901 | $20\frac{350}{1000}$ | 253,250 | 104 " 13 " | 2,420,288 | 142,273 41 |
| 1902 | $23\frac{440}{1000}$ | 179,520 | 65 " 15 " | 690,442 | 61,395 19 |
| 1903 | $17\frac{488}{1000}$ | 127,083 | 53 " 7 " | 373,000 | 44,943 70 |
| 1904 | $24\frac{388}{1000}$ | 225,198 | 88 " 16 " | 1,461,341 | 85,936 30 |

"It is, therefore, evident that dependence upon the precipitation over the area of watershed now under control, is accompanied with too much uncertainty to insure the financial success desired, and that the present water supply system must be extended to a permanent source that will afford an abundant supply of water throughout the open season.

"Since the close of the season of 1903 hydrographic surveys have been made to determine the possibility and cost of increasing the Company's water supply, by the construction of a canal along the westerly slope of the Morehead range, from Morehead lake reservoir, a distance of about 15 miles, to the creek known as Three-Mile creek, as measured from the Beaver lake house, or by the construction of a system of canals and inverted syphons from the Company's mines, a distance of about 17 miles, to Spanish lake, which is situated in the mountains at the head of Spanish creek, a tributary of the North Fork of the Quesnel river.

"WESTERLY SLOPE OF MOREHEAD RANGE.

"*Estimated cost of Canal having capacity for delivering 2,500 miner's inches of water.*

| | |
|---|---|
| "Ten miles of canal, including flumes, waste-gates, etc., from Morehead lake to 8-Mile creek, at $8,000 per mile | $80,000 |
| Five miles of canal, etc., from 8-Mile creek to 3-Mile creek, at $8,000 per mile | 40,000 |
| Timber crib dams at outlet of 3-Mile and 8-Mile lakes, with gates, camp buildings, etc | 2,000 |
| Total cost of south-west Morehead Canal | $122,500 |

"*Estimate of probable cost of Canal and pipe lines required to deliver 2,500 miner's inches of Spanish lake water at the Morehead pooling reservoir.*

| | |
|---|---|
| "Construction of 15 miles of canal at $9,000 per mile | $ 135,000 |
| 2,500 feet of 40" pipe line across Poquette pass at $8 per foot laid | 20,000 |
| 8,000 feet of 40" pipe crossing the South fork of Quesnel River at $10 per foot laid | 80,000 |
| Timber crib and plank-sheathed diversion dam at outlet of lake | 10,000 |
| Total estimated cost | $245,000 |

"A canal and system of pipe lines having a capacity for the delivery of 5,000 miner's inches of water can be constructed at a cost not exceeding $490,000.

"For several years last past, qualitative tests have been made from time to time for the presence of gold, platinum and osmiridium, in the heavy concentrates that remain in the sluices after cleaning up; and while making one of these tests in May, 1903, the presence of palladium was indicated, in addition to platinum and osmiridium. An analysis of a sample of concentrates, made by J. O'Sullivan, F. C. S., Chemist, of Vancouver, in May, 1903, gave large percentages of gold, platinum, palladium and osmiridium, which brought the value of the concentrates up to $3,872.76 per ton. A second sample taken from a pan of concentrates taken from the sluices after the clean-up in September, 1904, was sent to Mr. J. O'Sullivan, Chemist, of Vancouver, and gave the following results :—

| | Ozs. per ton. | | Gross value per ton of 2,000 lbs. |
|---|---|---|---|
| "Gold | 95 | | $ 1,900 00 |
| Silver | 180 | | 90 00 |
| Platinum | 64 | | 832 00 |
| Palladium | 64.4 | | 1,769 00 |
| Osmiridium | 42 | | 1,386 00 |
| Copper | 10.5% | | 16 56 |
| Total value | | | $5,993 56 |

"The gold and silver values are, no doubt, included in particles of pyrite and argentiferous galena and partly in small particles of gold covered by manganese and other metallic oxides, and cannot be recovered by the process of amalgamation. The platinum, palladium and osmiridium are found in minute metallic grains and enclosed in small fragments and nuggets of magnetite and chromite, which appear to make up quite a large percentage of the sluice concentrates found after cleaning up.

"What quantity of these high-grade concentrates are included in the deposits, or can be recovered therefrom, cannot be determined until after the completion of the system of undercurrents which is to be placed at the end of the sluice outside the tunnel, where everything of value will be separated from the tailings before going over into the dump and concentrated on the undercurrent tables. These undercurrents will probably be completed and placed in operation before the close of the ensuing season."

### Keithley Creek.

The *Onward* claim, on Keithley creek, owned by Messrs. Veith and Borland, referred to in last year's report, is proving a valuable mine. This is on a hill channel situated on the left side of the creek, about two miles from its mouth. It is 250 feet into the hill, about 75 feet above the present creek, and is a drifting proposition. The discovery of this channel was made two years ago, but encountering so much water as to render the working of the ground difficult and expensive, a great part of the present season has been devoted to the running of

a drain tunnel along the rimrock, which in July had been so far advanced as to render it possible to resume work on the pay gravel in the face. On an average, 15 men are employed on this mine, which pays its owners a dividend of from $1,000 to $1,200 per month. Work will be continued during the winter.

### SNOWSHOE CREEK.

The *Hayward* hydraulic claim, on Showshoe creek, owned by the same firm, owing to the dry season, worked but 50 feet in length of bedrock by 100 feet in width. About the first of September the water supply gave out entirely, when only two-thirds of the bedrock had been cleaned up; ten men were employed when piping, and five during the time of cleaning up bedrock. This claim paid about $1,000 in dividends.

The Luce Company, of which Mr. W. F. Anderson is foreman, working on this creek, employed four men during the time of piping, and worked about three months in all, cleaned out the old ground-sluice, and put in 250 feet of new flume to the face, where pay was left ten years ago, upon which operations will be resumed in the spring. The claim about paid expenses for the season.

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## THE CARIBOO MINING DIVISION.

Leaving the Quesnel Mining Division upon which it is presumed the Mining Recorder, Mr. Stephenson, will give a more detailed report, and coming to the Cariboo Division, I shall first refer to the mines still operating on Williams creek.

### WILLIAMS CREEK.

It is now 44 years since gold was first discovered on this stream, and when we consider that it has been worked continuously every year since, and that for a distance of only two and a half miles, it is surprising to find that within this limit gold is still annually produced in considerable quantity. Although the richer deposits in the deeper bedrock channel have been drifted out long since, and the shallower ground along the side-hill, situated at a sufficient elevation to admit of its washings being deposited into and carried away by the waters of the creek, has been worked by hydraulic process, yet there is an immense body of auriferous gravel as yet untouched, lying between the drifted out bedrock gravel and the surface of the present creek channel. It was this knowledge that induced the Cariboo Gold Fields, Limited, to instal its costly hydraulic lift-plant, which proved a failure (in consequence of the great elevation to which the gravel had to be raised) and their subsequent installation of a system of bucket elevators, which have not hitherto proved an entire success, owing to the wearing of the bearings which support the buckets. The introduction, this season, of chilled steel bearings appears to have solved the problem as to the proper method of raising the gravel from the pit to a sufficient height for its disposal, at a minimum cost. The gravel has been proved to contain high values, quite equal to expectations. Regarding the season's operations the manager, Mr. Bromfield Brough, says :—

"The new chain installed has worked well, with little if any signs of wear. There had been a good snowfall and the gravel to be operated upon showed decided signs of improvement; in fact, everything pointed to a very successful season. Unfortunately, as you are aware, the weather in June and all succeeding summer months proved to be abnormally dry. There appeared also to be unusual evaporation of the water in the hills; owing to the continual bright sunshine the water supply fell away suddenly, so that we were obliged to desist from elevating on the 23rd July, after running from the 23rd May. We had hoped that rain would

set in in the autumn and enable us later to resume elevating, but the expected rain did not come in time for us to do so. From 15 to 25 men were employed working the mine while it was in operation, and the clean-up for the amount of ground worked was satisfactory."

The *Mount* claim, situated on the west side of Williams creek immediately below the Cariboo Gold Fields property, is a hydraulic proposition. In respect of the season's operations the secretary, Mr. Tregillus, says :—

"The season's water was much below the average, and without our reservoir we should have been helpless. Our bank has increased in depth 11 feet, and is now 51 feet high; the increase is composed of an additional 20 feet of hard clay, while the gravel decreased from a thickness of 16 feet in 1903 to 6 feet in 1904. We moved 17,000 cubic yards of material, at a cost of a fraction over 9 cents per yard, which was slightly in excess of the yield. We employed on an average five men when working."

The First of May Hydraulic Company, operating on upper Williams creek, had a satisfactory clean-up for the short time it was able to work; six men were employed.

The Forest Rose Hydraulic Company, which made extensive improvements in the fall of 1903 for the next season's work, by thoroughly repairing its flumes, ditches and plant, was much disappointed at the short run of water. Having a very high bank (about 100 feet), part of which is hard clay, but little headway was made during the one month it was able to pipe. The result was fairly good, however.

The *Mucho Oro* claim, on Stouts gulch, owned by this same company, was enabled this year (by the Wintrip Company having worked up to its lower line) to instal and work its hydraulic plant, and had a very successful run of 26 day's piping, giving the company a good dividend for the time worked. Six men were employed.

The *Wyoming* claim, also on Stouts gulch, employed five men, placed a new monitor on the claim and dug a new ditch. The wash-up was fairly satisfactory.

### Lightning Creek and Tributaries.

This well-known stream, whose placers have yielded so largely in the past, is again giving evidence of coming to the front as a producer of the precious metal; chiefly from developments made by the Cariboo Consolidated, Limited, at their La Fontaine mine. As to present conditions, Mr. Bailey, M.E., the manager, says :—

"My report to you last year gave a detailed description of the plant that had been then installed. To this plant, during the past year, has been added a small saw-mill for cutting lagging, wedges, keys, etc. An hydraulic ram, operated by the water from the ditch from Lightning creek, has also been put in the pump discharge drain from the shaft, to raise water to the reservoir on the side-hill back of the shaft-house. This was made necessary by reason of the dryness of the past season. A sluice flume, for washing the gravels at the shaft-house, has been extended and housed in for a length of 90 feet.

"The main tunnel from the shaft was run a distance of 306 feet to the gravel in the deep channel. From this main tunnel 'drives' have been run both up and down stream, with the object of draining and blocking out the gravels in the deep channel. Cross-cuts have been run from these drives, and we now have practically 400 feet in length of the deep channel blocked out and in a condition to mine when once the gravel is drained. The total length of the various tunnels, drives and cross-cuts amounts to over 1,000 feet.

"That we are making good progress in draining the deep channel gravels is shown by the fact that we are steadily lowering the water level in the old *Eleven of England* shaft, situated about 550 feet further up the stream than our *La Fontaine* shaft. This lowering already

amounts to 80 feet, since the water was first tapped by the main tunnel last April. We estimate that we still have a depth of about 40 feet yet to drain before we will be in a position to work out the gravels on the large scale contemplated.

"At present we are pumping approximately 1,300,000 gallons of water in 24 hours, or less than one-half the capacity of the pumps installed.

"The values obtained from the bedrock gravels are of the most encouraging nature, and prove without doubt that the gravels can be mined at a large profit when once the deep channel has been drained.

"A daily average of 40 men has been employed at the mine during the past year.

"The company did not operate the *Lowhee* hydraulic mine during the past season, as they decided it best to use their resources in developing the Lightning creek property.

"The *Ah Quay* hydraulic mine, near Stanley, also owned by this company, was rented to other parties and by them operated with fairly good results."

The Lightning Creek Gold Gravels & Drainage Company, after having been driven from its underground works last season, has done but little further to prove the value of the ground, confining its efforts to the procuring of additional plant and placing the same upon the ground, preparatory to installing and operating it in the early spring, referring to which, and other works in that vicinity, Mr. Boyd, of Cottonwood, writes me :—

"The Lightning Creek Gold Gravels & Drainage Company has delivered at the present location of its works at the wing-dam, a first-class Keystone drilling machine, with all the necessary plant for drilling, which the company intends doing in the early spring, to find the deepest channel of Lightning creek at or near the present works, and when determined, other works necessary for the opening of mining operations will be prosecuted without delay. At or near the wing-dam on Lightning creek, and for three or four miles further down, considerable mining has been done during the summer, and is now being done on the bars and benches, in a primitive way, by Chinese with rockers. Considerable gold is being extracted."

### Mosquito Creek.

On Mosquito creek, one of the tributaries of Lightning, the McPhail company is having a ditch made to convey water to where it intends commencing hydraulic works in the spring for the purpose of thoroughly testing the ground before making preparations to work on a more extensive scale. Further down Lightning creek and on Cottonwood river, below the bridge, considerable mining is being done and quite a quantity of gold has been extracted.

The Point Company has again this season proved a valuable contributor to the gold harvest of the district, but was prevented from working a great part of the season by the influx of water into its diggings, and the works are at the present writing closed down.

Some considerable work has been carried on during the year on different parts of the creek and its tributaries by individual miners, with, in most cases, indifferent results.

### Slough Creek.

The exploiting of the deep ground of the Slough Creek, Ltd., has proven to be perhaps the most difficult and expensive proposition of its kind undertaken in this part of the Province. This enterprise having been referred to in previous reports at considerable length, it will be unnecessary here to make more than reference to the season's operations. For this information I am indebted to the manager, Mr. John Hopp, who, reporting to me on 29th November, says :—

"Since last year's report, after a short cessation of work about the first of the year, the Board decided to resume work in the two upraises, for the purpose of increasing the drainage area and thereby increasing, if possible, the flow of water, up to the capacity of the pumps. The flow is carefully measured daily over a weir dam placed in the air locks. All the water of the mine is forced to flow over the weir, and an accurate measurement is secured of the amount flowing per minute. The water made continued much the same, and for a short time increased slightly, though a number of new cross-cuts had been driven into the gravel. About the first of March a slight decrease was noticed, which has been steadily maintained ever since. On the first day of March we were pumping 774 gallons per minute, or 1,114,560 gallons in 24 hours. This has reduced steadily, and to-day's flow was 501.74 gallons per minute, or 722,505 gallons in 24 hours. The work of driving cross-cut tunnels was continued until August, when it was decided to discontinue this work, for although there has been a very remarkable improvement in the reduction of the heavy pressures and flow of water, yet these were too heavy to make satisfactory headway.

"The steady decrease of water during the entire spring freshet, and the continuous working in the tunnel at the same time, proves conclusively that there is no connection between the surface water and the water now being drained out of the gravel channel, which is covered with a capping of 100 feet of blue clay, and that it will be only a question of time when the ground will be thoroughly drained and easy to work. From the small amount of gravel taken from all of the openings into the channel most encouraging prospects of coarse gold were secured, although all of the gravel was shovelled out of a torrent of water, and it would be possible to save only a small percentage under such conditions.

"It was impossible to drift in an open face of gravel or to definitely locate the deepest part of the channel, and it was decided best to put in a diamond drill to take a cross-section of the channel from the main tunnel. This work has been carried on with a No. 10 American Diamond Rock Drill plant, using compressed air; and barring accidents, it is expected that this work will be completed about first of January.

"The pumps and machinery are in good order throughout, and with the continual drainage and decrease of water there is every indication of success in the near future."

The other mines on this creek and its tributaries, operated principally by Chinese, have produced, approximately, the usual amount of gold.

### Willow River and Tributaries.

**Willow River Mining Company.**

This important and costly undertaking deserves more particular mention than I am in a position to give; not only because of the benefits its success would exert upon the community, but because of the moral effect in inducing other companies to undertake the exploitation of deep ground similarly situated, of which there is an abundance in the district. This company has certainly experienced many difficulties in reaching bedrock, principally from the influx of water, but has at last succeeded. While sinking the sump the workmen were driven out, but succeeded in pumping the water from the shaft with the powerful 28-foot water-wheel operating two 18-inch Cornish pumps, and the company was able to drive out through bedrock. When just getting into the channel, from which excellent prospects had been obtained, the workmen were again drowned out; but after fluming a part of the ditch and tailrace, the pumps were once more started. At this writing the diggings are dry and operations in the face will at once proceed, with every prospect of excellent results.

In response to my inquiry regarding the *Alabama* claim, Mosquito creek, the foreman, T. H. Flynn, briefly says :—

"The *Alabama* claim has done better this season than in any previous year, and the outlook is bright for the future. We have taken out about $4,500 this year, the result of 25 days' piping. We employed nine men altogether—two whites and seven Chinese."

The *Williams* is a hill claim adjoining the *Alabama*, Mosquito creek, and belonging to the same parties. Regarding the season's operations, the foreman, H. E. Flynn, says:—

"In regard to the operations on the *Williams* claim this season, we piped about 38 days with a very light head of water, seven men being employed. For 15 days of the above time we had only sufficient water to work the 1½-inch nozzle, which is a very light head considering that we are operating with a No. 1 monitor, with about 160 feet of pressure. Still, the yield of gold has been most satisfactory, considering the amount of ground worked, the value of the gold taken out this season being between $6,000 and $7,000, or an average of about $170 a day for the time worked. The expenses were about $2,000. We have just completed a reservoir on this claim which will hold sufficient water, with a half-head coming in, to operate for five hours with a full head. This will greatly benefit the claim during light water. The prospects for another season are very favorable."

On Albrecht creek, a tributary of Willow river, two miles below Dragon creek, Messrs. Clarke, McIntyre & Co. are running a prospecting tunnel to tap a channel previously discovered in the hill, upon which work is going on at the present time.

### Antler Creek and Tributaries.

On the main stream there is but little to report. Henry Boursin, having re-located a portion of the ground formerly held by the Cariboo Deeps, Limited, continued a tunnel into the deep ground under the hill, in which fairly good prospects had been obtained by the former company, in the hope of finding a bedrock more favourable for the lodgment of gold, as, so far as the channel had been prospected, it was found narrow and exceedingly smooth. Work will be continued during the winter.

### Grouse Creek.

The *Waverly* mine, of which J. Pomeroy is foreman, commenced work about the middle of May, and worked in all four months, employing seven men and taking out about 450 ounces. During this time the pipe-line was changed, but no new plant installed. The outlook is exceedingly good for many years to come.

The *United* is a company recently organised with a view to locating what is known as the lost "Heron lead." A tunnel has been driven into the hill some 400 feet, but as yet no indications of the lost lead have been discovered. Work is still progressing.

Of the other mines working on this creek, none have taken out more than working expenses.

### China Creek.

The China Creek Hydraulic Co., under the management of B. A. Lasell, reports a very successful season on its properties on China creek, and of the showing in the mine Mr Lasell says:—

"Hydraulicing was commenced about the 15th of May and exceptionally good progress was made throughout the season's run, which ended about the 4th of July. During this time 6 days were lost by slides coming into the ditches, etc., making the actual run about 43 days. 101,000 cubic yards of material was moved. I will make no specific statement regarding the amount of gold taken out, but will say it was considerably above expectations. As the summer was an exceptionally dry one, only a short fall run was made. During the season the plant was put in excellent condition, the flume was taken out of the old cut and placed in a straight line through the pit, the ditches were cleaned and repaired and a new ditch was dug to carry

water for a small pipe-line to be used in cleaning up. Surveys were completed for a dam which, when built next summer, will create a reservoir which will be used in storing water during the early part of the season, and will insure a good water supply for the greater part of the season. This mine has undoubtedly a very bright future. During the season 15 men were employed."

The mine on McBean bench, belonging to this Company, was worked but a short time in the spring, a pipe-line was laid and about 10 days piping followed, showing satisfactory indications of its becoming a mine when further developed. The water was required to work the China creek claim; hence the short run.

The Chinese companies working on Stevens, Beggs and California creeks have produced the usual amount of gold.

### Cunningham Creek.

The Bear Hydraulic Co., J. Wendle, foreman, possesses a hydraulic mine of much promise, and being one of considerable magnitude, its success will prove of much importrnce to the district. Respecting the mine, Mr. Wendle furnishes me with the following information:—

"This mine is situated on what is supposed to be an ancient channel. It is located on the southerly side of Cunningham creek about one-half mile below its confluence with Pass creek, and, as is frequently the case, it is very difficult to locate the general position of the ancient channel until a certain amount of work has been done.

"The equipment of this mine was finished late last season, and it was possible to do only a small amount of work in the mine before winter set in. This season's work was, therefore, principally of a prospecting nature.

"The sluice-flume was placed at a point carrying about 10 feet of bedrock, and work was continued, as was supposed, directly across the channel. After going ahead a distance of 250 feet a shaft was sunk, and it was found that the sluice-flume would be 20 feet above the bedrock at that point. The sluice was then moved and placed 20 feet lower. As this necessitated a rock cut and other charges, it was close to the end of the season before the work was resumed.

"The deposit in this channel is about 110 feet deep, and possibly 400 to 500 wide, only one rim being exposed, and, with the exception of a small amount of surface silt and mud, is gravel carrying values, although the principal pay streak is from 5 to 20 feet thick and lies on bedrock. The gravel is of a reddish brown colour and is easily washed. The gold obtained varies in size from fine flour gold to pieces worth five dollars, and is easily amalgamated. The mine is equipped with a 48-inch sluice, 4 miles of 5-foot ditch, 2½ miles of 2-foot ditch, 2,000 feet of 30-inch to 15-inch pipe, 1 No. 6 giant, with all necessary camp buildings. During the season 15 men were employed."

Higher up Cunningham creek is the claim of McGregor, Thompson & Ross, as are also those of R. Creswell and others; and although it is known these companies have taken out a considerable quantity of gold, I am unable to obtain particulars as to definite results.

### Eight-Mile Lake and Vicinity.

The Thistle Gold Co., Ltd., of Eight-mile lake, has had another successful season, but, like the other hydraulic mines, was much handicapped from the scarcity of water for washing purposes, speaking of which the assistant manager, Mr. Burgess, writes me:—

"The season has been much shorter than usual, owing to the extremely light rainfall, 175 ten-hour shifts being the actual hydraulicing time, as compared with 275 shifts for the season of 1903. Piping was carried on through two No. 2 giants, under a pressure head of 100 feet. The total length of the system of sluices is now about 2,000 feet, which are set on

a grade of 4 inches to the 12-foot box. With the exception of the head boxes, in which longitudinal riffles are used, this system of sluices is paved throughout with blocks. An open-cut drain, about 800 feet in length, was excavated during the season at the lower end of Eight-mile lake. This lowered the surface of the lake about four feet, thereby giving greatly increased dumping facilities. An average of about 20 men are employed on this property.

"For the time being, hydraulicing has been discontinued on the Coffee creek property. A tunnel, now about 80 feet in length, is being run up stream in order to test the ground ahead. The indications for a paying property on this stream are very good."

The Slocan-Cariboo Company, of Canadian creek, has confined its efforts during the past season to determining the depth and course of the channel, by running a tunnel some 300 feet in length below the old *Clear Grit* workings, which has been accomplished in a satisfactory manner. Work is closed for the season, to be resumed in the spring.

On Jack of Clubs creek, the Discovery Company has driven a tunnel 1,200 feet to tap the hill channel, and sunk a shaft to the tunnel to facilitate the disposal of the dirt. Employed six men. The channel had not been reached when work was recently suspended for the season.

The Pleasant Valley, Limited, of Pleasant Valley creek, having installed water wheel and pumping machinery, is now in readiness to commence development work upon the return of the manager, who recently left for England upon a brief visit.

On Stoney creek, A. Stott & Co. have opened up a hydraulic claim which promises well, as, even in opening, it has paid current expenses.

On Summit creek, a number of small companies continue working, taking out small pay.

### Fraser and Quesnel Rivers.

On Quesnel river, the National Hydraulic Mining Company employed some 15 men during the season, but as to the result of its operations, I have been unable to obtain any information. It is, therefore, safe to conclude that nothing of importance has been developed.

On this same stream, James Deacon, having fitted up the old *McLaren* claim to be worked as a hydraulic mine, has the ground now fairly well opened up, and doubtless satisfactory results will be obtained another season.

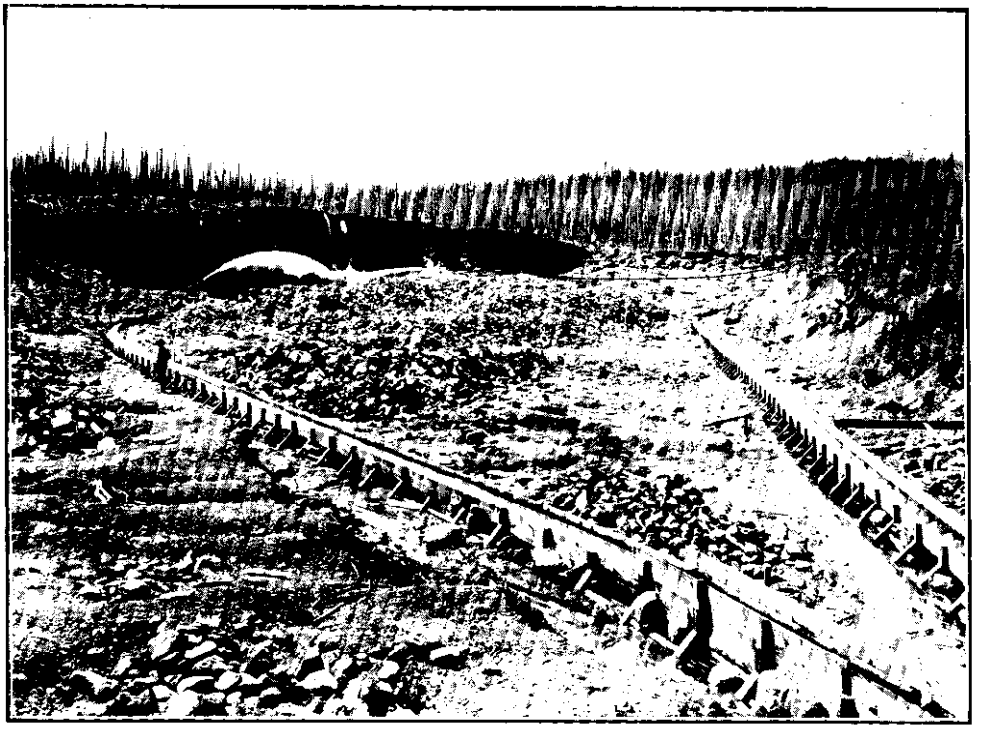
A few white men, and quite a large number of Chinese, continue to work the bars and benches of the Fraser and Quesnel rivers, with varying success, but usually reap a rich harvest when the water is low in the river, as it has been the present summer and fall; consequently, the gold product from this source has been somewhat better than usual.

### River Dredging.

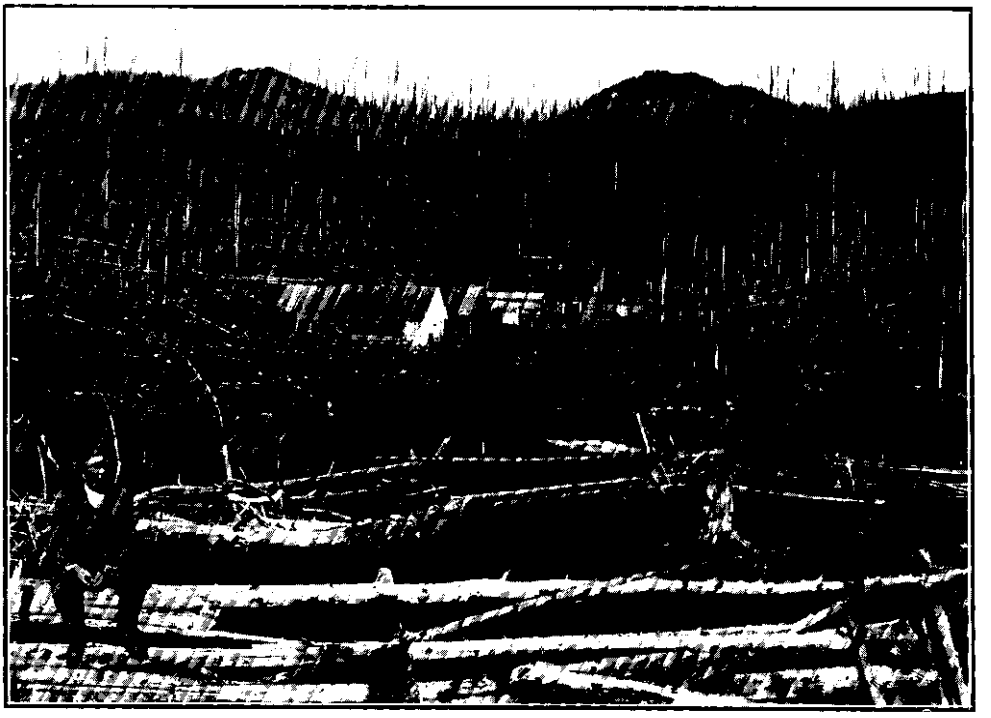
Nothing further has been done this season to prove that this system for the recovery of the auriferous sands and gravels in the beds of the streams may be pursued with profit; but, given improved transportation facilities, I personally have the utmost confidence that this system will ultimately prove a source of wealth to the district, as past experience has shown that the first cost of transporting and installing the plant is not the only drawback at present experienced, but the loss of time entailed from the breaking and wearing of the plant occasions much delay, and consequent expense, before the same can be replaced. Consequently, this present dormant resource will probably remain in *statu quo*, until railway communication is an accomplished fact.

### Quartz.

If I except some half a dozen claims upon which sufficient was done to entitle their owners to a certificate of work, nothing has been done further to develop our quartz veins, save what has been accomplished by Messrs. Baker and Atkin.



THISTLE GOLD MINING CO.'S HYDRAULIC MINE 8-MILE LAKE, CARIBOO.



PLEASANT VALLEY NEAR BARKERVILLE, CARIBOO.

Mr. Austin J. R. Atkin, who has been associated with Mr. C. J. Seymour Baker, as assayer and metallurgist, in exploiting the quartz veins of the district for the past two seasons, writes me regarding their operations, referring particularly to the discovery of a ledge of scheelite at Hardscrabble creek, which from present indications bids fair to be of much importance. Mr. Atkin says :—

"The season was spent in still further checking the information gathered in the previous two summers, and the least promising properties were temporarily thrown up. Although there are many ledges which will well repay thorough and systematic prospecting, as soon as a railway lowers mining cost, it is unfortunate that none but the very richest veins in the country can be opened up under present conditions. The most important find of the season, and one which may prove of great commercial value, was made on Hardscrabble creek.

"The following account may draw attention to the care which should be exercised in having every unidentified mineral thoroughly examined and its composition determined: In drifting up the channel some years ago for alluvial gold, some pieces of white mineral were occasionally found, and an examination showed them to be barytes (Ba. S0 4). Later on, the white pieces became more numerous, and seemed heavier, until the dumpbox required so much water to keep the riffles clear, that but little of the fine gold was saved. It was noticed that the finest mineral was the heaviest, and was unlike the white substance (barytes) which first caused the trouble. When the situation was at its worst, a change took place in the character of the bedrock, and at the same time the troublesome mineral disappeared, so that no further investigation into its composition took place.

"Some 'black sand' had been put away and the writer was asked how best to clean it, and to explain the circumstance of the white mineral. After separating some of the latter, an examination, since checked many times, showed it to be *scheelite*, of very good quality. The old workings being still in good condition, an attempt was made to find the deposit from which it came, and very little work exposed the scheelite-bearing zone. This consists of highly altered country rock, the scheelite being scattered through it in small patches, but it is in the quartz stringers that most of the mineral is found. Some of these, varying from one inch to four inches wide, contain about one-third scheelite, with a little galena, and products of decomposition of iron pyrites. This zone appears to be from 12 to 20 feet wide, as determined by work done up to July, 1904, and gives every promise of turning out a valuable deposit. Unfortunately, the country rock has been altered by the infiltration of calcite, until it approaches limestone in hardness, so that, before the lode can be opened up, machinery will have to be installed to concentrate the calcium tungstate.

"A test was made by washing some of the decomposed surface, but the ore had not sufficiently weathered to make this very satisfactory, as when the rock was exposed in Tertiary times, the stream removed the surface as soon as it was at all decomposed. However, sufficient clear scheelite was obtained by this crude method to indicate a concentrating ratio of 1 into 10 (approx:). These concentrates contained about 70 % tungsten trioxide, with very little galena or pyrites. With a ready market, which this mineral commands at present, the outlook for the new find is very encouraging.

"There are other deposits of scheelite in the Cariboo schist belt, for the writer has specimens in his possession which are 'float' from other ledges, which further prospecting may discover, although these ledges are not to be looked for in Willow river section."

A quantity of this scheelite was sent to Mr. E. C. Rollins, of Chicago, to have tests made to determine its value, in response to which a communication was received from Messrs. Cramer and Burt, of 1,114, Monadnock Building, Chicago, stating, "The scheelite was of good

quality, and there was at present a considerable demand for it, at prices varying from $360 to $460 per ton, according to quality." As there is no duty on tungsten ore going into the United States, the discovery of its existence here in large quantities but emphasizes our demand for proper transportation facilities.

OFFICE STATISTICS—CARIBOO DISTRICT.

| | |
|---|---|
| Free miners' certificates issued, company | 11 |
| " " individual | 347 |
| " " special | 1 |
| Records and transfers of recorded placer claims | 183 |
| Leaves of absence | 49 |
| Water records issued | 31 |
| Placer mining leases issued | 43 |
| " " cancelled | 128 |

*Revenue Receipts.*

| | |
|---|---|
| Free miners' certificates | $ 2,753 00 |
| Mining receipts general | 18,359 35 |
| Water grants and rentals | 1,478 25 |
| Leaves of absence | 172 50 |
| Land sales | 4,841 85 |
| Other land revenue | 593 50 |
| Mineral tax | 2,171 73 |
| Revenue tax | 3,171 00 |
| Real property tax | 3,042 00 |
| Personal property tax | 3,125 68 |
| Wild land tax | 156 70 |
| Income tax | 237 21 |
| Licence, spirits | 1,475 00 |
| Licence, trade | 545 00 |
| J. P. Court fines | 342 50 |
| Miscellaneous receipts | 228 70 |
| Total | $42,683 97 |

## QUESNEL MINING DIVISION.

REPORT BY W. STEPHENSON, MINING RECORDER.

In submitting this the annual report, with the estimated yield of gold obtained for the mining season of 1904 from Quesnel Mining Division of Cariboo District, I find there is a slight increase over last year's yield of gold, but not nearly as much as was anticipated at the opening of the mining season, owing to the fact that the past season was one of the driest on record in this section, where, it may be said, we had no rain during the summer. Consequently, after the water from the snowfall was exhausted, the streams quickly dried up and the season was short for hydraulic mining.

On Keithley creek, Messrs. Veith and Borland have a good drifting claim, from which they have already taken out a considerable amount of gold, and the prospects for the future are good. Underground mining is very limited in this Division, and as for hydraulic and other surface mining, a good supply of water is needed, and if not obtained, the output of gold falls short. On Snowshoe creek the water gave out early in the season, and the hydraulic claims had to suspend work after a short run.

On Goose creek, Mr. Thos. Helgesen has been steadily working on his lease all the season. The report is that he is cleaning up with satisfactory results. On the north fork of Quesnel river there are a few white men working, taking out fair wages, besides which there are a number of Chinese scattered along the river, working in a desultory manner, working a few days or weeks in a place then moving to find another place. Such is their mode of working, during low water, until the cold weather shuts them off. Down the main Quesnel river the work is about the same as on the north fork, as no organised companies are working on either stream.

*On the south fork of Quesnel river the Consolidated Cariboo Hydraulic Mining Co., J. B. Hobson, Manager, had only a short season's run, the water giving out much sooner than expected, there being no rain to keep up the supply in the reservoirs. The work of driving the tunnel through the rimrock, from the present river to the old channel in which they are working, proceeded satisfactorily, until cold weather caused the work to be suspended. This tunnel, when completed, including the upraise, will be 1,200 feet long, and is 10 x 10 feet in the clear and on the grade of the flume that will be laid through the tunnel.

On the Horsefly river, at Harper's Camp, Mr. R. T. Ward resumed operations last spring, and was doing well until forced to suspend on account of some company trouble. The work was shut down for the balance of the season. On the upper Horsefly, about 50 miles up the river from Harper's Camp, some new diggings were found during the past summer. Mr. W. H. G. Thompson, one of our oldest miners, was going up there, and as I could not spare the time to go, I asked him to examine and give me a description of the place, which he did. His opinion is that the place will pay men very well to work the ground in small companies, of from four to six men in a company. The pay-streak of gravel is from eighteen inches to two feet in thickness and lies upon a stratum of hard clay, at a depth of from eight to ten feet below the surface. It is likely some parties will remain on the ground through the winter to prospect.

There is nothing to report as to lode mining in this Division, as no work in that line has been done for the last year.

**See* also page 37.

# OMINECA DISTRICT.

## OMINECA MINING DIVISION.

REPORT BY FRED. W. VALLEAU, GOLD COMMISSIONER.

I have the honour to submit herewith my seventh annual report upon the mining industry of the Omineca Mining Division for the year 1904.

As predicted in my last report, the prospect of having a transcontinental railroad built through the district has been the means of attracting prospectors and capital, with the result that portions of the district hitherto unknown to the prospector have been visited, and paying creeks are reported to have been found, many of which will, no doubt, well repay development work when freight rates are lowered, as they will be when the district has railway communication with the Coast.

While active development work in hydraulic mining has, this past season, been confined to Tom, Vital and Lost creeks, considerable prospecting has been carried on at different points in the district, notably along the Oslinca, Meslinca and Findlay rivers, with their tributaries, to the north, and the Peace and Parsnip to the east, where several very promising localities for placer, quartz and coal have been reported. More attention is now being paid to quartz mining than ever was before, and a number of men have been looking over the district this season.

Vast areas of timber (spruce and cottonwood) suitable for lumber, and especially for the manufacture of pulp, have also been reported along the Omineca, Oslinca, Meslinca, Findlay, Parsnip and Peace rivers.

This past season has been one of the driest and warmest experienced in the district for years, rain falling but four or five times during the entire summer, and in consequence the creeks became extremely low after the month of July. The smoke from forest fires could be seen almost continuously to the north and east, although there were no fires in the immediate vicinity of Manson.

Following will be found in detail what has been done this year.

### MANSON CREEK.

**43rd Company.** The 43rd Mining and Milling Company, of Cariboo, Limited Liability, having allowed its leases to lapse on account of non-compliance with the terms, forfeited its property and water rights, but has this season re-located and been granted five creek leases as well as a water grant of 4,000 miner's inches upon Slate creek, and will begin active operations next year.

The manager of the company spent the season in the district looking after the company's stores, repairing flumes, etc.

Omineca and Peace River Mining Company, Limited Liability, of Victoria, also allowed its leases to lapse, but has re-located three hydraulic leases on Manson creek, and has had a representative in the district this season looking after its property.

The *Evans Black Jack* claim, having been leased by Mr. Evans to the Omineca and Peace River Mining Company, was forfeited at the same time as the leases held by that company, but has been re-located by Mr. Evans, who has taken out also a water right of 5,000 inches. This claim is now well opened and has been sufficiently proved to warrant its being worked upon a large scale. Negotiations for the purchase of this property are now pending.

### Chinese Placer Claims.

Twelve placer claims are being worked by Chinamen on Manson creek, but nearly all of these are in old ground and little more than wages have been taken out.

### Lost Creek.

The *McKinnon* mine, consisting of a hydraulic and a creek lease, was acquired last spring by Messrs. Newbery and Child, who, with a gang of men, have been employed all season in opening up and developing their property. A hydraulic plant has been installed, water brought on, and a pit opened which shows a good streak of pay gravel. Water was scarce this season, as it was late when they commenced actual mining.

Work was carried on upon the *Newitt* and *Mullen* mine last winter, the tunnel being extended some 500 feet, in order to tap the deep channel of Lost creek, but owing to an accident by which Mr. Newitt lost a portion of his hand by an explosion, nothing has been done this past summer.

The *Bread Winners'* mine, a group of six hydraulic leases situate on Manson, near the mouth of Lost creek, owned by Mr. E. G. Tilton, has been again laid over this season.

### Germansen Creek.

A creek lease at the old *Toboggan* claims was granted this season to J. J. May, on which a wing dam will be built this fall to turn the creek and work will be carried on next season.

Eleven placer claims have been taken up by Chinese on Germansen creek this season, but, as the ground where they are is deep, they have not made much more than wages.

### Tom Creek.

The owners of the *May Flower* mine have carried on work continuously all season. The ground is deep, about 18 feet after ground-sluicing, and very hard to work. Nine men have been employed.

### Vital Creek.

The property formerly held by the Vital Creek Mining Syndicate, and now owned by Dr. Powell, of Victoria, has this season been leased by the Messrs. Condit Brothers, and is being opened up by them. Eight men were employed. Most of the work done this season has been ground-sluicing by means of a "bucking hydraulic dam," which has worked very satisfactorily. The creek bed, having a heavy grade, was ground-sluiced down some 26 or more feet.

The Caledonia Gold and Silver Mining Co. has had two men sinking a shaft to bedrock, prospecting the property. A report from the manager, at Nanaimo, has been asked for but has not been received.

### Findlay River.

Three hydraulic leases have been granted in the vicinity of Pete Toys bar, and four quartz claims have been located about 12 miles south of Fort Grahame. Prospectors are wintering on the headwaters of the Findlay river, where they report having discovered good placer ground.

OFFICIAL STATISTICS.—OMINECA MINING DIVISION.

| | |
|---|---|
| Placer leases in force | 31 |
| " " issued | 12 |
| " claims re-recorded | 12 |
| " " recorded | 11 |
| Mineral claims " | 5 |
| Payments, in lieu of assessment | 2 |
| Conveyances, etc | 13 |
| Water records | 14 |
| Lay-overs | 3 |
| Powers of attorney recorded | 10 |
| Free miners' certificates issued | 92 |

*Revenue.*

| | 1903. | | 1904. |
|---|---|---|---|
| Free miners' certificates | $ 314 50 | .... | $ 430 00 |
| Mining receipts, general | 1,894 51 | .... | 3,578 70 |
| Miscellaneous | 439 90 | .... | 481 96 |
| | $2,648 91 | | $4,490 66 |

# CASSIAR DISTRICT.

## ATLIN MINING DIVISION.

Report by W. F. Robertson, Provincial Mineralogist.

The Atlin District formerly included the Atlin, Bennett and Chilkat Mining Divisions, but, by an Order in Council approved October 16th, 1903, which came into force January 1st, 1904, the Bennett and Chilkat Mining Divisions were done away with, and the territory formerly embraced in these Divisions has been included in the Atlin Mining Division, of which extended Division the Recording Office, with that of the Gold Commissioner, is at Atlin. The Atlin Mining Division, as at present constituted, may therefore be described as all that portion of British Columbia lying to the north and west of the divide between the watersheds of the Taku river, on the south and east, and that of Atlin lake on the north and west.

## CHILKAT MINING DIVISION.

Of the former Chilkat Mining Division, the southern boundary has been considerably altered by the recent decision of the Alaska Boundary Commission, and most of the creeks upon which the placer gold was discovered in 1900 have now passed into Alaska. Rainy Hollow, however, wherein a large number of mineral claims had been located, described in the Report of 1900, still remains in British Columbia.

This district was not visited by the Provincial Mineralogist this season, but it is reported to him that work still progresses slowly on these properties and that the development has in many cases been satisfactory to the owners.

## BENNETT MINING DIVISION.

In the former Bennett Division no placer ground has been found. A number of mineral locations, however, were recorded near the shores of Bennett lake, but as yet none have shipped any ore, other than as sample lots.

Mr. Whitfield, one of the owners of the property, has supplied the following information with reference to the *Gridiron Group*, one of the properties being actively prospected in this section :—

Gridiron Group.

The *Gridiron Group* consists of four unsurveyed mineral claims, situated on the west side of Bennett lake, about six miles from the town of Bennett, and is owned by Whitefield and Hildebrand. A tunnel has been driven in, 30 feet above the lake, for 110 feet, on a talcose crushed zone or slip, about 16 feet wide, having a strike E. and W., with a dip to the north of 45 degrees. This zone consists of alternating bands of quartz and talcose matter; the quartz contains iron sulphides carrying values in gold and silver, while some lead and antimony is present in places. The talc also contains some crushed ore which can be saved by concentration. The country rock is said to be porphyry. A short distance from the mouth of this tunnel there is a clearly defined vein, about 8 inches wide, carrying iron pyrites, from which high assays have been

obtained. The trend of this vein should make it cross the line of the tunnel about 180 feet beyond its present face, to which point of intersection it is intended to push the tunnel with all dispatch. On the property there has been erected a wharf 18 feet by 24 feet; also a shack and blacksmith shop, while an arrastra, 9 feet in diameter, driven by a windmill, has been constructed, to test the ore.

On Canyon creek, about 2½ miles north of the *Gridiron Group*, R. Peden *et al* have been doing work on some 8 claims, and have driven in 4 tunnels about 25 feet to 30 feet each.

Dr. Runnels has been doing development work on a group of claims in this vicinity, of which no definite information was obtained, but it is understood the work has been chiefly confined to surface prospecting, from which some encouraging assays have been obtained.

## ATLIN MINING DIVISION.

The Atlin Mining Division continues to be the chief factor in the placer gold production of the Province, and from present indications, promises to be an important producer for some years to come. This district was last visited and reported upon by the Provincial Mineralogist in 1900, during which interval the class of deposits being worked and the methods of working have changed materially, but the actual output of gold from the camp has been maintained at about the same amount, namely, from $300,000 to $450,000 per annum, while this year the output promises to be about $530,000—a greater production than has been since 1899.

The district was discovered in August of 1898; or, rather at that time the news of the discovery reached the "outside," although the discoverers had been prospecting the district for the greater part of the summer. These discoverers, Fritz Miller and his associates, belonged to that hardy class to which British Columbia owes so much, the pioneer prospector—the men who penetrate and search out the unexplored parts of the country, discovering the hidden stores of mineral which Nature has distributed, with no niggardly hand, throughout the Province, though often hiding them away in remote places, leaving but a very "blind trail" behind her. This trail these prospectors tried to follow, and successfully, unearthing that "pot of gold" which has proved nearly as elusive as that supposed to hang from the end of the rainbow, and from which has been taken out up to date about $2,995,000, the product of the Atlin district in placer gold.

In view of the benefit conferred upon the country by the prospector who discovers a new mining district, the reward which he receives seems entirely out of proportion to the service rendered; in fact, the discoverer of a new placer mining section receives merely the reward given for the discovery of gold on a new creek in an already well-known placer district—*i. e.*, the privilege of claiming, as discoverer, 600 feet (or a party of two discoverers gets 1,000 feet) instead of 250 feet allowed to subsequent locators, and this not in fee simple, but with merely the right to work this larger claim under the same conditions as others who were not pioneers, but merely followers of more enterprising or fortunate leaders.

It may not be out of place in this report to mention that the discoverers of the Atlin camp were fortunate enough to stake ground which has proved to be about the richest in the camp, and, while none of them made a fortune, at least the leader, Fritz Miller, secured a competency, which, unfortunately, he was not long spared to enjoy, as he died in Atlin in August, 1904, and was buried there. The public funeral, at which the Government was officially represented, was but a slight recognition of his services to this district in particular and to the Province in general, as by his efforts, or good fortune, Atlin was brought into existence.

The earlier discoveries of placer gold were made on Pine creek, and so far the productive mining has been limited to this creek, with its tributaries, including Spruce creek; and to McKee creek, which latter has its source adjacent to that of Spruce creek, but flows westerly into Atlin lake, entering such about ten miles south of Pine creek. As the available ground on those creeks was taken up, prospecting was pushed further afield, and gold has been found on several other creeks, but, apparently, not under conditions or in quantities sufficient to attract mining by individual placer mining methods, although, in several instances the prospecting has given results which indicate probable opportunities for the installation of plants for operation by hydraulics, or some other cheap mechanical method of handling large quantities of low-grade material.

Of these outlying districts which have more recently been occupying public attention, there is, lying to the north of Pine creek,

### Fourth of July Creek.

Fourth of July creek flows westerly, approximately parallel to Pine creek, a range of hills separating their watersheds, and towards its headwaters a number of mining leases have been taken up, but as yet no plants have been installed.

### Consolation Creek. *

Pine creek, with its tributaries—including the creeks flowing into Surprise lake—and Fourth of July creek, "head up" in the range of mountains forming the divide between the drainage area of Atlin lake and that of Gladys lake.

Over this summit from Fourth of July creek, and flowing to the north-east, is Consolation creek, which empties into Gladys lake, and is therefore in the Teslin Mining Division, but the prospecting of the creek has been done by men coming over the summit from Atlin.

During the past summer a number of leases have been located on this creek, on which ground very encouraging prospects are reported to have been obtained, but as yet the prospects do not indicate ground suitable for individual mining, though it may prove good for hydraulic workings. It is too early to predict what the creek may amount to as a producer of gold, as no mining has as yet been done, but the discoveries go to indicate that the gold-bearing area may extend considerably further than was supposed.

### O'Donnel River.

Prospectors proceeding up Spruce creek to its source found there a large plateau covered to a considerable depth with gravel wash. This plateau was also the source of certain tributaries of the O'Donnel river, a large stream flowing parallel with Pine, in a general south-westerly course, and entering Atlin lake about 20 miles south of the mouth of Pine creek.

During this past summer leases have been granted of ground on the main O'Donnel river, and on Feather, Slate and Fox creeks, small tributaries of the main river. Some of these leases have been surveyed, and steps are being taken towards operating the ground by mechanical means, but no operations have as yet been undertaken, except on a small scale.

On Bull creek, hydraulic operations were carried on this past summer with the aid of a canvas hose and a pipe, and it is reported that about 100 ounces of gold were recovered. Although the prospecting of Fox creek yielded some returns, the amount could not be ascertained.

### Graham Creek.

Among the outlying creeks upon which gold has been found is Graham creek, which flows into the Taku arm from the north. A large number of placer locations were made here in

* See also report on Teslin Mining Division.

1900, but since that time the creek has been abandoned and the claims have lapsed. Certain of the ground was subsequently taken up under leases, but, so far, no attempt at systematic work has been made.

Gold has been reported as found on the upper stretches of the Terra Heena river, but there is no official information of its occurring under workable conditions.

Within the bounds indicated by the creeks mentioned is the whole of the known commercially gold-bearing deposits of the district.

Before a deposit can be said to be gold-bearing commercially, the conditions surrounding such deposit must be taken into account. In hydraulic mining, for example, the conditions are :—

1st. The quantity of gold per cubic yard in the dirt required to be moved, and the form in which it occurs.

2nd. The quantity and availability of water, etc.

3rd. The character of the deposit and its amenability to the hydraulic stream, the grade of the bedrock, the quantity of boulders, etc.

4th. The possibility of a dump for tailings.

All of these conditions are necessary to success, though the importance of any one condition diminishes in proportion to the excellence of the other conditions. The point might be similarly illustrated regarding both individual placer mining and dredging. Locations are supposedly made only when there is at least a *present* prospect of their being *commercially* workable, not only as to the sufficient presence of gold, but as to the surrounding conditions. Since "conditions" change as the country opens up, as labour and supplies can be had cheaper, and as cost-saving devices are introduced and improved, we may look in the future to possible further extension of the goldfield than the locations at present recorded would seem to indicate.

The lapse of four years which had taken place since the writer's previous visit to the camp rendered to him noticeable the changes which had taken place in that time, possibly more so than they would be to residents, to whom such things have been a gradual transition. Probably the most encouraging fact noted of the camp is the maintenance during these years of the output, which still continues to be made from the same creeks and from within the same area as in 1900. Then, the gold was taken almost entirely from the beds of the modern creeks, and as their extent was limited, their exhaustion seemed to be within a measurable limit of time. Now, these creek beds have ceased to be an important factor in the production, except where worked by a company, or where individuals have consolidated their interests, and, working together, practically form a company. Such concerted effort seems to have rendered workable further and deeper reaches of the creek bottoms than was formerly anticipated, and this promises to continue, through the introduction of mechanical power for handling the dirt or overburden.

Then, the benches and the "old yellow deposit," though they were known to be gold-bearing and their importance was recognised, were still undetermined quantities. The benches have been worked back by hand for a certain distance from the creek, and as this distance, with the increasing overburden, became too great, hydraulic methods were introduced, which, having emerged from the experimental stage, now give definite promise of success.

The "old yellow deposit" had then been definitely determined in only a few places, and only near the "outcrops," so to speak, although the writer considered it safe at that time to say that "indications are that it extends for some distance into the "bench claims," and these indications have been proved correct by numerous drifts from the creek valleys and, in its deeper portions, by shafts with drifts therefrom.

Then, a placer claim was workable only when, during the short summer season, it would supply the miner with his necessities for the whole year. Now, these "drifting propositions" provide winter work for men, enabling them to work in summer placer claims yielding a smaller return than was formerly necessary.

And the end is not yet, as far as this "old channel" is concerned, for its limits have not as yet been defined. That it is much greater than was formerly even suspected is certain,—and it is almost as certain that for years to come it will continue to be mined and to produce gold.

From the nature of drift mining, it does not here promise large enterprises or great individual profits, the gold therein being very uniformly distributed, and in amount only such as to pay good wages for the labour expended. This means for the camp a long, steady existence, since the greater part of the "old channel" is under so great an overburden as to be workable only by drifting.

Where the deposit occurs along the valley of the present stream, as on lower Pine and Spruce creeks, and where it has been cut by these streams, it is being attacked from the valley by hydraulic methods.

Since the previous visit of the writer, the development of the camp has rendered clear many points which were previously little more than indications, and as such were given in the Report of 1900. The conclusions then arrived at have been almost exactly borne out by the subsequent work; the area of the field remains the same; the evidence is strengthened that Pine and Spruce creeks at one time joined about Stephendyke and then debouched to the north, towards Trond gulch, emptying into a lake which then covered all the flats at the Half-way house, and that the present course of these streams below this point is of more recent cutting. The "old yellow channel" has developed along the lines then indicated, but to an extent not then hoped for.

In 1900 the Provincial Mineralogist attempted to ascertain the direction of flow of this yellow dirt, by taking levels at various points, and while these levels were not conclusive, they indicated a flow, which subsequent work has confirmed, giving a grade to the deposit conforming in direction to the flow of Pine and Spruce creeks, but it is so slight (being between 1 and 2 per cent.) that it is difficult to believe that the heavy material in the deposit would be carried by a current produced by such a grade; and further, the workings of the hydraulic pits, etc., notably that of the North Columbia Co., on Pine creek, expose a face in which the heavy boulders and angular fragments are so deposited together as to render it extremely improbable that this deposit is an "*old channel*," in the usual meaning of that term: viz., the bed of an ancient stream.

In Cariboo, and elsewhere in British Columbia, where the placer deposits occur, the "old channels" contain in themselves the evidence of the direction of their flow; and this is shown by the more or less uniform size of their constituents, by the rounded or flat water-worn form and faces of the gravel, and, above all, by the "shingling" of the flatter stones in the deposit, while the gold is usually on bedrock or in some defined stratum.

All of such evidence of flow is lacking in the old "yellow deposit" of Atlin, and while some of the boulders are large and rounded, many are angular, the flat ones often standing on edge, as though so dropped into mud in still water. The greater part of the deposit consists of granite fragments, now almost decomposed, with resultant clay (kaolin) and grains of silica. While the gold here is found for the most part near bedrock, though not necessarily *on* it, it occurs some height above—more or less throughout the deposit. The characteristics of the deposit did not seem to admit of its having been caused directly from glaciers. The evidence is such as to force the conviction that this deposit was not formed in rapidly running water, but

that it was dropped in comparatively still water on a bottom (bedrock) such as that of a lake or sea, with a *slope*, but not a *channel*. As to exactly howthe dirt was deposited, there is room for various theories, but the most probable seems to be that glaciers, carrying in their bases the dirt, slid into a sea or lake and, driven by wind or current into this bay, there melted, the dirt dropping to the bottom, gradually forming the deposit in question.

This is further borne out by the fact, reported by the Superintendent, that in the *Deeks* pit, on Pine creek, during the hydraulic working, a layer of seashells was found in and near the top of the yellow dirt. This layer was very local, and did not extend to the adjoining pits, and was, unfortunately, all washed away before the Provincial Mineralogist visited the camp.

It is not very clear where these glaciers were formed, as certainly no quartz has been found in the vicinity which would justify the belief that it is the *madre de oro*.

## PINE CREEK.

Of the producing creeks, Pine, with its tributaries, still continues to be the most important. Of the main creek it may be said that practically all of it has passed out of the hands of individuals and is now held by companies.

A cold snap having come in the last part of September, a few days before the camp was visited by the writer, most of the individual workers in the camp had been "frozen out," and had stopped work, although at least five weeks' fine weather followed, so that the details of work done by individual miners on this and other creeks are best given by the Gold Commissioner, in his report, as he was with the camp all season, therefore this report will deal only with the general features.

**Pine Creek Power Co.**

The Pine Creek Power Co. is the outcome of the old Sunrise Co., and of this Mr. F. T. Blunck is president and manager and a principal owner. The company has leases on the south bank of Pine creek, almost opposite the old *Sunrise* ground and below *Discovery* on the creek.

Under the superintendency of Mr. W. W. Loveridge two adjacent hydraulic pits, working into the south benches from the creek valley, have been opened up, and these, although separated, are practically one pit subdivided, the division between them being kept, so that, while clearing away boulders or blasting in one pit, the water may be used uninterruptedly on the other.

The overburden of deposit consists of a light glacial mud and gravel, which forms the capping of the benches and which is considered devoid of gold. Underlying this is a deposit of coarse, well washed gravel, containing a few large boulders, of which some are apparently from the old yellow deposit, cemented together by a blue clay, the whole having a bluish colour which gives the deposit a distinctive appearance. This deposit probably belongs to what was described in the Report of 1900 as "the second run of gold," which in many cases overlies the yellow dirt, and frequently shows wash derived from the cutting of the yellow channel. From the face of the pits, for practically as far as they have been opened, this blue dirt reaches to bedrock, and it is this material which so far has been worked. In a couple of places in the face, however, yellow dirt has begun to show on bedrock, rising up in the face as work proceeds, so indicating that the yellow deposit will probably be found to be the bedrock deposit of the future; a fact which is considered encouraging, since the yellow channel is the one which in Atlin has been found most consistently persistent in its gold tenure.

It is too early to predict whether, as work proceeds, the yellow channel will in time gradually replace the blue, or whether the blue will be found to continue overlying the yellow. The writer, however, is of the opinion that the former will prove to be the case.

While the overburden washes away very easily and the gold-bearing deposit washes readily, some little difficulty is found in disintegrating all the clay, which has a tendency to pass through the sluice, carrying the gold with it.

The bedrock consists of what has been classed by the geological survey as the "Magnesian rock" of the camp, but it is so very much cut up by igneous dykes as to be almost replaced by them. These dykes, which appear to have been porphyritic in structure, are mostly of a light yellowish colour, and are soft and much decomposed, and this decomposition greatly facilitates the cleaning up of bedrock in the pit, as the dykes are readily washed away by the hydraulic stream for a depth of a foot or two.

With these softer dykes are others, dark in colour, hard and basaltic in character, which withstand the hydraulic stream and stand up in knobs and ridges in the pit but do not offer trouble by holding the gold. The bedrock seems to have a gradual slope, rising from and up the creek, but is too flat to supply a sluice grade. The elevation of the bedrock above the level of Pine creek is estimated at about 20 feet, and this at present provides dump for the tailings, but how long it will continue to be available depends upon how much of the season's dump may be washed away by the following spring's freshet, and, as the face of the pit recedes from the creek, the question of stacking the tailings will eventually have to be met.

At present each pit is provided with a Loveridge derrick, worked by water power, and with a reach of boom sufficient to cover the workings; and with this the boulders are piled up in the pit. The derricks are guyed with wire cable and have an extension boom, the motive power being supplied from a small Pelton wheel carried under the platform of the derrick. This wheel at present only raises and lowers the boom and load, and a great improvement would be effected in having it rigged to swing the derrick, this work having, so far, been done by hand.

The main sluice in each pit is about 60 inches wide by 36 inches deep, has a grade 4.7 and 5 inches to the 12-foot box, and this, with the water supply available, is sufficient to carry away the dirt.

A crude attempt at providing an under-current in the sluice has been made, which consists of a series of rectangular bars of steel, about 3 inches by 1 inch, set on edge across the bottom of the sluice for a space of about 30 inches, with a nominal aperture between them of about $\frac{1}{8}$ inch. The material discharged through these openings with the water is led on to a large apron provided with riffles about 1 inch deep, laid crosswise. In practice these orifices are found to be either so choked up that practically nothing gets through them, or, if opened, to allow such a rush of water that it is questionable whether the apron would catch or hold fine gold. As a matter of fact, nothing was being saved by them when the property was visited.

The water supply is taken out of Pine creek, about 2 miles below Surprise lake, and at a level of about 30 feet lower than the lake, and is conveyed through the old *Sunrise* ditch, down the north side of Pine creek, to a point about half a mile above the town of Discovery. Here it is carried across the valley in a steel inverted syphon to the southern bench, where it enters a second ditch, by which it is carried to a pressure box located on the hillside about 120 feet above the level of the pits, and thence to the pits by a slip joint steel pipe-line. A branch from the main pressure pipe leads to each pit, and is provided with suitable gates, so that the water may be used in either or both, as desired.

It is not desired that the exact output of the pits for the season be published, but the President, Mr. Blunck, states that it was sufficient to be quite satisfactory to the company and to justify the installation of a plant to bring on water in greater quantity and at a higher pressure. Mr. Blunck has kindly forwarded the following details as to the season's operations:

"The work of getting the ditches and pipe-line in shape for the summer's work was begun in April. Piping began on June 9th, and continued until October 24th, equivalent to 118 days of 24 hours each. During this run some 130,312 cubic yards of dirt were removed, the bank washed was from 35 to 40 feet high, and the area of bedrock stripped was about 9,925 square yards. In doing this work 28,750 miner's inches of water (almost 2,000 inches daily) were utilised. The highest number of men employed at any one time was 54, and the lowest 18, or a total of 28,898 hours' labor was employed. The wages paid were at the rate of $3.50 per day and board. The season's operations were fairly successful. After work was closed down this fall, the company was engaged in making important changes in its water supply system, substituting for a long stretch of wooden flume a ditch line of larger dimensions, by which it is hoped to obtain not only an increased water supply, up to 3,000 inches, but also to permit of work being started from three to four weeks earlier in the spring. The estimated cost of this improvement is $14,000."

**The North Columbia Gold Mining Co.**

The North Columbia Gold Mining Co., of which Mr. J. M. Ruffner is Manager, with office at Discovery, owns certain leases situated on the south bench of Pine creek, and, beginning in the month of August of 1904, opened up a hydraulic pit about opposite the old creek claim, *No. 8 above Discovery*—that is, about opposite the upper end of the town of Discovery. The property is on the same bench as is that of the Pine Creek Power Co., and about 500 yards higher up the creek. The occurrence of the gravels and of bedrock here is practically the same as in the Pine Creek Power Co.'s pits already described, the only notable difference being that here the "yellow dirt" covers bedrock in the whole pit, increasing in thickness from 2 or 3 feet near the mouth to 15 or 20 feet at the face, and being overlain by the blue dirt and glacial wash. Though the pit was opened up only late this past summer, it has been pushed forward until the face is into the bench about 300 feet. The pit was opened with a cut of about 100 feet wide, but as work progressed this was extended until, at the end of the season, the face was approximately 300 feet long, and had an average height of about 66 feet.

**Water Supply.**

The water supply is derived from Pine creek, being taken out at the flats, which extend some distance below Surprise lake, and at a level, practically, as high as could be obtained from the lake. The ditch follows the south bank of the creek and, from the intake to the pressure box, is about four and a half to five miles long.

In cross section, the ditch is 3 feet deep, 4 feet wide at the bottom, and 9 feet wide on the top, with a grade of 7.9 feet to the mile. The pipe-line from the pressure box is 24 inches diameter and 1,500 feet long, made of No. 14 and No. 16 sheet steel, in sections 16 feet long with slip joints. The pressure in the pit is equivalent to about 150-foot head, which is utilised through two No. 4 monitors with from 5-inch to 7-inch nozzles.

**Sluice.**

The main sluice is straight and almost 500 feet long, with a grade of 6 inches to a 12-foot box. The frames are made of 5 by 7-inch lumber and are 60 inches wide by 30 inches deep inside, lined on the bottom with 2-inch lumber and on the sides with 1-inch. The blocks are 6 by 6 inches and 10 inches deep, of sawed lumber. The riffles are 2 by 2 inches. One of the few weak points in the plant is undercurrent in the sluice, which is similar to that used by the Pine Creek Power Company, and not more efficient.

**Dump.**

The most serious obstacle with which the property has to contend is that of inadequate height for dumping. The sluice empties into Pine creek, and is about 15 feet above the creek bottom, and even at the end of this, the first season, the creek was almost dammed across by the tailings, which were piled up so high as to require, for a large part of the time, the use of a small monitor to free the sluice outlet.

This matter is receiving the best attention of the management, which intends this coming season to install some sort of a tailings elevator for the removal of at least the coarse tailings. The finer material would probably be taken care of by the creek in flood.

One very noticeable feature in the working of this pit is that the monitors are always kept so placed as to *drive* the dirt; one is used to undercut when necessary, and very little ground-sluice is used. The clay is washed by the monitors up against a pile of boulders near the mouth of the sluice, and so disintegrated.

This system of working is unusual in the district, and, under the circumstances, is certainly much more efficient than squirting square against the face and trusting to the back-wash and ground-sluice to carry off the material. The duty obtained from an inch of water has thereby been materially increased, and with, apparently, no accompanying disadvantage.

The number of men employed as a regular force, besides the manager, is:—Two foremen, 4 pipers (total 6, 3 on each shift); 8 general work; 1 ditch tender; 1 carpenter, part of the time. A large force was, of course, employed in opening up the pit.

**The British America Dredging Co., Ltd.**

The British America Dredging Co., Limited, of which O. T. Switzer is the manager in Atlin—and whose head office is 764, Bullitt Building, Philadelphia—this past season began to operate the dredge which was brought into the camp during the season of 1903. The dredging scheme, as at first formulated by W. J. Robinson and associates, contemplated working certain leases on what is locally known as the "Poor Farm," that is, certain deposits of loose modern gravel occurring in the present valley of Pine creek, near its mouth, and some two or three miles below the falls on the creek. This gravel, which is said to be eminently suited for dredging, did not carry as high values per yard as a number of other deposits in the camp, which latter, however, may not be as amenable to dredging as the former.

Subsequent to the ordering of the dredge, but before its installation, the company secured the *Ophir Group* of leases on Gold Run—a draw in the Pine creek valley parallel with and on the south side of that creek, and about nine miles up from the mouth—and on this ground, instead of on the "Poor Farm," it was decided to place the dredge. This decision seemed to be justified by the very substantial return of which this ground gave promise, if it could be handled by some appliance such as a dredge, for it had been pretty thoroughly tested by drift workings from shafts 20 to 35 feet deep and had been shown to be sufficiently rich to pay wages for even this costly mode of operation.

The general scheme included the establishment of a central power-plant, just below the falls on Pine creek, at which point electric power would be generated, and from there transmitted, at high voltage, to a number of dredges, which it was intended eventually to operate on Pine and Spruce creeks. Up to the present there is but one dredge in operation on Pine creek and one under construction on Spruce creek.

**Power Plant.**

This central power-plant was built on Pine creek, a few hundred yards below the falls, on a flat near the creek, and on the north side. The plant is exceedingly compact and simple, is very efficient and has been well put together, with no display, the construction being business-like in all particulars. Some little trouble, due to foundations insufficient in such gravelly soil, is reported to have been had at first; but this was subsequently rectified by placing a substantial concrete substructure. When visited, everything was found to be running in first-class order. The power-house is a timber building, covered with corrugated iron, and in this are installed two power units, which can be operated separately or together. Each unit consists of a 24-inch turbine, of a

nominal 500 horse-power, having a Lombard automatic governor, made by Stillwell and Bearce, Dayton, Ohio, and directly connected to a Westinghouse 3-phase alternating motor of 180 K. W. and 1,100 volts. So far, only one unit has been required, the other being in reserve.

The water for power is taken out of Pine creek above the falls, and conveyed by a ditch along the side-hill to a point opposite the plant, discharging into a pressure box about 187 feet higher than the turbines. From here it is conducted to the plant by a steel rivetted, slip-joint pipe-line, diminishing from 30 inches to 24 inches in diameter, and about 1,900 feet long. The pipe-line connects with a heavy, wrought-iron distributing pipe, equipped with relief valves, and from this water is supplied to the turbines through separate pipes, provided with gates which can be opened or closed as desired.

The plant has been found to operate most satisfactorily and has given very little trouble. Some difficulty was at first experienced with the automatic governors, as the water for their operation was taken from the main pipe, and contained so much grit and mud as to interfere with the delicate mechanism and adjustment of these machines. Oil was subsequently substituted as the medium of operating the governors, since when the trouble has disappeared and the regulation effected has been very satisfactory.

Although little difficulty has been experienced with the plant proper, a good deal of trouble has been caused by the filling up of the ditch and flume with sediment from the hydraulic operations further up the creek, and although sand-traps have been in use, they were not enough to catch the fine silt, which finally settled in the ditch, filling it up to such an extent as to require a man a considerable part of the time to shovel it out.

The electric current is "stepped up" at the power-house, from a voltage of 1,100 to 22,000 at which voltage it is conducted to the dredge site by a pole-line between five and six miles long, equipped with copper wires. At the dredge site there is a transformer house, where the current is again reduced to 1,100, and then again to 400 volts, at which voltage it is used on the dredge, being conducted thereto by an insulated and waterproof cable. The maximum amount of power which can be used by the dredge is about 220 horse-power, or less than half what can be generated by one unit of the power plant, and such an amount of power is seldom called for, as the motors are seldom all in use at any one time.

**Dredge.**

The dredge scow is about 96 feet long, 40 feet wide and 6½ feet deep, drawing about 4 feet of water. The dredge machinery is operated by electricity and is of the Bucyrus type, that is to say, it is a most substantially constructed chain bucket elevator, having on the chain some 96 buckets of 3 cubic feet capacity each, and, normally, should run at a speed of 18 to 20 buckets per minute. The bucket ladder is a most substantial steel-trussed arm, capable of reaching 20 feet ahead of the dredge and to a maximum depth of 44 feet, although, in this instance, bedrock is only about 28 to 30 feet below the level of the water in the pond. The buckets deliver their contents into a revolving screen of heavy boiler-plate, with holes varying from 1 inch at the upper end to 4 inches at the lower end. The oversize boulders from this screen are dumped over the side on to scows and taken away. The screenings pass through into a tail apron-sluice about 120 feet long, provided with iron Hungarian riffles. Provision is made for taking the finer material to gold-saving tables, which, together with about 90 feet of the sluice, are supported on an independent scow. These tables were found, however, not to be in use, but all the material which passed through the various sized holes of the screen, up to 4-inch holes, after having been once separated, was mixed again and run through the same sluice at the same time, a practice not usually considered the best.

The motors installed and in use on the dredge were as follows:—

75 horse-power motor, driving ladder and buckets.
50 " " 10-inch cent. pump supplying water for sluice.
30 " " 8 " " " sprays
20 " " driving revolving screen.
20 " " driving winches for moving scow.
5 " " pumps for general purposes.
Also electric light plant.

The whole plant has been most substantially constructed, the workmanship and materials are of the best, and the installation has been all that could be desired. Whether the design is that best suited for the material being handled is open to question, but it must be remembered that the plant was originally designed for the conditions existing at the "Poor Farm." The plant was erected under contract by the Western Engineering Company, and is a creditable piece of work.

The ground selected to be dredged underlies a small, almost level, flat, a few feet above the drainage level of Gold Run, where an artificial pond has been made to float the dredge. This last season much time was lost and expense incurred in getting the pond opened out for work, as the tailings had to be dumped on land and removed by horses. This should cease as the pond becomes larger, when they will be dumped behind the dredge. The face of the cut is reported by Mr. Switzer to have advanced about 200 feet. The width of the cut was at first 150 feet, but was subsequently reduced to 100 feet. It was estimated that the amount of dirt handled during the season was about 25,000 cubic yards. The superficial deposit is loose gravel, easily moved, underneath which is a deposit of gravel and boulders cemented in a stiff hard clay, and supposed to be a continuation of the "yellow dirt" found lower down the creek, although the colour is not so marked. It is, of course, impossible to inspect directly the deposit being dredged, since it is under muddy water, but its character may be inferred from that of the adjoining drifting propositions. In these the clay, though it weathers on exposure to air, is, when first exposed, tough, if not hard, and tenaciously holds the boulders. This is the gold-bearing stratum, and the gold is chiefly near the bedrock, which is uneven, but not so hard as to be undredgable.

Great difficulty was experienced in working this deposit with the dredge, since even a small boulder set in such clay and projecting, was just a big tooth to "chew up" the dredge buckets, and this it did most effectively, for at the close of the season the lip of every bucket had been so dented and bent in as to render them practically useless for cutting a bank. The lip on every bucket will require to be replaced before next season. These lips were originally of manganese wrought steel, 1 inch thick, and it is the intention of the Manager to replace them by lips made of 1½-inch steel.

The damage to the buckets was practically the only one sustained by the plant during the season—a very creditable showing for the plant, considering the strain to which it was subjected, being often brought to a stand-still by contact with some imbedded boulder. This damage is reported to have been done in the first month's run.

The ground proved to be so tough that towards the end of the season the management adopted the policy of putting a series of holes into the bank with a keystone drill in advance of the dredge. These were loaded with dynamite and fired electrically, and this did much to loosen up the ground. The full efficiency of this scheme was not demonstrated, since, when it was tried, the bucket line was in such a dilapidated condition as to give little criterion of what might be done with the ground so broken up, but it unquestionably was a great assistance, even under the existing conditions.

The gold-saving apparatus, however, left much to be desired, in illustration of which Mr. Switzer reports that in the fall, when dredging out the tailings to form a shallow bottom on which to rest the dredge for the winter, a considerable yardage of this material, which had already been through the gold-saving appliances, was passed over the portion of the sluice, only some 30 feet in length, on the main dredge scow, and yielded about as much gold as had the original dirt.

The bed of Pine creek opposite "Gold Run" has not been found to be gold-bearing, the run of the gold-bearing gravels having apparently been through Gold Run, which enters into or is cut by Pine creek at about the point where the bridge on the waggon road crosses the creek. At this point Pine creek was found to be gold-bearing, and here was seen about the only placer mining done in the bed of the creek during the past season. This work was being carried on by Green & Co., who employed a small force of men, and are reported to have obtained results which left a fair margin of profit. The stream had been diverted to one side and pits sunk from 10 to 20 feet to bedrock. Operations were carried on with the aid of Chinese pumps and a derrick operated by power from a water-wheel.

**Green & Co.**

When the ground was visited, however, nothing of the actual operations could be seen, as the pits had been allowed to fill up, and preparations were being made for drifting during the winter on the Gold Run deposit where it comes out into the cutting made by the present creek.

The deposit of Gold Run crosses, as described above, from the south to the north benches of Pine creek, locally known as "Tar Flats." These low, flat northern benches form the valley bottom of Pine creek, and are from 30 to 40 feet above the creek, being underlain, to a large extent at least, by the yellow dirt deposit, which is at this point at a level slightly lower than the bed of the creek.

This ground is for the most part held under lease by the B. A. Dredging Co. and is worked by individuals on the "lay" system, a royalty of from 15 to 20 % of the gold obtained being paid. Commencing at the creek, these individual miners have run in 15 to 18 tunnels, reaching bedrock, either by shaft or inclined tunnel; while, further back from the creek, drifting has proceeded from two or three vertical shafts, which have been sunk to bedrock.

In a letter recently received from Mr. O. T. Switzer, of the B. A. D. Co., he says his company intends to install a steam shovel on Tar flats during the season of 1905.

Trouble is experienced from water at all seasons except after the "freeze up" in winter, and, consequently, work in this section is confined to this season, the dirt being brought to the surface and washed when water is available. The miners get winter work at living wages, after paying the royalty to the lessor. Among those so operating are Alexander Ross, C. E. Gilmore & Co., and others.

### GOLD RUN.

As has been already noted, before the advent of the dredge on Gold Run a considerable number of drifting propositions were worked from shafts sunk to bedrock. The dredging company bought up a number of these individual claims and on such ground installed the dredge. Immediately above the dredging company's ground there are several of these drifting propositions still in operation.

Of these, Messrs. Thomas & Brown hold four claims (250 by 250 feet each) immediately adjoining on the east the dredging company's ground. A shaft has been sunk to bedrock, a depth of 38 feet, and from this, by a system of levels and breasts, a considerable area of ground has been mined out from bed-

**Thomas & Brown.**

rock up to a height of from 4 to 6 feet. The dirt is loaded into wooden buckets at the working face and trammed on flat-cars to the shaft, where it is hoisted by hand to the surface and there washed, when convenient, in a 12-inch sluice-box, with water brought by a wooden flume from the N. C. G. M. Co.'s ditch.

This property is considered the "model" drifting mine of the camp, and certainly the work has been carried out with a neatness and system, combined with the requisite technical knowledge that renders the mine a credit to the owners. The shaft is lined throughout with sawed lumber, so carefully jointed and so regular as to look like one piece. The collar has been raised sufficiently above the ground to admit of a dump, and to bring it above the level of the sluice-boxes, which here have to be raised up on trestles, as the ground surface is practically level.

The windlass is of wood, about 8 inches in diameter, most neatly set up, with a rope brake and iron cranks, and is double acting; that is, an empty bucket is lowered while a full one is being raised, a practice seldom seen in British Columbia, yet so simple and effective as to be worthy of note. The hoisting rope is steel, about $\frac{3}{8}$-inch in diameter. The buckets hold about two cubic feet. On the surface is a shed containing a small vertical boiler, which supplies steam to a small pump under ground, which is ample to keep the mine drained.

Altogether, the work has been most systematically carried out, and while the intrusion of surface water has forced the abandonment of several adjoining propositions, in this mine the timbering has been kept in such good shape that there has been no break in the roof and the surface water has been excluded.

The sluice-boxes are of the ordinary style, provided with the ordinary pole riffles and a few iron ones. A system of undercurrents has been provided, however, which was the only one seen in use in individual work in the camp. This undercurrent and gold-saving table is made with the same neatness and judgment which characterises the rest of the work about the mine. A sketch drawing of the arrangement accompanies this report.

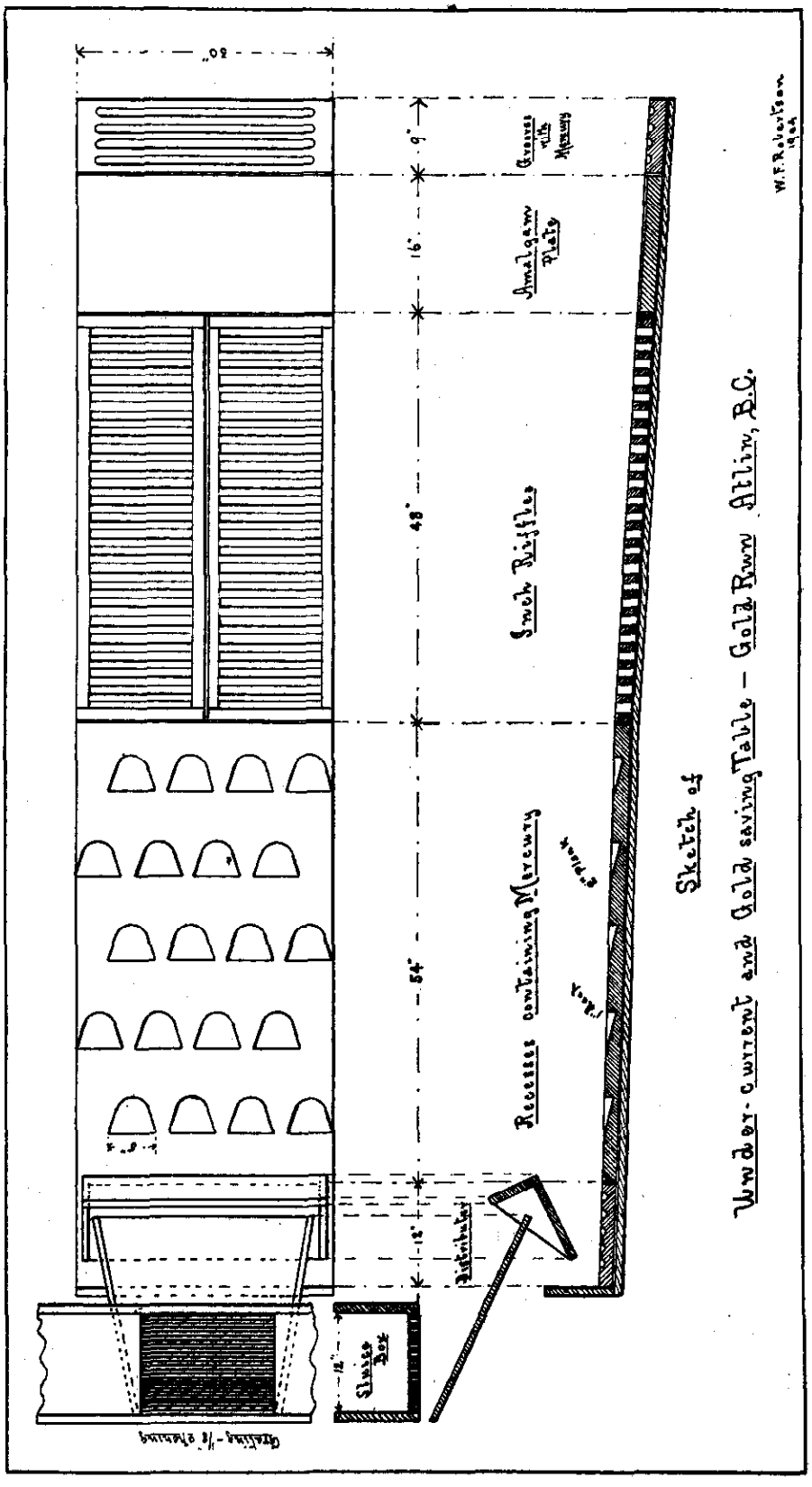
Mr. Thomas informed the Provincial Mineralogist that he found the gold chiefly on bedrock; that he found he could make $1\frac{1}{2}$ ounces of gold to the set pay a profit; and that one man could mine two sets per week.

**Martin & Clark.** Immediately above Thomas & Brown's claims, to the east, L. B. Harris has a 100-foot claim not being operated, and to the east of this Martin & Clark have three claims. In November, work here had been closed down for the season, but it was seen that the property had been worked by a vertical shaft some 32 to 35 feet to bedrock. A small steam hoist had been in operation, the boiler also providing steam for a steam-pump underground. Sluice water was obtained from the Ruffner ditch.

**L. B. Harris.** Immediately to the east of the last-mentioned property, Louis B. Harris has two claims. This property was also temporarily shut down, the caving of the ground to the surface having admitted more water than could be pumped out.

It was reported that the main drive had been run up stream from the shaft 100 feet, and the ground stoped out for four sets wide to the south of this. Bedrock was slightly deeper than on Martin & Clark's property. A small vertical boiler and hoist were in place, and four men, who had secured a "lay" on Harris' 100-foot claim below, already mentioned, were using it to run a circular saw to cut lagging.

**Stukey & Co.** To the east from the preceding claims, Stukey & Co. are mining on a partnership basis. They have one creek and two bench claims. The property had been worked with six men during the summer months, and though it was temporarily idle when visited in November, it was intended to resume work


Sketch of
Under-current and Gold saving Table — Gold Run Atlin, B.C.
W. F. Robertson
1904
Amalgam Plate
Grooves with Mercury
Sluice Riffles
Receiver containing Mercury
Distributor
Sluice Box
16'
48'
54'
12'

during the winter. A vertical shaft had been sunk 35 feet to bedrock, from which drifting had been done eastward across the claim, and the ground had been mined for 22 sets to the south. A small vertical boiler and hoist were in place, covered by a suitable house. It was understood that 173 ounces of gold had been taken out from July 6th up to time of closing, about the first of November.

**Kent & Co.**

Still to the eastward on Gold Run, Kent & Co. have some six claims, which were operated during the winter of 1903-4, and up to June, 1904, when work was stopped for the summer; but it is reported that work will be resumed during the coming winter.

From Gold Run eastward to Surprise lake, the valley of Pine does not contain any working properties. A good deal of prospecting has been done in the way of shallow pits, but nowhere have these proved successful in finding gold in paying quantities. This is not to be wondered at, since the yellow deposit, the most fruitful source of gold on the creek, has been shown, near Gold Run, to be at a level considerably lower than that of the present creek, and, consequently, has not been cut by upper Pine creek. At the point where Boulder creek enters into the valley of Pine, bedrock is too deep to be reached by any other method than drifting from a shaft.

**Black & Grant.**

Messrs. Black & Grant, about a year ago, sunk a shaft on the north side of Pine creek valley and on the west side of Boulder creek, where the valleys intersect, some 200 yards from the flats. The ground is included in the leases held by the "Société Minière," or, as locally known, the "French Company," and has been obtained by the present operators under a "lay," which includes not only the 1,200-foot plot now being worked, but also an option to work further ground to the south. Bedrock was found at a depth of about 60 feet, with a slope to the south of from 5 to 7 per cent. From the shaft, drifts have been run to the north for approximately 450 feet, and ground to the width of 100 feet along the drive had been mined. The dirt is loaded into cars at the face and in these is run to the shaft, where the car is hoisted in a cage and run over a track to the sluice-boxes.

The ground was heavy and required very careful and costly timbering, which is found to be one of the heaviest items of mining cost. One "cave" had been experienced about a year ago, but the drift has been run around this and no serious damage was felt, further than that there was an increased influx of water, which, however, is not prohibitory in amount. The timbering has been well done, and the mining has been done systematically and well. It is gratifying to be able to report that the yield of gold has been sufficient to leave a substantial surplus after all charges against the property have been paid.

The surface plant consists of a water tube steam boiler and hoist, with a small extra boiler, used only when the water is excessive; all housed in a substantial shaft house, which also serves as a timber-framing shed.

The deposit being mined is peculiar. The bedrock, as best it could be seen, was similar to that exposed in the hydraulic pits further down the creek, and dipped with the flow of Boulder creek. Lying on this is a deposit of clay with little or no sand or gravel, in which is imbedded angular fragments of rock with comparatively few water-worn boulders, all so placed as to indicate that it was not deposited in running water, but rather as was the yellow dirt already referred to, or that it was a slide from the adjacent hill. The colour is a dull gray, not the yellow of the "yellow deposit," and the level at which it occurs is much higher than would permit it to be a continuation of the gold-bearing deposit of Pine creek. Indications point to its origin being a slide. This bedrock deposit varies from 2 to 6 feet in thickness where worked, and appears to be the gold-bearing stratum. Above this is a deposit of loose,

fine, water-worn gravel and sand, clearly a deposit from the creek, not cemented together, for which reason much trouble is experienced in holding it up, as it is apt, if it gets a chance, to run down between the lagging.

The manager, Mr. Black, pointed out that the pay was entirely in the bedrock deposit, which is the only portion being mined, and that the upper deposit is practically barren.

### BOULDER CREEK.

Of the smaller tributaries of Pine creek, Boulder continues to be the most important. For some distance up from its mouth, the ground, including the benches, is held by "La Société Minière de la Colombie Britannique," a French Company, of which Mr. Henry Maluin is the local manager. In the lower part of the leases, great difficulty had been experienced in providing "dump" for the tailings, the comparatively flat grade of the creek bed necessitating the use of very long sluices, which were expensive to keep up. As the work proceeded up the creek, however, the grade increased to such an extent that in a short time height enough was gained to enable the tailings to be piled on ground which had been worked out.

Work for the season had finished when this property was visited, and no details of the season's work were obtainable. The ground is reported to be rich and, with the question of dump settled, should become profitable. The property had been worked from June to October in 1904, washing an area of ground approximately 200 by 100 feet.

Bedrock is lower than the bed of the present creek, and, consequently, where hydraulic work is in progress the stream has to be flumed. The bedrock deposit here is of the same class as is found in the lower drifting propositions, looking more like slide material than like gravel wash, and is here about 10 feet thick, being overlain by 15 feet of loose boulders and gravel, above which is 20 feet of fine silt, and above this again is some 100 feet of fine sand and gravel.

Above the French Company's ground a number of individuals and small partnerships are working the benches from creek level, the creek bed proper being about exhausted, and they report satisfactory results. Bedrock here is about 15 feet below creek level, the dirt being shovelled into sluices and the boulders piled either by hand or with the aid of a derrick.

The creek is being pretty uniformly worked up as high as *Nos. 20 and 26 Above Discovery*, where C. D. Newton is operating a small hydraulic proposition, with satisfactory returns. The wash here is largely granite, with many large boulders. Work is carried on directly in the creek bed, and as the boulders are very numerous, and the grade is not sufficient to allow of their being carried off, they are piled up. A substantially constructed sluice, with blocks and with a branch running from it, has been laid; and while work has this season been carried on in a small way, Mr. Newton is so well satisfied with the value of the ground that he proposes operating on a larger scale this coming season.

Below this, on the creek, Charles Taylor, Garrison, and Clarke and Sutherland had been working during the summer season, and are reported to have done well.

### RUBY CREEK.

Ruby creek flows into Surprise lake from the north about three miles from the outlet. This creek was formerly held by certain parties under leases, but these leases were allowed to lapse, when the ground was staked as "claims" by individual miners. These men have been working the claims for the past year, and report having obtained values sufficient to work the creek by hand.

The creek was not visited by the writer, as work had then ceased for the season, but he is informed on reliable authority that the miners have jointly driven a long bedrock drain, with cross-cuts, and that an area of ground, estimated as over 3,000 acres, has been prospected, with the results mentioned.

### Birch Creek.

Atlin Lake Co.

The lower portion of Birch creek is held by the Atlin Lake Hydraulic Company, of which Mr. A. Bryan Williams is local manager. This company originally purchased in 1900 a large number of claims from individual miners, which they consolidated for the purpose of establishing a hydraulic mining enterprise. Operations for the season of 1904 were suspended by October, and the details of the summer's work could not be obtained on the ground, but from personal observations afterwards, it appeared that about 400 feet of the creek channel had been washed to bedrock for a width of 50 feet.

The face of the cut indicated a depth of wash of about 20 feet, consisting of two layers of well-washed gravel, separated by a bed of "slum." Boulders of considerable size are rather plentiful in the wash. The grade of the bedrock in the creek is ample for all purposes, and though bedrock is hard, it is not very difficult to clean.

The operations of the company are greatly hampered by the very limited water supply available, the topography of the creek permitting the construction of only a small dam, which retains water for but a few hours only. From this dam a flume leads down the eastern side of the creek to the pressure box, the water being led to the workings in a steel pipe, and used through two monitors having 6 and 7-inch nozzles.

### Spruce Creek.

Spruce creek is the principal tributary of Pine, entering it from the south-east about two miles from Atlin lake. For about two miles above its junction with Pine, that is, up to about *127 Below* or opposite Stephendyke on Pine creek, the two streams are close together, running about parallel, with little more than gravel hills separating them. There seem to be strong indications that at one time Spruce and Pine joined at this point, viz., two miles higher up than at present, both creeks then keeping a north-westerly course, and that the present channels of both creeks below this point are of comparatively recent cutting.

In neither stream below this point has gold been found in quantities to pay for working, and such as has been found is accounted for by the breaking through of the recent channels, and the carrying down by the water of the finer gold.

Spruce Creek Power Co.

Proceeding up the creek, the first workings found were those of the Spruce Creek Power Co., operated by Denny & Blaine, of Seattle, located at about *127 Below Discovery*, that is, just about opposite the Stephendyke flats, on Pine creek. Here extensive hydraulic operations had been carried on during the summer, work having been suspended before October. The ground being worked was a bench on the left or south side of the creek, the bedrock rising from the creek at a moderate angle, and consisting of much the same character of rock as that found in the Pine Creek Hydraulic workings. The bench or bank being worked had been opened up with a face along the creek of from 300 to 350 feet, and had been worked back for about 125 feet.

In October, much loose material had fallen from above, somewhat obscuring the face, which appeared to consist of a bedrock deposit of blue dirt, similar to that found in the Pine Creek Power Co.'s. pit, and here from 10 to 15 feet thick, over which lay from 25 to 30 feet of fine silt or "boulder clay," and above all ran a heavy layer of fine loose wash, or "chicken feed," as the miners call it, which increased rapidly with the steep surface of the hill, which here reaches a height of 200 feet.

One of the original owners of the property, who visited it with the writer, informed him that the values were all found in the blue channel dirt and within four or five feet of bedrock. This pay dirt appears not to follow the bend in the present creek, but to cut across under the

point of the hill, coming out again into the creek some half a mile further up. This has been practically demonstrated by several drifting mines higher up the creek, one of which, drifting from the present creek bed in rock, cut through the "rim" into the old channel, which is now being mined. It would appear, therefore, that the operations are being carried on on what is practically the outlet of an old deep channel, here coming out of the hill.

The water supply is derived from Spruce creek, being taken out at about *No. 17 Below*, and carried by a ditch along the north bank of the creek to a point about half a mile above the workings, where it is carried across the valley of the creek by a rivetted iron inverted syphon to the top of the gravel ridge which is being washed. Here it is again delivered into a ditch and flume and carried to a pressure box some 180 feet above the workings. The pipe from the pressure box starts with a diameter of 22 inches and is reduced to 16 inches at the pit. One No. 6 and two No. 4 monitors were used. A supplemental water supply, used as a bye-wash, is taken out of Spruce at *No. 100 Below*, and is brought down the north side of the creek in a ditch and carried over the creek to the pit by an aqueduct.

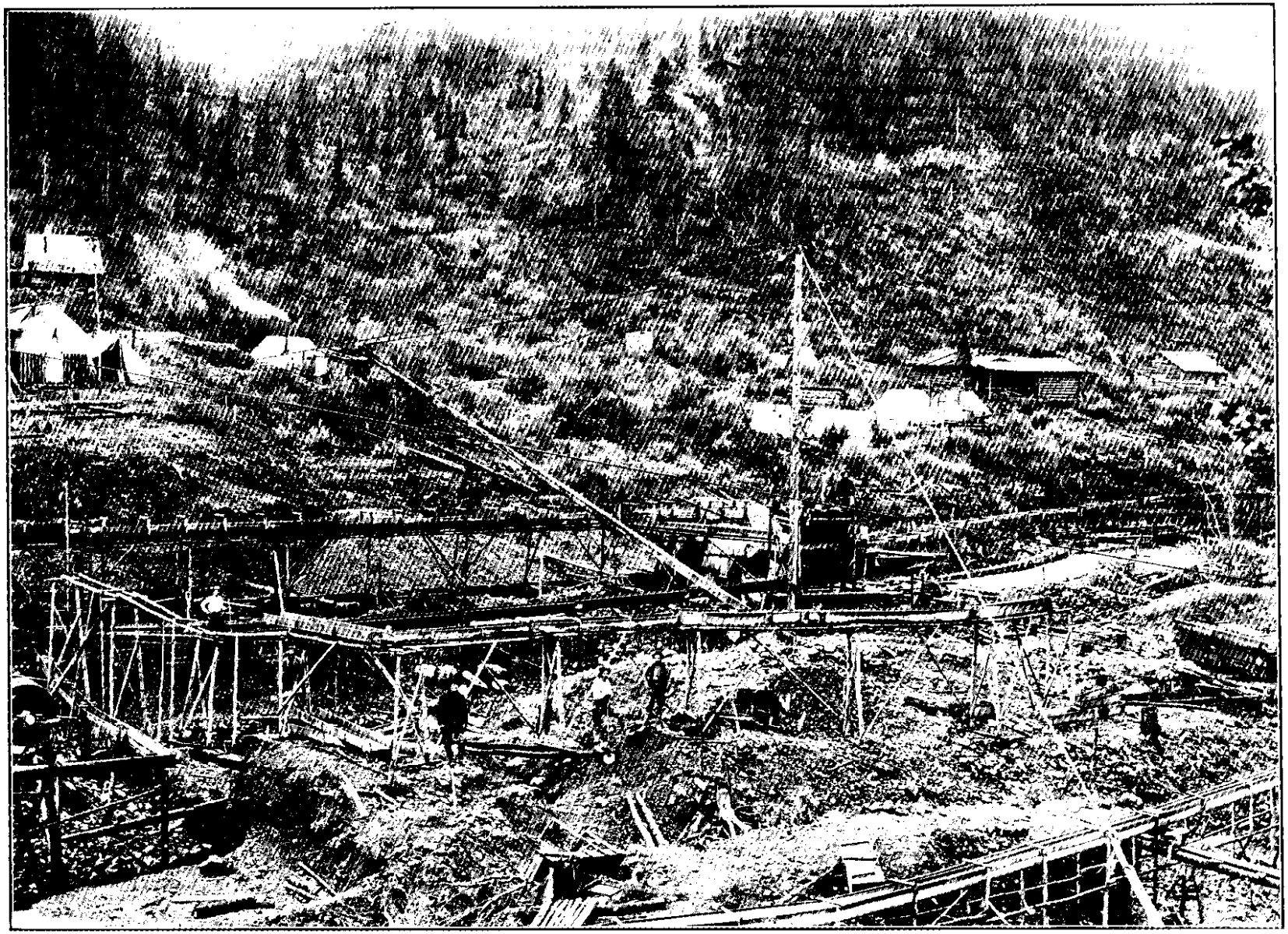
This is the first season of operation for this company, and the pit is scarcely yet in shape, while several details in the water supply will require to be improved.

Spruce creek is the stronghold of the individual miner and of mining partnerships. Bedrock in the creek bottom above the last-mentioned property begins to get comparatively deep, so that it remained unworked during the first years of the camp, when only the more accessible diggings were touched. Of later years these deeper workings have been worked quite extensively, with bedrock 20 to 25 feet deep, the ground being rich enough to stand the expense of such operations.

These creek workings, which extend along the creek for about one-half to three-quarters of a mile, are mostly on 100-foot square claims, or on several of these amalgamated, and are, as a rule, equipped with derricks worked by undershot or overshot wooden water-wheels, which wheels usually also serve to operate Chinese pumps for unwatering the pits. The greatest trouble met with has been the shortage of water for power, and of room to dump tailings, with an increasing amount of seepage in the pits, which latter difficulty has been overcome in the lower group of pits by keeping open a drainage ditch on bedrock.

As far as could be learned from the operators, these workings about averaged wages for help employed and for other expenses. There are one or two enterprises now on foot with the object of handling the dirt in a more economical way, by the installation of steam shovels, and to the use of this class of machine the ground seems admirably adapted. The steam shovel possesses various advantages over the dredge, which is the machine used elsewhere in the district. It is more easily moved, cheaper to install, and, the bedrock being dry, can be cleaned up in the usual way and all the gold can be recovered; and the last, but by no means the least, advantage, the operator can see what he is doing, and can so avoid boulders, loosening them either by hand or by blasting. It is probable that the coming summer will see at least one of these machines installed.

About five miles above the Spruce Creek Power Co. plant, W. F. Gore, acting as superintendent for an Eastern company, was operating a hydraulic plant washing the bed of the creek and the bench to the south, at a point just above the canyon. The plant is equipped with a fine water supply under good pressure. The ground, where worked in the creek bed, is reported to have been fairly good, but values did not extend either up or down the stream. This location is between two canyons, and experience has shown that old pay channels do not follow through canyons, but must be looked for in the hills on either side. The limited amount of pay dirt met with would indicate such to be the case here, and there is a strong



PLACER MINING IN 1904 ON SPRUCE CREEK, ATLIN.

probability that such old channel only crossed the creek here, and that exploration of the bank to the south will expose its outlet. If it be found sufficiently above the creek bed to form a dump, this ought to put the property in a very good position. Prospecting in this bank to the western end had revealed a rimrock rapidly rising, with coarse gold in small quantities, but sufficient to give encouragement.

Towards the upper end of the creek, approaching the Blue canyon, the valley flattens out, leaving wide flat stretches covered with gravel wash of varying thickness, in which some prospecting has been done with fair success, but on which there are not as yet any producing claims.

Just below this canyon the valley narrows, rimrock being visible on either side, the wash being from 8 to 12 feet deep, with numerous heavy boulders through it. Here a number of individual miners were working this past summer, making about average wages, and while the ground is fairly rich, it is difficult to work on account of these boulders.

**Spruce Creek Dredge.**

A number of these claims have been purchased and consolidated by the British Columbia Dredging Co., a Philadelphia syndicate, allied with the British America Dredging Co. The syndicate has brought in and is installing on these properties a large dredge of the Bucyrus type, much more powerful than is the one on Pine creek, and which, when operated, will be supplied with electrical power from the power plant on Pine creek. About two-thirds of the necessary machinery has arrived at Atlin, and most of this has been taken to the ground by teams. The hull of the scow, the timber for which was brought from the coast, was more than half finished when work was suspended for the season. It is the intention of the company to form a pond to float the dredge by building a dam across the creek valley; and this work has been started. The pole line from the power plant to the dredge site is up, and ready for stringing the wires. It is estimated that it will be at least the end of 1905 before the dredge is in operation. The construction of this plant also is in the hands of the Western Engineering Co., of San Francisco.

On Spruce creek, much more than anywhere else in the camp, the "yellow deposit" assumes a shape resembling an ancient channel, being comparatively narrow, and bounded by defined rimrocks. This channel, while comparatively straight, has been cut and re-cut by the present stream, which takes a more tortuous course, although the general direction and wider boundaries of both are identical. At and just below each of such cuttings of the old channel, the modern stream carried gold in workable quantities, while at other points it did not, indicating that, to a large extent at least, the gold of Spruce creek was derived from this old channel, the bed of which was at an elevation superior to that of the present creek for a considerable distance up. Each of these cuttings exposed the end or side of the old channel, and on these exposures a number of drift mines have been run in.

## McKee Creek.

McKee creek drains a small section of country, triangular in shape, between Spruce creek and O'Donnel river, and flows into Atlin lake from the east, about 10 miles south of the town of Atlin. A fairly good waggon road has been built from Atlin to the creek, near its mouth, but any heavy material is transported by the lake, on scows in summer and on the ice in winter. The creek is short and has a steep grade, averaging about 11 %, and this is a great assistance in the mining operations. The creek gravels contain an unusually large number of boulders, which proved a great trouble to the economic working of the creek by individual miners.

**Amalgamated McKee.**

The lower stretch of the creek is being operated by the Amalgamated McKee Hydraulic Mining Co., of which Mr. F. T. Hamshaw is local manager. This company is, as the name implies, an amalgamation of the properties of the Atlin Mining Co. and of the McKee Consolidated, and as such was worked last year. The company has this past year been working a strip of the south bank of the creek above the canyon, where it owns the first bench only, the ground back of this being reported as held by other parties. In this bench is evidently the old channel of the creek, containing a deposit very similar to the old yellow deposit of Pine creek and carrying very good values. Mr. Hamshaw had stopped work for the season when the property was visited, and the details of the summer's operations were not obtainable.

It was ascertained from the former manager of the Atlin Mining Co., who had worked last year the strip of ground immediately in front of that worked this summer, that the ground ran from $1.10 to $3.30 per square yard of bedrock. The property is reported to have produced in 1902 about $24,000, in 1903 $48,000, and in 1904 about $52,000.

Water for hydraulicing is obtained from the creek above, and is brought on in a flume 40 inches wide by 30 inches deep, giving a head of 350 feet at the lowest point.

This company is operating two pits, the lower opposite the old *Discovery* claim, and here hydraulicing has washed away a strip about 600 feet long by about 150 feet wide, with a depth of wash varying from about 10 to 30 feet at the face. The upper pit appears to have been opened up only this past season.

Very little further work seems to be going on in the bed of the creek, but from the hydraulic pit as far up as the forks of Eldorado creek, there are a number of individual miners at work in the south bank in the same "old channel," and they are reported to have made fair profits this year.

On the main creek, just above Eldorado creek, the Consolidated McKee Creek Co. has been operating a small hydraulic plant washing a high bench, but is having considerable extra expense, as it is obliged to impound the tailings, since the creek claims immediately below are not as yet worked out.

## Mineral Claims.

Quartz mining in the Atlin District has not yet reached the productive stage, and, as a matter of fact, prospecting for mineral claims has not received the attention it deserves, partly from the fact that the remoteness of the district would entail cost for transportation of ore outwards or supplies inward, which would render ores of ordinary grade impossible to work, and partly from the fact that placer miners are not quartz prospectors, and the quartz prospector has not as yet taken hold of the district. Still, for all this, there have been a large number of mineral claims located in the district, a few of which have received some material development. The records of the Atlin office show that in 1903 there were 57 locations and 112 certificates of work issued for mineral claims, while in 1904 some 105 claims were recorded and 122 certificates of work issued.

**Imperial Group.**

The greatest amount of work done on any group of claims in the Atlin District has been done on the *Imperial Group*, or, as better known locally, the *Munro Mountain Claims*. This group is situated on the southern flank of Munro mountain, overlooking the valley of Pine creek, and is some five miles from the town of Atlin, a good waggon road running to the base of the mountain. These claims were fully described in the Report of 1900, at which time considerable work had been done and was in

progress by the Nimrod Syndicate, which, however, suspended operations shortly afterwards; since which time, according to Mr. Featherstonhaugh, under whose superintendence the work was done, little further underground development has taken place. In 1902 some work was done on the property, chiefly on the surface, which confirmed the underground workings. No work was being done on the properties in 1904. The following account of the work previously done is given, as the results obtained from this more developed property have a bearing on the probable value of similar veins in the vicinity.

As stated in 1900, a distinctly marked quartz vein from 1 to 8 feet wide, averaging anou 30 inches, cuts the hillside in an easterly and westerly direction. This vein was tapped by a cross-cut tunnel some 30 feet below the outcrop, and drifts amounting to about 100 lineal feet were driven thereon.

In the immediate vicinity of the *Imperial Group* several other locations occur on the same or similar quartz ledges, but none of these have received any serious development, nor has any ore from them been treated.

The range of hills lying to the north of Pine creek valley, on which the *Imperial Group* is situated, is cut by numerous quartz veins, and between Birch and Boulder creeks a number of these have lately been uncovered and developed to some extent. These veins seem to have a general N. E. and S. W. trend, dipping nearly vertical, and have, as far as may be judged from development work done, the appearance of being permanent and regular. The veins occur in highly altered sedimentaries (classed by the Geological Survey as the "Magnesian Rocks" of the district), in greater or less proximity to the granite mass lying to the north, and, while the rule is not advanced as uniform, it is a fact that a number of these quartz veins are accompanied by, and often in contact with, light-coloured acid dykes, apparently finely porphyritic in structure, very much weathered and soft on the surface, and often containing in such outcrops more gold than does the solid quartz beside them.

The development done has not as yet proven whether this gold is the result of the decomposition and concentration of the quartz ledges, or of placer gold washed into the decomposed outcroppings, or whether these dykes, as is quite probable, are not at least the carrying medium, of the gold which is found in varying quantities in the adjacent quartz ledges. This latter theory is strengthened by the fact that certain very similar dykes, uncovered by the operations of mining on Pine creek, do contain an appreciable amount of gold occurring as a constituent part of them.

About 100 feet lower down, a second cross-cut tunnel was run in for 75 feet, where it cut the vein, on which drifting to the extent of 75 feet was done,

Prior to 1900 some 270 tons of rock were treated in a small five-stamp mill then situated at Atlin. This ore was from the upper levels and the management reported it to have yielded about $7 per ton, the gold being free. A subsequent lot of 25 tons from the lower levels was treated similarly, and yielded less than $3 per ton. The quartz in the vein was so crushed that much of it could be mined with a pick. The assays from the upper tunnel were reported as over $10, but in the lower tunnel they were much less.

The following extracts from the Report of A. H. Bromley, M. E., to his Directors has been furnished by Mr. Featherstonhaugh :—

RESULTS OF MILL TESTS, IMPERIAL GROUP.

| Lot No. | Wt. Tons. | Yield per ton. | Location in mine from which ore was taken. |
|---|---|---|---|
| 1 | 60 | $ 6 52 | No. 1 tunnel, west drift. |
| 2 | 63 | 12 57 | " " |
| 3 | 51 | 6 12 | " " and east. |
| 4 | 75 | 8 42 | " " and winze. |
| 5 | 25 | 3 15 | No. 2 tunnel, east and west drifts. |
| 6 | 78 | 4 84 | No. 1 " west stopes. |
| 7 | 20 | 1 97 | " " " |
| | 372 | $ 7 05 | |

**Lake View.**

Travelling along the range of hills from Birch creek eastward, at an elevation of from 800 to 1,000 feet above the level of Pine creek, the first point at which work has been done on this series of quartz veins is on the *Lake View Group*, containing the *Lake View*, *Grand View* and *Last Chance* claims, owned by J. Woods, J. Downing and W. R. Brown, of Atlin. These claims have been surveyed as a preliminary to applying for a Crown grant, but were not being worked when visited. There are several quartz veins on the properties, all approximately parallel and running in a general north-east direction, but the work done has been confined to two of these veins. An adit tunnel has been run in on the largest of these, which has a width of from 2 to 4 feet, with good free walls, and which appears to be following closely a dyke of the character already mentioned. The quartz is very white, containing a very little mineral in the form of iron sulphides, with occasional patches of galena, while a little free gold is sometimes visible, but the values are chiefly on the sulphides, or in gold not visible to the eye.

Some 300 to 500 feet to the north-east of the tunnel and higher up the hill, two inclined shafts have been sunk, in either the same, or a parallel, quartz vein, which here seems to dip more into the hill. The shafts had not been in use for some time and could not be entered, but, judging from the dump, were probably in the neighbourhood of 40 feet deep. The veins here still continue regular. The quartz is somewhat more iron-stained than in the tunnels, but this is probably due to surface staining. The property had been under bond to an English syndicate, whose local director informed me that on large average samples taken while developing, he had obtained assays running about $8.40 to the ton, mostly as free gold.

**White Star Group.**

Continuing along the hillside from the *Lake View* group frequent outcroppings of quartz are visible, and on one of these are the workings of the *White Star* group owned by Capt. Hawthorne, of Atlin. On this group the most important work consists of a cross-cut tunnel about 25 feet long to the quartz ledge, which has been followed by a drift to the east for 60 feet, disclosing a vein of quartz about 5 feet across, dipping to the north at an angle of about 80°, and having a strike N. 55° W. (mag.). The walls of the vein are particularly well defined and free, and the quartz presents a distinctly banded appearance, more particularly towards the hanging-wall side, where there is "paystreak" some 6 to 8 inches wide, while towards the foot-wall side the quartz becomes dull white. The mineralisation is slight, chiefly iron sulphides with a very little galena, and most of the gold is probably free.

The owner had been unable to get any assays on the ore and could not give any exact figures as to values found. I personally did not take any general sample for assay, recognising the difficulty of getting a reliable sample with a small pick. Hand samples from the tunnel, assayed by the Government Assayer in Victoria, gave results varying from nothing to $7.60 in gold per ton, while a certain sample containing a small quantity of galena gave $2.40 in gold and 9 oz. in silver per ton. There are several open cuts on the property, and outcrops of quartz, but the most satisfactory development is in the tunnel already mentioned.

**Sunbeam Mineral Claim.**

Still further to the eastward, along the same range of hills and on the west slope of the cross valley of Boulder creek, further quartz veins have been exposed on the *Sunbeam* mineral claim. This claim was located this past summer by Probasco and is now held by Probasco, Clark, Kappele, Henderson, *et al.* The location is about opposite *26 above Discovery*, on Boulder creek, and at an elevation of some 600 feet above the creek. The hillside is here covered with a heavy gravel wash which completely hides any quartz veins which might come through the underlying country rock.

The location was made through following up quartz float in the wash. A trench was dug across the general trend of the formation for 120 feet in length, from 4 to 10 feet in depth, and not over 2 feet wide at the bottom, which exposed the quartz ledge. When visited, the banks of the cut had caved in somewhat, although the owner had tried to clear out the cut for inspection, so that only an imperfect view could be had of the solid formation. The trench appeared to cross-cut first, for 20 feet, the soft decomposed outcrop of a light-coloured dyke, and adjoining this on the uphill side (north) a large quartz vein, of which some 8 feet could be seen actually exposed. This quartz is very white and free from sulphides, but appears to be part of a large regular vein.

Some 20 feet above the exposure, more quartz was uncovered, here much darker in colour, and whether this was the upper part of the same vein as exposed below or a separate vein, could not be seen, as the intervening space was covered with gravel. Only the locator had worked on the claim and he had not broken into the outcropping, so it was found impossible to get a representative sample of the ledge without putting in a shot. On the edge of the cut was a pile of quartz, probably broken loose from the ledge, and of this general samples were taken for assay, which gave small values in gold. The locator claims to have had several very high assays from samples taken when the cut was clear. These samples seem to have been taken from or near the contact of the dyke and quartz, and while it is quite probable that the dyke may prove to be gold-bearing, it is impossible to determine this until it has been exposed to a depth below the reach of surface decomposition and consequent possible surface enrichment from the placer gold in the overlying gravels. It was recommended that a small stream, easily available, be turned into the cut to sluice it clear; by which method as much could be accomplished in a week as the locator had accomplished by hard work all summer.

There is little doubt but that all the quartz veins exposed between Birch and Boulder creeks belong to the same series, since they are approximately in line, and have about the same strike and general characteristics.

**Red Jacket.**

The *Red Jacket* mineral claim on Pine creek, about *Four Below Discovery*, was located in 1899, in the bed of the creek, having been discovered in the working of the placer ground at this point. The Nimrod Syndicate sunk a shaft about 50 feet deep on the property in 1900, and reported good values as obtained, but the company got into litigation and work was stopped. The property has since passed into the hands of Mr. J. M. Ruffner, of the North Columbia Gold Mining Company, who, in 1902, ran a cross-cut from the shaft for about 100 feet. Since then it has not been worked and is filled with water, which it is difficult to keep out owing to the location of the shaft.

On the surface the values appeared to be in a decomposed quartzose dyke, but from the dump it would appear that the work done has followed a quartz vein occuring in a serpentine rock. In the quartz on the dump free gold was visible, and Mr. Ruffner showed the writer a sack of quartz in which gold was visible in nearly every piece. The claim is equipped with a small steam hoisting and pumping plant, and it is understood to be the intention of the owners to continue the work in 1905.

**Rock of Ages.**

The *Rock of Ages* is another claim on which the lead was discovered through placer working in the bed of the creek, and a shaft was there sunk meeting such serious difficulties from water as to practically lead to the closing of the mine, until such time as the lead is traced into higher formation and there developed. No work was being done on this property in 1904.

The shore of Atlin lake where the wide valley of Pine creek enters, in the vicinity of the town, is chiefly composed of magnesian rocks, cut by numerous small veins of quartz, and from this, on the surface at least, assays in gold can usually be had, and in several spots considerable work has been done to determine whether the values continue with depth.

**Anaconda Group.**

The first of these operations was on the *Anaconda Group*, worked in 1900 and fully described in the report of that year, where the values appeared to be in the soft magnesian rock rather than in the quartz, and, according to the statement of the management, were not found to continue to the depth of a small tunnel run in some 25 feet below the surface. The work was, therefore, abandoned and the property has since remained idle.

To the north of the town about one mile, a number of locations have been made in a very similar formation, although the quartz vein appears to be somewhat larger. Of these, the most developed is the *Beavis Group*, consisting of three claims, the *Gold*, *Gold No. 2* and *Sydney*. The group was reported to be under bond to Wynne Johnston and associates, of Skagway, who have already done some work on the property, and intend doing more this coming winter. They also sacked and shipped a certain amount of ore as a test lot. When visited, the shafts were found to be lagged up, at least down to the water level, and the vein could not be seen therein, but from surface showings, the dump, and the evidence of a miner who was present during the progress of the work, it is safe to say that there is a pretty well-defined quartz vein, averaging about 18 inches wide and apparently accompanied by a light-coloured acid dyke, such as previously mentioned, both of which are mineralised with iron sulphides, and which carry gold in varying amounts.

**Beavis Group.**

At a point some 300 yards from, and 200 feet above, the lake, Beavis had put down a shaft for some 20 feet on the vein. About 150 feet further to the north-west, and apparently on the strike of the lead, Johnston sank a shaft about 65 feet deep, from which drifting on the vein had been done for about 100 feet, with a cross-cut to the north-east 20 feet long, which is said to have cut a second quartz vein 4 feet wide. The quartz from the two shafts appears to be generally similar, and is mineralised with iron sulphides, in places to a considerable extent. The quartz taken from these shafts had been piled on the dump, and from this, the ore shipped as a test lot had been carefully sorted out, the actual result of which test has not been made public.

The writer took general samples of these dumps as they lay, being assisted therein by Mr. Wm. Gass, the owner of a similar and adjoining claim, who knew the ore and who tried to select ore such as went to make up the trial shipment. These samples were assayed by the Government Assayer, whose results indicate the presence of gold, but not in sufficient quantity to admit of shipment.

Gold Star Group.

The *Gold Star Group* of five claims, owned by Wm. Gass *et al.*, adjoins the *Beavis Group* on the east, and is in very similar country rock, except that it is somewhat more cut up by dykes. Here the quartz veins seem to have a general east and west trend, and are more split up into veinlets, which are correspondingly more frequent. A shaft had been sunk for 35 feet on a particularly well silicified portion of the formation. This shaft was partly filled with water and could not be entered, but the quartz therefrom was still on the dump. This was sampled by Mr. Gass, one of the owners, in the presence of the writer, and the sample was handed by him to the Government Assayer, who reports it to contain to the ton 50 cents in gold and $\frac{3}{10}$ ounces in silver.

Ottawa Group.

Still further to the east and about two miles from Atlin is the *Ottawa Group* of six clams, owned by the Shirley Bros., of Atlin, on which a shaft has been sunk to a depth of 36 feet, timbered for 16 feet down, and a drift therefrom driven 18 feet. These also were filled with water, so that the formation underground could not be seen. From the dump, however, it would appear that the country rock was still the magnesian rocks already mentioned, and here cut by a dark-coloured irony dyke, much altered and seamed by small quartz stringers, reported by the owner to have given assays of about $5 to the ton in gold. The writer, together with Mr. Shirley, took a general sample from the dump of the lead matter, which showed low gold contents.

Full Moon M. C.

The Shirley Bros. also own and have done some work on the *Full Moon Mineral Claim*, formerly the *Anny*, about one mile east from Atlin. Mr. Shirley reports the ledge to be running east and west, and to consist of a number of quartz veinlets cutting through the same class of magnesian rocks, over a width of about 7 feet. This was sampled by Mr. Shirley, and the sample brought by the writer to the Government Assay Office at Victoria, where it was found to contain a small amount of gold and about $\frac{3}{4}$ ounce of silver to the ton.

A brief visit was made to the south end of Atlin lake, the steamer "Scotia" being engaged between trips for the purpose.

Laverdiere Group.

The *Laverdière Group* consists of four claims, the *French*, *Alvaine*, *Holy Cross* and *Broughton*, the first three having been Crown-granted. The group is situated about two miles from the deep water of the lake, on the left bank of Hoboe creek, a creek which flows down from the glacier into West Bay. The general country rock in the immediate vicinity of the claims is a clay shale, with limestone appearing a little higher up the steep mountain side. What appears to be a very large igneous dyke, felsitic in character, cuts up through the shales at least to the limestone, and this dyke is very heavily mineralised; so much so that it appears in places almost completely to replace the dyke matter. The mineralisation occurs possibly as a segregation of the metallic sulphides and oxides which took place at the time of the formation of the dyke.

A tunnel has been driven in on a heavy segregation of this sort, at an elevation of some 20 feet above the level of the flat valley of the creek. This tunnel was found to be in about 185 feet, and had developed a very large body of mineral, by far the largest seen in the Atlin district; in fact, the tunnel was in mineral for most of its length. The first 20 to 30 feet of this tunnel was in almost solid iron sulphides, which seemed gradually to change into equally solid magnetite, through all of which there were minute stringers of copper pyrite, with copper carbonates near the surface. Towards the inner end of the tunnel the felsitic rock appeared in patches, but did not cut off the magnetite, merely rendering it less solid. The uniform character of the mineralisation was very striking, and it is certainly a most exceptional body of mineral. The ore from the tunnel had all been saved and was found

piled up in cribwork at the tunnel mouth. This ore pile was carefully sampled over all accessible portions and the sample, representing the general average of the tunnel, was quartered down by the Government Assay Office, giving, upon assay, low values in copper, with traces of gold and silver.

**Copper Island.** A landing was made at Copper Island to inspect the deposit from which several slabs of metallic copper had been obtained. Mr. Laverdière was present and pointed out the spots from which these were taken. The island here rose steeply from the water's edge, and the formation was found to consist of a bed of volcanic ash or tuff cemented together with lime. Through this were a number of calcite veins a few inches in width, in which in spots bright native copper was seen, and it was from these veinlets that the slabs of copper referred to had been obtained. These veinlets, while exceedingly interesting, are not sufficiently large, nor does the metallic copper in them occur in sufficient quantity, to be of importance commercially.

The enclosing rock shows green stain and contains little nodules which were suspected of carrying copper, and it is thought that the copper in the veins had leached out from the enclosing rocks. Samples of the rock from the immediate vicinity of the copper-bearing veins and elsewhere, were, consequently, taken for assay, but were found not to contain an appreciable amount of copper.

**Union Group.** It was not found possible to visit this group, which is situated near the glacier at the foot of Atlin lake, but a hand sample therefrom was obtained from Mr. L. W. Sageman, one of the parties interested, which consisted of quartz and copper carbonates. This sample was assayed and found to contain: Copper, 6.1%; gold, 0.03 oz.; silver, 91.4 oz. per ton.

## TAKU ARM.

On October 19th a heavy wind storm, lasting all day, prevented travel by water, but this dying away in the evening, a canoe was obtained at Taku, and the writer made a start at 8 p.m., paddling all night along Taku inlet, through the Golden Gate, and southward therefrom for a distance of nine or ten miles, down Taku arm, to the *Engineer Group*, on the east shore of the Arm.

**Engineer Group.** This group, which consists of some 13 claims, was located and a good deal of work done on it prior to 1900, since when considerable money has been spent on its development by the Engineer Mining Co., of Skagway. The claims, which have not as yet been surveyed, extend along the lake shore and inland part way up the mountain, covering the bench-like foothills, which are some 400 feet higher than the lake. The property has not been worked this past year, and there was not even a caretaker on the ground.

A tunnel, driven in to cross-cut a large body of quartz outcropping on the bluff above, had been started below the level of highest watermark, and had, in consequence, been flooded by the spring floods. The tunnel ran in straight for about 200 feet, and at a point 175 feet from the portal a drift had been made to the right for about 115 feet, from which exploratory cross-cuts, etc., had been run to the extent of about 75 feet in all. The tunnel had cross-cut through slate, cutting in its length several small quartz veins, and the main vein was developed by the drift which showed the quartz to be from 7 to 20 feet wide. This main quartz lead continued in the drift for about 80 feet from the tunnel intersection, when it seemed to disappear into the wall, and the subsequent exploratory workings had not picked it up again, except as small stringers. The quartz is white and vitreous in appearance, showing very little mineralisation, while samples therefrom gave only a trace in gold. The tunnel had been laid with steel rails, and well equipped with cars, blacksmith shop, sheds, etc. This is the largest showing of quartz

INDIVIDUAL PLACER MINING--BOULDER CREEK, ATLIN.

seen on the property, but is not the showing for which the stamp mill was brought in. That showing is located some 600 feet further to the south along the beach at the original point of discovery. Here, a small stringer of quartz at right angles to the general trend of the larger quartz vein—viz., east and west—cuts from the shore into the hill, on which from the beach a shaft had been sunk for 30 feet, and from this shaft it is reported most of the rich samples taken from the property were obtained. Where this stringer should cut the hill, and 100 feet above high water, a three-compartment shaft had been sunk for 70 feet. This was well equipped with a Joshua Hendy steam hoist and locomotive boiler, all covered over by the frame of a fine building, which had never been completely boarded in, but was left unfinished, with tools lying where last used.

Just below, near the beach, has been erected the frame-work of a stamp-mill and bins, all excellently built, but only half completed, while on the beach in a cabin is apparently the complete machinery for the mill which has never been erected.

**Gleaner Group.**

The *Gleaner Group* is situated on the mountain side directly above the *Engineer Group*, and in almost identical geological formation—slate and shale cut by quartz veins of irregular continuity. There was a large surface showing of quartz 7 feet wide, to strike which at a depth of 100 feet, a cross-cut tunnel had been started and run in for 180 feet, but had not as yet encountered the main ledge of quartz which outcropped above.

No work had been done on the property in 1904. The writer did not personally go to the property from the *Engineer Group*, the above information being supplied by one of the owners, then present, who had worked the property.

**White Moose Group.**

This group of claims is situated on the west shore of Taku arm, nearly as far south as the entrance to the West arm of Taku arm, and about opposite the *Engineer Group*. The property is now held by a local Atlin syndicate which is trying to develop the property with very limited capital. The claims extend for some distance along the shore and have not been surveyed, so the boundaries of the various claims could not be distinguished.

A landing was made at the most northerly of the points at which development work had been done, and from this point the trial shipment, referred to later, was made. Here on the beach, between high and low water, a quartz vein, about a foot wide at this point, outcropped through the gravel, having an east and west strike, and cutting into the bank some 15 to 20 feet away. From this outcrop, as far as it could be reached from the surface during low water, there had been broken out about 1860 pounds of sorted ore, which was sacked up and shipped to the Tyee smelter at Ladysmith, where it was sampled and assayed, with the following return, given by one of the owners:—

| | | | |
|---|---|---|---|
| Copper | 7.36 % | Antimony | 1.37 % |
| Silver | 50.34 ozs. | Arsenic | trace. |
| Gold | 0.78 " | Silica | 59.81 % |
| Iron | 6.51 % | Lime | 1.35 % |
| Zinc | 3.85 % | Alumina | 3.22 % |
| Lead | 4.79 % | Sulphur | 10.13 % |

The lot yielding a net return of $41.92.

The character of the mineralisation is shown by the analysis. It was manifestly impossible to follow this showing down where it was found, so, on the strike of this outcrop, some 30 feet further inland and 15 feet higher on the bank, above the reach of highest water, a shaft was sunk about 30 feet to intercept the lead, which was found in place. The shaft could not be entered, but from the dump it was evident that the quartz here was not so heavily mineralised

as on the beach, although there was more mineral visible here than at any other portion of the group. A rough general sample of the dump as it lay was taken and, when assayed by the Government Assayer, showed values in copper and silver.

From this first showing, proceeding south by a trail approximately parallel with the shoreline, but from 100 to 300 yards inland, a number of quartz veins were found upon which small test pits had been sunk. The quartz in all of these was white and vitreous and showed little visible mineralisation, and upon assay gave low values in free gold, and carried 2.5 oz. in silver. The country rock generally was shale, slate and schist, cut by occasional igneous dykes, often porphyritic in character.

Near a log cabin on the property, a tunnel has been driven in for about 160 feet, with the evident intention of cutting at depth a quartz vein which outcrops on the hill some 100 feet vertically higher up; this it has not as yet done, but may when driven further.

Still further to the south, on a high steep bluff, and approached by a separate trail from the beach, there is a large outcropping of quartz, apparently of a vein fully 6 feet wide and dipping into the hill at a very flat angle. To tap this at a depth of about 150 feet, a tunnel had been driven in some 150 feet, but this had been poorly timbered and had caved in so as to be impassable. As nearly as could be made out, this was on the *Rock of the Sunset* mineral claim. Little work had been done on the outcrop, but a sample, with difficulty broken off as best could be, and showing little mineralisation, gave upon assay 3.4 oz. silver per ton and slight gold values.

**Magnesite Deposit.**

A very curious and unusual occurrence of magnesite ($Mg. CO_3$) is found actually within the townsite of Atlin and less than a hundred yards from the Government office. The formation in the vicinity of the town is composed of the magnesian rocks already mentioned. On these rocks, overlain with wash, is the townsite, rising from the lake to a height of about 200 feet. Skirting the townsite on the rear—that is, the east—is a low depression or flat "draw," swampy in character, devoid of trees and in places showing "hummocks" of white magnesite which seems to be "growing up" from the swamp level; for certainly these deposits are constantly rising higher and higher, and now form mounds 5 to 8 feet above the swamp level. The deposit is exposed on the surface over several acres and is, when dry, perfectly white. It has been dug into for a depth of about 10 feet, and continues equally pure and clean from all foreign matter, such as clay or gravel, as on the surface. This deposit was at first considered to be simply an accumulation of magnesite formed from the decomposition of the surrounding rocks and deposited by surface waters in this swamp. If such was its origin, it seems incredible that the deposit should be so free from clay and other materials, equally portable by water, and that it should be deposited in mounds above the water level. It seems probable, therefore, that the deposit is not from water, but that underlying this draw some particular stratum in the magnesium rock occurred, which, being softer, was more easily worn away, so forming the draw, and being more susceptible to the action of swamp waters carrying carbonic acid, was altered from an oxide of magnesia into the carbonate of magnesia or "magnesite," in which operation it would be greatly increased in bulk and so rise in mounds, seeming to "grow up" from below. In this connection attention is drawn to the analysis, given further on, of a mineral spring in the vicinity.

The magnesite deposit has been staked as a mineral claim by A. C. Hirschfeld, of Atlin, who, during the season of 1904, dug from the surface exposures some 200 tons of the material, which was sacked and shipped to San Francisco, Cal., as an experimental lot. The transportation companies are understood to have given a rate of $8 per ton from Atlin to California, which apparently still leaves a margin of profit for the producers. It is understood that this

shipment was intended to be used in the manufacture of "magnesia brick" for furnace linings. The remarkable purity of the deposit would seem, however, to render it applicable for other uses, and this would justify a higher price being paid for it than is at present realised.

"Mineral Industry" says that the consumption of magnesite in the United States in 1902 was 53,252 short tons, of which 49,786 tons were imported from Greece and Austria; the greater part of the home production came from California, where it is calcined and the calcined product shipped east to the principal point of consumption, Pennsylvania. The uses to which the mineral is put are given as refractory lining for open-hearth steel furnaces and converters, as a lining for rotary kilns used in the manufacture of Portland cement, and as a non-conducting covering for steam boilers and pipes. It is also used in the manufacture of paper stock by the sulphite process. A limited but increasing quantity of magnesite is used for the production of carbonic dioxide gas, which is liquefied under pressure and so sold. This is done either by calcination direct or by treatment with sulphuric acid; in which latter case, magnesium sulphate (Epsom salts) is produced as a by-product. The average price of calcined magnesite in 1902 in California was $15 a short ton.

The writer saw the magnesite being mined and no selection of the material was necessary; it was simply shovelled into sacks. A sample from the shipment brought by the writer to Victoria, and analysed in the Government laboratory, gave the following:—

| | | | |
|---|---|---|---|
| Iron | trace. | Silica | 1.12 % |
| Alumina | " | Carbonate magnesia ($Mg. CO_3$) | 88.62 % |
| Sulphates | none. | Oxide (Mg. O) | 9.44 % |
| Chlorides | " | Moisture | 0.80 % |

**Mineral Spring.**

Near the north end of the townsite of Atlin, and flowing out underground from the swamp in which the magnesite deposit occurs, is a mineral-bearing spring. In 1900, Mr. J. C. Gwillim, then of the Geological Survey, took some of this water to Ottawa for analysis, upon which Dr. Hoffman, chemist of the Survey, reports as follows:—

"This water was found to contain: Potassa, traces; soda, very small quantity; lime, very small quantity; magnesia, somewhat large quantity; ferrous oxide, trace; sulphuric acid, very small quantity; carbonic acid, large quantity; chlorine, very small quantity; silica, trace; organic matter, faint traces.

"The magnesia amounted, approximately, to 1.834 parts in 1,000, an amount which would correspond to 3.851 of magnesium carbonate, or 5.869 of magnesium bicarbonate. It is more than probable that it is to the water of this and similar springs in the vicinity that the deposits of hydro-magnesite occuring back of Atlin townsite owe their origin."

## ATLIN MINING DIVISION.

### Report of J. A. Fraser, Gold Commissioner.

I have the honour to submit herewith my annual report on mining operations in the Atlin Mining Division, Cassiar District, which now includes what were formerly the Bennett and Chilkat Mining Divisions, for the year ending 31st December, 1904.

As remarked in my last report, conditions here are continually changing, so that much of what is done in this District is of a tentative nature and results are difficult of anticipation. Some things foreshadowed have not materialised, and some disappointed hopes and expectations must be acknowledged; still, I think steady, if slow, advancement may be claimed for mining as a whole in this District. The snowfall of last winter and the cold, wet summer

made possible a longer and fuller water supply than usual without the extreme high water, which invariably causes more or less damage and paralyses operations until it subsides. While fewer men were engaged in mining this year than last, the output has been larger and the revenue about the same. The success of drifting operations has contributed materially to this end and is an encouraging phase of the mining industry here, as it affords steady employment the year round with fair returns, and enables miners to remain in the camp during the long winter months, almost as profitably as in the busier summer period. From 550 to 600 men were engaged in placer mining this year, or not more than 700 in mining of any form, as against from 800 to 900 last year. Upwards of 250 men engaged in drifting operations this winter, which is probably 100 more than were so employed last winter.

This winter men are drifting on Spruce, Pine, Gold Run, Boulder, Ruby, Wright and, in a small way, on Birch and McKee creeks.

### PINE CREEK.

As anticipated by the reports for the past two years, the individual operations on this creek this season were very light indeed, not more than 65 to 70 men on Pine creek and 20 to 25 men on Gold Run being engaged in mining, together with those employed by the various companies, making 150 to 175 men all told. The results obtained were, I believe, very satisfactory to the operators, very nearly as much being reported for royalty by the individual operators as by the companies.

**Pine Creek Power Co.**

Of the companies, the Pine Creek Power Company, Limited, F. T. Blunck, President, M. W. Loveridge, hydraulic superintendent, led the van on this creek for amount of work done. The returns were, perhaps, not all it had a right to expect from the known richness of its ground, still, I believe, results were profitable and satisfactory. This company moved over 130,000 cubic yards of gravel and stripped nearly 10,000 square yards of bedrock, using an average run of 2,000 miner's inches of water and considerable quantities of black powder and dynamite. The number of men employed ran as high as 36, with an average of 21 during the season. They operated two pits alternately, generally using two 7-inch nozzles and overflow.

From the cemented nature of the material, and particularly the hardness of the blue glacial deposit overlying the pay dirt, they found it expedient to use explosives, which was done by running in tunnels with T ends, in which black powder was placed and exploded by battery, with excellent results. The glacial deposit was difficult to deal with as it came down into the pit in large blocks which required "bull-dozing" with dynamite the same as boulders.

The remarkably uniform gold values and the extent of the gold-bearing yellow deposit (mentioned in former reports), wherein are found the best values, is such as to encourage the management to expect much better "net results" next season. It is hoped, by a different disposition of the pipe-lines, to get an increased pressure with more direct discharge into the pits.

**N. C. Gold Mining Company.**

The North Columbia Gold Mining Company, J. M. Ruffner, Manager, was mentioned last year as operating on Gold Run and on Stephendyke. Last winter, however, they acquired the property of the Eastern Hydraulic Mining Company, being the *Eastern Group* of six hydraulic leases situated on the south side of Pine creek. To the development of this property its energies were mostly directed, with very gratifying results, although the amount of gold recovered did not cover the expenditure, which totalled nearly $20,000. Much of this amount was spent in the enlargement and extension of water ditches, flumes, etc., and the construction of pressure boxes, roads, bridges, and works incidental to the opening up of new property.

On the *Stephendyke Group* of leases not much was done beyond the construction of a pressure box, a bedrock flume, and several hundred feet of open cutting for prospecting purposes. About $1,200 was expended in sluicing operations. The Company employed as high as 60 men at times, with an average of 8 on the *Eastern Group* and 6 on the *Stephendyke Group* for a good portion of the season.

Atlin and Willow Creek.

The Atlin and Willow Creek Gold Mining Company, Limited, under the management of Mr. F. H. Brackett, employed from 8 to 12 men on the south side of Pine creek, and won about $15,000 from a comparatively small area, and doubtless netted a handsome profit upon the aggregate expenditure.

B. A. Dredging Company.

The British-American Dredging Company, Limited, O. T. Switzer, General Manager, has acquired extensive interests in this district, and last season built a large dredge on Gold Run, which, while not completed in time to do any work, was still supposed to be ready to commence operations with the opening of this season. Upon starting operations, however, it was found that the electrical power plant did not work satisfactorily, and much time was lost in overhauling the plant and securing satisfactory service therefrom. As Gold creek, upon which the dredge was located, is but a very small stream, a pond had to be formed in which to float the dredge, and, as bedrock lies from 30 to 40 feet below the surface, this pond was formed by scooping out a shallow excavation and surrounding it with a dam, formed with the material excavated. Considerable difficulty was experienced in keeping water in the dam, but the greater difficulty was encountered in the form of a streak of yellow gumbo about 12 feet thick (deep), which was met with about 10 feet below the surface. This material was thickly intermingled with green serpentine boulders, and the mass was so hard and tough that the dredge made very slow progress through it, and until a pond sufficiently deep and large to accommodate the dredge was excavated below the common level, explosives could not very well be used without injuring the dam. Late in the season, when the excavation had attained the necessary depth and dimensions, this material was drilled (with a key-stone driller) and blasted, with such success that the Manager feels confident that he has solved the problem of operation and can make a good showing next season both as to the quantity of material handled and net profits therefrom.

The difficulties encountered in the initial operation of this dredge are the more regrettable as it was the first in the district, and the avowed intention of the management was to place several of those dredges in the neighbourhood. While the ground upon which it was placed is undoubtedly rich and carries good values for a considerable depth upon bedrock, it happened to be one of the most difficult spots in the district to operate on account of the gumbo.

The difficulties attendant upon the operation of this dredge prevented the company from placing another on Tar Flats (Pine creek), as was contemplated last year. Beyond some "lays" and prospecting work, nothing was done there nor on the *Race Horse* and *Feather Groups*. This company employed an average of 25 men during the season.

### Spruce Creek.

On this creek about 135 men worked during the season, besides those employed by the companies. Notwithstanding a scarcity of water, and the unfortunate litigation that for a time prevented a majority from working, the output reported by the individual miners very nearly equals that of last year, being over $90,000. Water and dump room are vexed questions on this creek. Water, because so much is needed for power purposes to run the pumps in use by the majority of the operators, and so many are drifting into the banks on either side who also need water for sluicing, all of which is independent of the requirements of the hydraulic com-

panies who alone, towards the end of the season, would require all the water in the creek. Dump room is also at a premium because the pay gravel extends into the benches so far, and is so rich in many parts, that very good returns are realised by the miners, notwithstanding the cost and labour involved in getting it out to the creek bed, and the owners of bench claims naturally wish to work their ground, and as the creek claims are not all worked out it is at times very difficult to adjust and distribute the available dump ground to the satisfaction of all concerned. More dump ground is needed on this creek than elsewhere because it has been discovered that the pay dirt is so firmly cemented together that ordinary sluicing does not recover all the gold and, in many instances, ground that has been sluiced once and allowed to lie for some months yields better returns upon the second sluicing than upon the first, so that, where room is available the miners put out large dumps and allow them to lie during a portion at least, of the winter, to secure the benefits of disintegration caused by the frost.

About 125 men are drifting on this creek this winter, and as yet the width of the pay-streak does not appear to have been determined, although it is evidently over 700 feet in width. The difficulties now existing on this creek will, I think, largely disappear with the introduction of bedrock drains and flumes, and improved methods of operation which, I am pleased to say, are likely to be adopted.

**Spruce Creek Power Company.**

Of the companies, The Spruce Creek Power Company, Limited, under the management of Mr. E. F. Blaine, with Mr. Hays Haslitt as hydraulic superintendent, comes first. This company, which has acquired all the interests of the Consolidated Spruce Creek Placers, Limited, as well as other properties and interests, did considerable work this season but was hampered for want of water. A force of 16 men was employed by it during the season.

The Gladstone Hydraulic Mining Partnership, Wheelock and McCloskey, managers, being still hampered for dump and room for tailings, confined its operations to the extension of its water ditches for the operation of the *Gladstone* and *Gorgon* leases, and to prospecting the *Gladstone*, which was done by a shaft 36 feet deep, and drifts therefrom, with the results from which the management is thoroughly satisfied and is encouraged to undertake much more extensive development operation next season. A force of 17 men, with an average of 10, was employed during a part of the season.

The Columbia Hydraulic Mining Company, E. F. Meisner, manager, carried on prospecting work for a portion of the season but did not accomplish much, nor secure very satisfactory returns. From 8 to 15 men were employed during a portion of the season.

The owners of the *Crown Group* of hydraulic leases did some prospecting, with very flattering results, but have not yet undertaken the installation of plant which another season, however, will see well under way.

The property formerly held by the Camp Hammell Mining Partnership and the Blue Canyon Partnership, together with most of the individual holdings or claims between the *Crown Group* and the *Blue Canyon*, having been acquired by Mr. A. C. Denniston and some members of the British-American Dredging Company in the fall of 1903, very little mining has been attempted there this season, and not more than 12 to 15 men were engaged on that portion of the creek. The above-mentioned parties, however, having secured incorporation as the "British Columbia Dredging Company," have undertaken the construction of another large dredge—a 7½-foot, open connected type, elevator dredge. This company cleared the right of way and erected 7½ miles of electrical pole-line to connect with the British-American Dredging Company's power plant on Pine creek, excavated a basin for the dredge, transported over four hundred tons of material to the point of construction, and got the frame up and the work of

construction well advanced, but owing to the lateness of the season, wet weather, etc., work was suspended somewhat early, to be resumed next season as soon as the weather will permit. An average of 32 men were employed in this work until closed down.

A number of hydraulic leases, or leases for placer mining purposes, under Part VII of the Act, have been taken up along Spruce creek, on several of which considerable prospecting work has been done, but not much more than would constitute assessment work, except in the cases already mentioned.

On Little Spruce, which is a tributary to Spruce creek, entering the same from the south about *140 Below Discovery*, some hydraulic leases were acquired last winter and, on a group of these, some development work was done, in the course of which a shaft was sunk 27 feet from the surface without finding bedrock. The last 13 feet were through a bed of blue cemented material, below which they again struck "wash gravel" carrying "pay," but, owing to lack of pumping apparatus and other necessary appliances, they closed down for the season after spending about $3,000. They intend sinking to bedrock immediately upon resuming work next season.

### McKee Creek.

Only a small number of individual miners (12 to 15) operated on this creek this season, and the majority of those even were upon "lays" upon company holdings, but the reputation of the creek for "good pay" was maintained and, while all did fairly, some did exceptionally, well. While there is sufficient water in this creek for ordinary sluicing purposes, there is not enough to satisfy those operating hydraulic plants, and some difficulties arose between adjacent owners, which culminated in litigation, and perhaps affected the output for the season, inasmuch as it embarrassed and delayed some of the operators.

Of the hydraulic properties on this creek the leases and interests of the Atlin Mining Company, Ltd., and of the McKee Consolidation were acquired by the Amalgamated McKee Creek Mining Company, under the management of Mr. Clarence M. Hamshaw, and, as threatened litigation was thus averted by common ownership of conflicting interests, a very good record was made for the season. This company uncovered about 8,000 square yards of bedrock during the season, winning therefrom about $42,000 and making the highest royalty returns of any operators in the district for the season—viz., $52,500, which included about $10,000 recovered by "lay" operations. This company employed an average of 17 men for the season, and, I am pleased to say, "netted" a handsome profit on the season's operations.

**Amalgamated McKee.**

I may say that the difficulty in reaching the bottom of some of the old channels in this creek, the great amount of debris to be moved, and the scarcity of water, have suggested to the managers of this company the idea of installing a steam-shovel for picking up the pay gravel, after ground-sluicing off the comparatively barren top débris, dumping this into cars, operated by electricity, and conveying it to the lake shore (not far distant) for sluicing, where ample water and dump can be provided at comparatively small cost. The idea seems practicable and, if so proven, will introduce a method of operation that will solve to a great extent two of our greatest difficulties and render profitably workable several properties in this district of otherwise doubtful value.

The McKee Consolidated Hydraulic, Limited, F. T. Hamshaw, manager, whose properties lie higher up the creek than the last-mentioned, expended a considerable amount in flumes and waterways and exploratory work, endeavoring particularly to bottom some old channels which seem to be considerably deeper than the present channel of the creek. This prospecting work was not entirely successful, not having found bedrock, except on the "rim"; but sufficient gold

**McKee Consolidated.**

was secured in what was done, to arouse great expectations when bedrock is eventually reached. The management expresses itself as very well satisfied with the prospects. An average of 16 men was employed until the middle of August, and of 10 men from then till the end of September.

### BIRCH CREEK.

As mentioned in last year's Report, much more attention has been given to this creek by individual miners than in any season since 1899, and about 20 miners were operating above the hydraulic company's works, but with rather indifferent success—still, with sufficient to induce them to believe that the ground is rich enough to warrant the continuance of work. The possible shortage or lack of water is the greatest drawback they anticipate.

**Atlin Lake Co.**

The Atlin Lake Company, Limited, A. Bryan Williams, manager and superintendent, is the only company, so far, operating on this creek. Opertions were commenced by this company in April, and piping on May 6th, and continued until about the end of August, when, owing to the decrease in water supply and an anticipated further shortage, the operations were closed down for the season. The anticipated shortage did not occur, owing to a considerable rainfall, and sluicing might have been continued throughout September, but it was then too late to resume.

However, as it was, a force of from 12 to 16 men was employed, and about 30,000 cubic yards of gravel were moved, which yielded over $12,000, being much the best season the company has had, and securing for it, I believe, for the first time a "net" profit from the season's operations. I have reason to believe that everything is in very good shape for an early start next season.

### BOULDER CREEK.

Owing to the unfortunate and expensive litigation, in the fall of 1903, between some of the miners on this creek and the Société Minière de la Colombie Britannique, which involved the disposition of their tailings and debris, and to some extent the use of the water, and which was decided against the miners (the decision in part taking the form of an injunction practically perpetually restraining those certain miners from depositing or permitting the deposit of debris upon the company's property), many of the miners either disposed of their properties or had them laid over pending a possible change to conditions more favourable to their interests, so that not more than about sixty men were mining on the creek this season, besides those operating on the property of the Société Minière de la Colombie Britannique. The results were as usual fairly good, and in some cases very good indeed.

**Societe Miniere de la Colombie Britannique.**

Of the companies operating on this creek the Société Minière de la Colombie Britannique, Henry Maluin, manager, Joseph Fall, superintendent, as usual, leads in the amount of work done. With a force of as many as 23 and an average of 17 men, over 50,000 cubic yards of gravel were moved, but notwithstanding that there was practically no embarrassment such as obtained the two previous seasons from the operations further up-stream, and that the company's operations were carried on at far less cost than formerly, the results were disappointing and not nearly as good as last season. This apparently can be explained only by assuming that the portion of bedrock uncovered was too smooth and therefore barren, but the management are still confident of better results next season, and consider themselves in good shape to secure them.

**Black & Grant.**

Although this company's hydraulic operations were unsatisfactory, the same cannot be said of the operations of Messrs. Black & Grant (J. H. Black and W. Pollard Grant), who have a "lay" upon a portion of the company's ground a short distance below the pit operated by the company.

This firm commenced operations about November 1st, 1903, by sinking a shaft nearly 60 feet to bedrock. The shaft is commodious and well timbered, and is operated by a steam hoist. The heaviest timbers procurable are required for posts, and caps in their drifts and tunnels. With all the care, an open seam permitted the creek to come in, early in June, which did much damage to the workings, actually compelling the suspension of operations for from two and one-half to three months. Within the year ending November 1st, about 15,000 cubic yards of pay dirt was hoisted, and nearly $60,000 won therefrom, the last two months' operations yielding nearly $14,000. This quantity of earth probably does not represent one-third of the quantity moved, as all rocks and boulders are systematically piled in the worked out portions, so as to provide permanent supports, as well as for economy of space and handling. An average of 35 men, besides those engaged above ground cutting and hauling wood and timbers for the mine, has been employed. They used about 700 cords of wood, at a cost of about $4,500, 2,600 sets of timbers and over 25,000 lagging, which together cost nearly $10,000. The cost and difficulties of operation have been formidable, and it is very gratifying to find such pluck and determination as they have shown rewarded by substantial profits. The success of these operations is instructive in demonstrating that high values are obtainable in the deep channels, of which I believe there are many in this district.

On the *Non-Union* lease, operated by A. H. Garrison & Co., with a small hydraulic plant, an average of six men (maximum nine) being employed, about 1,000 feet of water flume, and 800 feet of bedrock flume and pipe were laid, and about 8,000 cubic yards of gravel moved. The question of housing their tailings entailed some additional expense, as they built a tailings dam or crib, which, however, appears to serve the purpose very fully, and incidentally demonstrates that even on a creek possessing a heavy or steep grade such dams can be successfully operated.

### Ruby Creek.

On this creek from 12 to 15 men spent most of the season prospecting and four are drifting on it this winter. None have as yet got much past the prospecting stage and very little gold has been recovered, although this is the second season spent on the creek.

Of those operating on the creek, the Ruby Creek Mining Partnership, Limited, Robert Mackay, foreman, has done more work than the rest all told, having spent altogether over $6,000 in the two seasons. This season an average force of six men, with a maximum of eight, was employed and the open cut of last season was continued up-stream about 200 feet further, where a depth of 20 feet was attained. At this point a shaft was sunk 27 feet to bedrock, which was struck at a depth of 47 feet from the surface. The bedrock was found to be a quartz conglomerate, very much crumbled and broken. An excessive flow of water was found on bedrock which necessitated the use of pumping gear with more than the ordinary capacity of hand appliances, which being secured, permitted drifting on bedrock, and cross-cuts were run to an aggregate width of 50 feet. Still, this was not far enough to determine the width of the channel, nor even whether the deepest point had been found. Operations were suspended on account of the pump freezing up, the foreman assuming that winter was upon him. In sinking, however, from 25 to 30 feet in depth, "pay" gravel was encountered from which very fair prospects were obtained, some portions being very good indeed and far above the average of much of the ground being "hydrauliced" in the district. My impression is that this creek would make an exceptionally good hydraulic or steam shovel proposition, but is too deep for ordinary individual placer mining methods. Good prospects were found by the other operators, as far as they have gone.

### WRIGHT CREEK.

On this creek about 20 men were mining during the season, with varying success, some doing very well indeed, while others hardly made wages. This has always been the history of this creek, some portions having been found very rich, while other portions were unusually barren. Two men are drifting on the creek this winter.

### THE ENGLISH COUNTIES HYDRAULIC SYNDICATE.

C. Dubois Mason, manager, expended, through Messrs. Gierke & Co., over $4,000 on this property again this year, but, unfortunately, spent the greater part of the season contending with a hard barren cement, and only just before the close of the season did they strike the "pay" gravel peculiar to the creek, in which in the past the best values have been found. The operators think, however, that, now they have it, they can follow it, and are looking forward with sanguine expectations for the reward of their industry and their faith in the ground, which certainly has been very marked, and which, I trust, will not be unrequited.

### OTTER CREEK.

On this creek the Otter Creek Hydraulic Company, Limited, did considerable work on the leases held under bond from Messrs. Carmichael, Moran *et al.*, but early in the season closed down, with, I understand, the intention of abandoning any further claim under the bond. The owners are still confident as to the value of their property, and claim that it is quite capable of profitable operation by properly utilising the available supply of water, the scarcity of which is the greatest difficulty.

### SNAKE CREEK.

On Snake creek a number of leases were secured by local parties, but while it is their intention to equip the property with hydraulic plant, nothing has been done beyond some preliminary prospecting.

### O'DONNEL RIVER.

On this river nothing has been done in the way of development, except at a point some 10 to 15 miles from its mouth, where the O'Donnel Syndicate, under the management of Mr. Robert McKee, did considerable prospecting and opened up high gravel banks which are represented as carrying good values throughout and as being an ideal steam shovel or dredging proposition. The whole river, practically, is located in the form of mining leases, and I have reason to believe that active development will be carried on next season at several points, with the probability of one or more dredges being located thereon, or at the least arranged for, before the end of the season.

On Bull creek (a tributary of O'Donnel River) the Bull Creek Hydraulic Syndicate operated during the season with a small hydraulic plant, and from four to six men prospecting their ground, and while no very rich ground was discovered, still some very fair values are reported and on the whole, it is claimed, the values would justify and repay operation by dredge or steam shovel.

### GRAHAM CREEK.

On this creek no work was done this year for apparently no reason other than that the leaseholders were endeavouring to raise capital to equip the property with hydraulic plant, and did not succeed in time to commence operations this season.

There are other creeks in the district to which some attention has been paid during the season and on which some locations were made, but no development has been reported from any of them.

The season, on the whole, has been favourable and this fall and the winter up to date particularly so. It will probably astonish many to learn that open sluicing has been carried on, with very little interruption from frost, right up to the end of the year, particularly on Spruce creek and Boulder creek. With the exception of two or three short intervals, the thermometer has ranged between 10° and 36° Fahrenheit, and often for days (and nights) not dropping below 20° or even 25°. Some sluicing is carried on all winter by parties whose situation enables them to cover their dump-boxes with a tent or temporary cabin, so securing sufficient gold to pay at least running expenses.

There has been a falling-off in the number of claims recorded and re-recorded, which is partly due to so much ground being taken up in lease form, there not being much ground remaining unoccupied that is considered worth locating in 250-foot claims, and partly to the fact that several groups of claims have been consolidated into lease form. Of the ground held in lease form, I think that, outside of the consolidations of placer claims on McKee, Pine and Boulder creeks, very little indeed would be located in placer claim form, even if it were open for location, and as to the leases, or applications therefor, a considerable percentage of the latter will probably never be completed, and of the former I expect to have to recommend a goodly number for cancellation within the next few months, for non-fulfillment of conditions.

While the output of gold from the district is considerably larger than last year, a smaller amount in proportion has been reported for royalty, and while it seems impossible to get anything like accurate and full returns from the producers, I think the system of monthly returns, recently introduced, will materially increase the amount reported and incidentally the revenue legitimately due therefrom. It is difficult to secure returns from the small producers, particularly where their output is under $2,000, and it can never be done under existing methods and conditions, except by systematic solicitation on the part of some official appointed to call upon them where and when at work.

## Mineral Claims.

I am again compelled to report very little activity in quartz mining, but, while very little more than assessment work has been done throughout the district, except upon a few properties. I have not observed any lack of confidence on the part of the holders of quartz properties, while on the other hand, the confidence of many seems to increase as development proceeds and better values are disclosed, as appears to be invariably the case.

Of the properties mentioned in former reports, nothing has been done on the *Yellow Jacket* for some months.

On the *Beavis Group* of three claims, just north of Atlin, considerable work has been done of an exploratory nature. A shaft was sunk to a depth of 66 feet and about 106 feet of crosscut tunnelling was done, but no shipments were made beyond certain small lots sent to the smelter for test purposes. From $4,000 to $5,000 were spent in development work, and the bondholders express themselves as quite satisfied and prepared to proceed as soon as arrangements are completed.

The *Imperial Group* of four claims on Munro mountain is also in a somewhat similar position, some work having been done during the year, although it is just now at a standstill.

The *Anaconda* and *Gleaner Groups* were allowed to be sold for taxes by their respective owners, and were promptly purchased by interested parties.

With reference to the *Engineer Group*, on Taku Arm, nothing has been done since my last report, as the company owning the property is in course of re-organisation, on a basis that will insure increased capital and development on a much more extensive scale than hitherto.

On the *White Moose Group* (Taku arm), some work has been done and a test shipment made, the returns from which, I understand, were very satisfactory, but nothing is being done at present.

While the above-named properties are not being worked at present, the owners in every case (except perhaps that of the *Anaconda*) express themselves quite satisfied with the value of their respective holdings and the possibility of their development into valuable mines.

Besides the properties above mentioned, considerable development has been done upon other properties throughout the district, as, for instance, the *White Star* and *Lake View Groups*, situated about 12 miles from Atlin, between Birch and Boulder creeks, and on the eastern slope of Boulder mountain. They comprise, in all, a block of about 10 claims, covering an area of about 500 acres. A good waggon road passes within a mile of them, and there are good pack trails to the camps. Work has been done on these properties as follows :—

On the *White Star Group* of three claims—An open drive, through country rock, 52 feet long and 5 feet wide, to tap the ledge. Tunnelling on vein, 58 feet long, 5 feet wide, and 6½ feet high. The ledge is 4 feet wide and assays from traces of gold to high values in gold and silver.

The *Isabel* and *Barbara* mineral claims—A surface cross-cut exposes the No. 1 ledge, which is 100 feet wide. A tunnel to tap the ledge at fifty feet is in course of construction. Mining work done amounts to 1,140 cubic feet. Assays from $3 to $6.

The *Lake View Group* of three claims—Besides various shafts and surface cuttings, a tunnel 151 feet long, 4 feet 6 inches wide, and 6 feet 6 inches high, has been driven to prospect No. 2 vein. The dump from the tunnel contains about 140 tons of ore. This property has lately been surveyed.

To facilitate mining operations, the amalgamation of these properties is contemplated.

Development is also being prosecuted, by Mr. George Pollay, on certain properties on Wright creek, by Mr. Henry Nicholson and others on Little Spruce creek, and by Shirley Brothers and Conley, and Rorke & Company, within two or three miles to the north of Atlin, where the prospects obtained are considered encouraging. On the last-mentioned property I understand that this winter's development work has exposed quite a large body of pyrrhotite ore that is very promising in appearance.

Somewhat extensive development is being prosecuted on a group of claims on Table mountain, a little to the north-west of Taku portage and on the east of Taku arm, by an American company, under the management of Mr. John O. Cooper, which has built substantial camp buildings, trails, etc.

Some promising properties are also being developed in the vicinity of Lake Bennett and Otter lake, on the former of which, particularly, large deposits of good ore are represented as existing, from which shipment may be undertaken at almost any time.

Some new discoveries in ledge form have also been reported, notably upon Boulder and Spruce, but upon these sufficient development work has not been performed to warrant any report.

A new departure in the mining industry has been made in developing the extensive deposits of magnesite adjoining Atlin townsite on the east. All the available deposit has been acquired by a local syndicate, and a shipment of something like 175 tons of the magnesite was shipped this fall to a firm in San Francisco, for test purposes, the results of which, I believe, have not as yet been ascertained.

Office Statistics—Atlin Mining Division.

| | | |
|---|---|---|
| Records issued, 107, representing | 107 | claims. |
| Re-records issued, 469, representing | 502 | " |
| Bills of sale recorded (placer) | 303 | |
| Grouping permits issued | 32 | |
| Abandonments filed | 11 | |
| Leave of absence granted, representing | 357 | claims. |
| Free miners' certificates issued (individual) | 831 | |
| " " (companies) | 13 | |
| " " (special) | 3 | |
| " " (substitute) | 1 | |
| Mineral records issued (Atlin, 75; Wells, 29; Bennett, 1) | 105 | |
| Certificates of work issued (Atlin, 91; Wells, 17; Bennett, 14) | 122 | |
| Notices filed under the "Mineral Act" (Atlin, 8; Wells, 2; Bennett, 1) | 11 | |
| Bills of sale recorded under the "Mineral Act" | 11 | |
| " " (hydraulic) | 96 | |
| Permits to move stakes issued | 14 | |
| Applications for mining leases declared void, etc | 29 | |
| " " declined | 16 | |
| Hydraulic leases cancelled | 2 | |
| " applied for | 105 | |
| " issued | 61 | |
| Water records applied for | 16 | |
| " issued | 4 | |
| " abandoned | *nil.* | |
| " cancelled | " | |
| " in force | 64 | |
| Bedrock flume grants applied for | 1 | |
| Investigations held by the Gold Commissioner under Part IX of the "Placer Mining Act" | 61 | |

*Revenue Collected*

| | | |
|---|---|---|
| Free miners' certificates, individual | | $ 4,099 50 |
| " " companies | | 1,092 50 |
| Mining receipts, lease rentals | | 8,245 00 |
| " lease deposits | | 2,200 00 |
| Water records | | 1,175 75 |
| Bedrock flumes | | 300 00 |
| Mining receipts, other sources | | 4,519 70 |
| Leave of absence | | 917 50 |
| Royalty on mines and minerals | $5,472 64 | |
| Less amounts refunded | 392 50 | |
| | | 5,079 99 |
| | | $27,629 94 |
| Revenue collected, other than mining | | 12,387 11 |
| Total revenue of Atlin office for the year 1904 | | $40,017 05 |

GOLD PRODUCED UPON WHICH ROYALTY WAS PAID, 1904.

| CREEK. | TOTAL OUTPUT OF CREEK, 1904 | INDIVIDUAL MINERS. | | | COMPANIES. | | |
|---|---|---|---|---|---|---|---|
| | Value. | Ounces. | Value. | Royalty. | Ounces. | Value. | Royalty. |
| Pine Creek..... | $107,317 65 | 3,364 | $ 52,130 65 | $ 596 35 | 3,560 | $ 55,187 00 | $ 983 75 |
| Boulder Creek.. | 107,905 60 | 1,478 | 22,905 60 | 271 20 | 5,484 | 85,000 00 | 300 00 |
| Spruce Creek... | 101,556 95 | 5,811 | 92,978 60 | 985 90 | 538 | 8,578 35 | 111 35 |
| McKee Creek... | 57,191 00 | 186 | 2,891 00 | 29 50 | 3,503 | 54,300 00 | 1,010 00 |
| Birch Creek.... | 16,100 00 | 258 | 4,000 00 | ..... | 780 | 12,100 00 | 202 00 |
| Wright Creek.. | 3,365 00 | 234 | 3,365 00 | 6 00 | ..... | ..... ..... | ..... |
| | $393,436 20 | 11,331 | $178,270 85 | $1,888 95 | 13,865 | $215,165 35 | $2,607 10 |

| | |
|---|---|
| Royalty paid in 1904 on gold recovered in 1903 | 976 59 |
| Total | $3,583 69 |

In the above is included $68,000 for Boulder creek, on which the royalty has not yet been paid.

SUMMARY.

| Ounces. | Ounces. | Value. | Royalty. |
|---|---|---|---|
| Individual miners | 11,331 | $178,270 85 | $1,888 95 |
| Companies | 13,865 | 215,165 35 | 2,607 10 |
| Total | 25,196 | $393,436 20 | $4,496 05 |

| | |
|---|---|
| To which is added royalty paid in 1904, on gold recovered in 1903 | 976 59 |
| Making the amount of royalty collected, 1904 | $5,472 64 |

## NORTHERN PORTION OF CASSIAR DISTRICT.

(Including the Teslin, Liard and Stikine Mining Divisions.)

REPORT OF JAMES PORTER, GOLD COMMISSIONER.

I beg to submit my annual report upon the mining in progress in the Northern Cassiar District, which includes the Teslin, Liard and Stikine Mining Divisions.

I regret to say that, from the standpoint of gold produced, the season has been a poor one, and this is accounted for by the fact that the Berry Creek Mining Co., Ltd., which controls a large extent of the old gold-bearing channels on the south side of Thibert creek, below the mouth of Berry creek, did not wash any gravel this season.

**Berry Creek Mining Co.**

The Berry Creek Mining Company, Ltd., has been operating on this creek for several seasons, and despite many obstacles, has of late years been the largest producer in the district. This company, under the management of Mr. Alex. Hamfield, while it has proved beyond a doubt that the ancient alluvial

deposits of the locality contain gold in quantity sufficient to be profitably worked, has found itself in the position that, to carry out the work to advantage, it must enlarge its available water supply and plant, matters requiring a considerable outlay of money and energy, if the plant is to be re-installed this coming season.

The question of transportation of heavy machinery into the district is a serious one, as you will see from the following:—Machinery is transported by a coasting steamer from some coast city to the mouth of the Stikine river, and from here it is taken by river steamer to Telegraph creek, the head of navigation on the Stikine. From Telegraph creek it has to be packed on the backs of animals, or, if the pieces are too heavy, hauled over a pack-trail for a distance of 75 miles, to the head of Dease lake. It is then transported down the lake on scows for a distance of 25 miles, to be again packed by animals to the mine, a further distance of 7 miles.

Note by Provincial Mineralogist.—The following has been extracted from the official report of the manager, Mr. Alex. Hamfield, to his Directors, and is by his permission here given:—

"The Berry Creek Mining Company was formed by Mr. Hamfield and his associates to take over the property of the Thibert Creek Mining Co., of which it is, therefore, the successor. Upon the formation of the company in the early part of 1904, it was realised that, to operate the property successfully, the plant of the Thibert Creek Company, using 500 miner's inches of water a day, must be materially enlarged, and consequently, additional equipment was ordered to bring the plant up to the utilisation of 1,000 miner's inches daily. The additional plant so ordered consisted of:

| | | | | |
|---|---|---|---|---|
| 1,200 | feet pipe, | 18 in. | diameter, of | No. 12 steel. |
| 500 | " | 18 in. | " | No. 14 " |
| 300 | " | 12 in. | " | No. 16 " |
| 800 | " | 10 in. | " | No. 16 " |

Two No. 6 steel construction, double-jointed, ball-bearing giants.

Twenty-one 18-in. 3-piece water gates, with accessory fittings.

"Owing to the difficulty in getting prompt delivery, this material did not reach Telegraph Creek, the head of navigation, until June 20th. It was started to the mine by H. B. Co.'s pack-train, but by the end of the season had not all arrived. The remainder, however, will be forwarded by sleighs this winter and so will be on hand for an early opening in the spring.

"The freights from Wrangel to Telegraph Creek were $40 per ton, and from Telegraph Creek to the mine $200 per ton of 2,000 lbs., which gives some idea of the costs entailed by the remoteness of the camp.

"It was decided, considering the lateness of arrival of the equipment, not to attempt any washing during the year 1904, and only a force sufficient to erect the new plant was taken in.

"The non-delivery of the plant as contracted for prevented the complete installation of the new plant, but all the pipe was rivetted together, and about 1,000 feet of the most difficult part was laid, and the remainder can be quickly put in place in the spring.

"The sluices in pits Nos. 1 and 3 were lowered 12 and 20 feet respectively, to give a more effective grade and facilitate removal of boulders. A new pit, No. 4, was opened at the lower end of the workings and 100 feet of sluice-boxes, 3 by 5 feet, laid therein. A lot of other work also was done, such as re-adjusting car tracks, building bridges for pipe-line and a new spillway, rendering the dam tight, etc. The saw-mill was removed from the mine to a site on Dease lake, opposite Porter's landing, where a better supply of timber is to be had.

"Water was brought on from the second fork of French creek into Berry creek, while a new water record of 300 inches was acquired on the second tributary of the north fork of Dease river. The total distance this water will have to be brought is 12 miles, but a survey shows that, by utilising a natural waterway, a ditch of less than two miles will suffice.

"Some definite measures are to be taken towards the saving of the osmiridium which is known to exist in the deposit to an appreciable amount.

"The expenditures for re-equipment this past year were over $20,000, and some additional expense will have to be incurred to bring the new plant up to a state of efficiency, but when this is done the plant will be in a much more efficient condition than ever for economic production, and 1905 should witness a successful run, with a steady flow of 1,000 miner's inches of water, six monitors that may be used, and five openings through which to wash the gravel."

**Rosella Company.**

The Rosella Hydraulic Mining and Development Company, with head office at Victoria, B. C., and of which J. W. Haskins is manager, controls certain property on Rosella creek. Last winter the company had a waggon road cut from Dease river to its claims on Rosella creek, a distance of 12 miles, to permit of the transportation of hydraulic equipment. A portion of this plant arrived at Telegraph Creek during the summer and some of it was started out on the trail to Dease lake, but was left at a point 23 miles out, from whence it will be taken this winter by dog teams to the head of Dease lake and in the spring conveyed down stream as soon as the ice breaks up. The company will probably be able to install the plant next season in time to have a short run.

A number of parties were searching over the district this past summer in quest of suitable locations for hydraulic and dredging leases, with the result that several have been staked on Dease river and on McDame creek.

It is reported that a Seattle company expects to install a plant this coming season on certain of the McDame creek locations.

Three men have been prospecting in the Clearwater river section of the district, and I am pleased to be able to report that they were rewarded by finding some very good placer ground on what is known as the first north fork of the Clearwater river. I believe that several men will be employed in the locality this coming season.

Quite late in the season several placer claims were located in the north-western portion of the Teslin Mining Division, on Consolation creek, which flows into Gladys lake from the south-west. This locality is remote from Telegraph Creek, the Record Office of the Division, being nearer to the Atlin Record Office; the Mining Recorder at which point, Mr. E. J. Thain, has been appointed a Deputy Mining Recorder for the Teslin Mining Division. These locations were consequently received by Mr. Thain and by him forwarded to the Teslin Record Office at Telegraph Creek, to be there recorded.

Under date of November 24th, Mr. Thain reports as follows:—

"Consolation creek (erroneously marked on the departmental map as Consolidation creek) is a feeder of Gladys, or, as it is sometimes known locally, Sucker lake.

"These locations are reached from Atlin by a trail by way of Fourth of July creek, up Volcanic creek, crossing the divide and following Consolation creek down to the *Discovery* claim. The distance from Atlin is variously estimated at from 40 to 45 miles in a north-easterly direction.

"An alternative and almost level route may be taken by following Pine creek up to Surprise lake; thence following the southern shore to the north-east to the end of the lake; thence over a low divide on to one of the tributaries of Consolation creek, which is followed down to its junction with the main stream.

"Consolation creek rises on the eastern slope of the same range of mountains in which, on the western slope, Birch, Boulder and Ruby creeks, of the Atlin Division, have their source.

"*Discovery* claim, on Consolation creek, was recorded at Atlin only late in the season, on September 22nd, 1904, and, consequently, very little work has been done on it as yet, while subsequent locators have made no attempt to prospect their claims, the season being too far advanced to permit of work being done to any advantage. The discoverers say they intend putting on machinery in the spring, which would indicate that they consider their ground to be fairly deep. It is reported that they are drifting in a bench in an apparent endeavour to strike rimrock."

Prospecting was prosecuted this past season by several parties in the Terrahina district, that is, on the eastern slope of the range which forms the divide between the watersheds of the Atlin and of the Teslin Mining Divisions. In one instance a prospector claims to have found good prospects in a dry gulch, but, although he found in a pan a nugget worth from one to two dollars, water not being available, he made no locations.

Other than those already mentioned, no new finds have been made in the district.

The bringing in of machinery by those already interested in the district demonstrates their faith in its future prosperity, which, I think, is warranted. There are many old channels in the district which will yield a harvest of gold, if taken hold of in a proper manner and handled by practical men.

At present, as must be expected in such a vast interior district, the difficulty and expense of transporting machinery and supplies is a very serious handicap, and no greatly increased activity need be looked for until such handicap is removed by the construction of a railway, or at least of a serviceable waggon road.

Owing to lack of mail facilities in winter, the office statistics are given for the period stated, and not for the calendar year.

Office Statistics—Northern Cassiar District.

*(From November, 1903, to October, 1904, inclusive.)*

| | |
|---|---|
| From free miners' certificates issued | $ 268 00 |
| From general mining receipts | 2,245 50 |
| | $2,513 50 |

Note by Provincial Mineralogist.—The following is from a Report made by Mr. R. D. Featherstonhaugh for the Atlin-Tuya Coal Prospecting Syndicate, upon certain coal lands situated on the Tuya river:—

"I left Atlin on July 4th, 1904, over the Dominion Telegraph trail to Nahlin, thence over the old Teslin trail to Telegraph Creek, arriving there on July 17th. I learned there that the Tuya river was very high and it would be impossible to cross it if I went up by the Dease trail and Caribou camp on the east side of the river. As the stakes of your property and the principal outcrop of coal are on the west side, I had to go up on that side, following an old Indian trail for some distance, having to cut out a trail for the pack-horses for 12 or 15 miles. This necessitated the employment of two extra men and one horse for seven days, and leaving Telegraph Creek on the 18th, I arrived on the property on the 21st of July.

"The easiest route to reach the property would be from Wrangel by steamer up the Stikine river to Telegraph Creek, thence by saddle horse, which would occupy about three days from Wrangel.

"The property is situated on the Tuya river, in the Cassiar District, Province of British Columbia, about 25 miles up stream from where the Tooya empties into the Stikine river and about 35 miles from the village of Telegraph Creek. At the latter place there are stores, hotels, post office and telegraph office. The property consists of 13 leases, each one mile square, or over 8,000 acres.

"The country for about 15 miles along the Tuya river is of sedimentary formation, consisting of carboniferous conglomerate, sandstone and shales, the general trend being north-east and south-west, the contact on the north being principally granite and on the south basalt and other eruptive rocks. The sandstone and conglomerate apparently extend in a westerly direction, a distance of nearly 50 miles, to the Nahlin river, where the same formation with the same plant fossils can be easily seen.

"Lying between the strata are large seams of coal. Outcrop No. 1, marked on the accompanying plan, is a seam of coal 38 feet thick lying on a bed of clay and shale, capped by a stratum of conglomerate of varying thickness, then a stratum of coarse sandstone, on top of which has been deposited by ice at a later period about 20 feet of coarse gravel composed of granite and syenite boulders. This coal seam strikes approximately N. 30° W. and S. 30° E., and has been tilted to an angle of about 40°, and has been cut through by the river for a depth of 35 feet, thereby saving a large amount of prospecting to get the information which has been obtained at this point. An analysis made by the Provincial Assayer at Victoria, B.C., from samples, last November, gave the following results:—

| | |
|---|---|
| "Moisture | 11.35 % |
| Volatile matter | 28.36 % |
| Fixed carbon | 49.22 % |
| Ash | 9.92 % |
| Sulphur | 1.15 % |
| Heating value in British thermal units | 11,401 |

"Outcrop No. 2 on plan is a seam of coal 26 feet thick and about one-half mile down stream from outcrop No. 1, dip and strike corresponding with No. 1, but a distinctly separate seam, and can be traced for a long distance on the surface.

"Outcrop No. 3 on plan shows up on Coutts creek about 400 yards up stream, on the right-hand side going up. Coutts creek is a large creek running nearly east and west, emptying into the Tuya river about one and a half miles below No. 1 outcrop. This outcrop is over 40 feet wide, dipping at an angle of 35° to the north, and strikes more with the trend of the country, namely, easterly and westerly. A great deal of coal can be found in the wash in the creek bottom.

"The whole area is fairly well timbered with spruce, affording sufficient supply for mining and construction purposes.

"A practically unlimited water power can be obtained at a reasonable cost from the Tuya river and Coutts creek.

"Of course railway facilities for the handling of the coal is an absolute necessity. The proposed line from Kitimat harbour or Hazelton to Dawson would pass through the property within a few miles of the present outcrop of coal, following the old survey of the Cassiar Central Railway."

## SKEENA MINING DIVISION.

Report by John Flewin, Gold Commissioner.

Sir,—I have the honour to submit herewith my annual Report on mining operations in this Division for the past year.

On the whole, there has not been as much activity as I had expected, yet the receipts show a gratifying increase, the mining revenue being over fifty per cent. in excess of the previous year. Although there has not been any extensive development in any particular section, a large amount of preliminary work has been performed by individual prospectors and small companies, the results, in most cases, being very satisfactory. Portland canal and the Telkwa river camps continue to attract the most attention, the former especially showing greater promise of becoming an exceedingly rich camp than was hitherto expected of it. Two new discoveries were located here during the season, one of them a body of high-grade silver ore across the divide from the *Stewart* property, the other being a large body of copper-gold ore near Maple bay, located under the name of the *Copper King Group*. A large amount of stripping and cross-cutting was done on this property, and there is every evidence that it is a true ledge with well-defined walls.

Following in William Hunter's tracks, a number of prospectors went into the Telkwa camp, and succeeded in locating some rich ore, assays from which range from $90 to $116 in gold. All who have located in the camp are most enthusiastic about their prospects. The ore is not only high-grade, but the bodies appear to be immense. Copper, gold, silver ores, and hematite iron are there in abundance, while there are immense fields of coal within a few miles. Indications point to a considerable influx of prospectors, both into Telkwa and Portland-Observatory inlet camps, which will undoubtedly both be very busy centres during the coming year.

### Portland Canal.

Negotiations have been on foot recently for the acquisition of several groups in this camp both by Seattle and Alaska companies, but so far only one deal has been consummated, that of the *American Girl Group*, on American creek, the property of Stewart, Conway and Brightwell. The deal is a 12 months' bond for $100,000, with payments at stated intervals, the purchasers to carry on continuous work. This is the largest price ever offered for a mineral property in either northern British Columbia or Alaska. The purchasers have made a thorough inspection and are confident that they can ship from the start ore which will average $100 per ton. These parties shipped the whole of their supplies, powder, horses and men by the steamer "Nell" in October, but, unfortunately, the loss of that vessel by fire, compelled them to return south for the winter. They now intend to bring in fresh supplies in February, and get the property on a shipping basis early in the spring.

Across the divide from the *Stewart* property, Messrs. Harris & Rearick, of Ketchikan, located, in August last, a fine-looking body of silver ore on Salmon river. This stream flows into Portland canal, about two miles south of Bear river, and was formerly embraced in the territory of Alaska, being to the west of the Provisional Boundary, but since the establishment of the permanent boundary monument at Eagle point by Commissioners King and Tittman, last August, the line deflects to the south sufficiently to include on the Canadian side the headwaters of Salmon river. This includes the whole mineral belt where the new discovery lies. The discoverers located six claims, composing the *Silver Lake Group*. Their main showing is exposed 500 feet in length, and from 10 to 20 feet in width. The hanging wall is grey porphyry, with a blue lime foot-wall. The average of their assays gives $48 in

gold, silver and copper from the surface, one assay showing $34 in gold alone. It is the intention of the locators to take in supplies over the ice and commence active development early in the spring.

On the summit between the *Silver Lake* and *American Girl Groups*, Dan. Lindeborg, an old Boundary prospector, late in the fall located four claims, the ore on which is similar to that on the two former groups. The distance from the *Silver Lake* to the *American Girl* is about five miles through an open country, easily prospected, and with abundance of bear, mountain goat and marmot, and the lakes, of which there are many, teeming with trout.

Considerable work has been done on the M. K. Rodgers properties (of which J. E. Stark, of Nanaimo, is superintendent), as follows :—

On the *Silver Bow Group*, consisting of the *Silver Bow Nos. 1, 2, 3* and *4*, and *Washington* mineral claims, one tunnel in rock 15 feet long, 5 feet wide and 7 feet high; one cutting in rock 40 feet long, 5 feet wide and 5 feet deep; one cutting in earth 80 feet long, 5 feet deep and 5 feet wide.

On the *Homestake Group*, consisting of *Homestake Nos. 1, 2, 3* and *4*, one open cut in rock, 8 feet wide, 5 feet deep, and 10 feet long; one open cut in rock 6 feet wide, 10 feet deep and 15 feet long; one cross-cut on ledge in rock and earth 5 feet deep, 5 feet wide and 20 feet long; one trench on ledge in earth 8 feet deep, 5 feet wide and 10 feet long.

On the *Golden Sheaf* and *Iron Crown Groups* considerable surface prospecting and stripping has been done. In addition to this work the Rodgers company has built cabins, blacksmith shop, etc., on each group and graded twelve miles of trail.

On the *Roosevelt Group*, situated on Bitter creek, a tributary of Bear river, Messrs. G. Chambers, J. E. Stark and D. J. Rainey, have run their tunnel in 230 feet, in addition to stripping the ledge in a number of places.

On the *Ruby* and *Morning* mineral claims, owned by Rev. W. H. Collison and W. Noble, the following work was done: 50 feet of stripping; one open cut in rock and gravel 10 feet long, 4 feet deep and 4 feet wide; one open cut in rock and gravel 9 feet long, 7 feet deep and 4½ feet wide; one open cut in rock and gravel 6 feet long, 4 feet deep, and 4 feet wide.

The *Hector Group* consists of the *Hector*, *Tiger*, *Wild Goose*, *Detroit*, *Rainier* and *Black Hawk* mineral claims, owned by Messrs. Chambers, Deaville & Co. On these claims the following work has been done: One open cut, 16 feet wide, 20 feet long and 8 feet deep, in soil; one open cut in rock, 8 feet long, 6 feet wide, and 6 feet deep; stripped ledge a distance of 75 feet, in soil and rock, 10 feet wide and 6 feet deep; two small open cuts, one in rock and one in earth.

On the *May Bee* and *Blue Jay*, two promising looking claims, only statutory assessment work was performed.

The Portland Consolidated Company have performed the following work on the *Blue Bell Group*, situated at Maple bay: Run 17 feet of tunnel, 5 feet wide and 7 feet high; one open cut in rock and gravel, 14 feet long, 7 feet deep and 4 feet wide; one open cut in loose rock, 17 feet long, 6 feet deep and 6 feet wide; one open cut in rock, 16 feet long, 6 feet deep and 4 feet wide; stripped and cross-cut 110 feet of ledge.

The *Copper King Group*, also situated near Maple bay, consists of the *Copper King*, *Hope*, *Elsie* and *Summit* mineral claims, owned by Messrs. Noble, Woodcroft, Collison and W. R. Flewin. On these claims the owners have traced the ledge 2,300 feet, stripping, cross-cutting and sampling every 100 feet. The ledge is very uniform and well defined throughout the whole distance, varying from 5 to 20 feet in width. This is a splendid concentrating proposi-

tion with every facility for inexpensive handling, being only about three-quarters of a mile from the beach, with an altitude at the highest showing of 1,280 feet. The gangue is quartz, with porphyry and diorite walls. The values are in gold and copper. In addition to other work the owners have built a good trail from Maple bay, and erected a house, etc.

### Observatory Inlet.

In this camp statutory assessment work has been recorded on the *Bonanza* and *Hidden Creek Groups* of claims. Negotiations are about closed for a sale of these properties to an American company for $60,000.

Reference was made last year to a discovery of ore on Alice arm by Messrs. Roundy and Nicholson, just before my report was sent in. Two claims were located, the *Black Bear* and *Aldebaran*. The find proved to be much more valuable than was at first supposed. The ore is ruby silver and gray copper. The owners have done considerable stripping this season, and have uncovered a ledge 12 feet wide, which contains several stringers from 6 to 12 inches in width of high grade ore. The location is in the same mineral belt as the *Bonanza*, and about half a mile from salt water. A great deal more work would have been done on the property, but owing to the threatening manner of some of the Kincolith Indians, who ordered the owners off the inlet, it was deemed advisable to suspend operations and return to Nass harbour.

### Queen Charlotte Islands.

Mining in this section has been very quiet during the season, only a few records being issued.

On the *Golden Gate* claim the owner, Abraham Heino, has sunk a shaft 20 feet, while on the *Trust* and *Skincuttle Entrance* claims he has driven a tunnel 60 feet, built a wharf and 300 feet of tramway, with ore bunkers of 200 tons capacity, the whole involving an outlay of over $3,000. A trial shipmeut of 22 tons of ore was made to the Tacoma smelter, which gave a net return of $9 per ton. The property being so much out of the usual steamboat route, and transportation consequently expensive, further work was suspended. It is expected by the owner, who is still prospecting the property, that it will shortly resume shipping.

### Kitsilas Canyon.

Only statutory assessment work has been performed in this camp, with the single exception of the *Golden Crown Group*, owned by Messrs. Jongdall, Anderson, Wells & Durham. Sufficient development had been done on the group to justify the owners in opening negotiations with Vancouver parties to place a stamp mill and other machinery upon the ground. Just when everything seemed ripe for closing the deal, an unfortunate accident occurred on Skeena river, whereby J. E. Jongdall, the senior partner, lost his life by the upsetting of his canoe, Messrs. Durham and Boss, who were his companions, narrowly escaping a similar fate. This has postponed the consummation of a deal until some disposition is made of the interest of the deceased. It is hoped to get the machinery on the ground during the coming summer.

### Lorne Creek.

The Dry Hill Hydraulic Mining Company has prosecuted work steadily all season, employing a large gang of men. Mr. F. G. Holt completed the building of a flume for the company under contract, about the end of the season. Water was turned on for 48 hours, with the very gratifying result that $500 worth of gold dust was cleaned up.

The Hardscrabble Company has been engaged all season in prospecting its ground and making preparations to get water on.

The same thing is true of the *Ibex* hydraulic claim, owned by John P. Fults, Jr., of Fairhaven.

### TELKWA RIVER.

In consequence of the discoveries made by William Hunter late the previous year, a number of prospectors went into this camp early in the season. They found the prospects even better than Hunter had represented them, and a number of claims were staked.

On the Hunter claims, consisting of the *Hunter*, *Tin Billy*, *King*, *Prince*, *Idaho* and *Rainbow* mineral claims, the following work was done: One open cut 40 feet long, 3 feet deep and 4 feet wide along the ledge; one tunnel 8 feet long, 6 feet wide and 7 feet high; one shaft 8 feet deep and 4 feet square; one open cut 20 feet long, 6 feet wide and 6 feet deep; one open cut 15 feet long, 4 feet deep and 6 feet wide; one open cut 10 feet long, 3 feet deep and 3 feet wide; one open cut 25 feet long and 4 feet deep; one 5 by 7 tunnel 25 feet long; one open cut 20 feet long, 3 feet wide and 4 feet deep; one open cut 30 feet long, showing the ledge; one tunnel 25 feet long; one shaft 10 feet deep and 4 feet square; and one open cut 15 feet long, 3 feet wide and 3 feet deep.

On the *Telkwa Group*, consisting of the *Telkwa*, *Naiad*, *Oread*, *Daisy* and *Discovery* mineral claims, the property of Messrs. Loring, Hankin & Forrest, the following work has been done: One tunnel 10 feet long; one open cut 20 feet long; one open cut 20 feet long, and two other tunnels each 10 feet long.

On the *Eldorado* claim, same owners, one tunnel has been driven on the ledge 20 feet.

### KITIMAT ARM.

No new developments have occurred in this camp during the past season, but steady development work has been carried on upon most of the properties previously located.

On the *Golden Crown Group*, the owners, Messrs. Steele & Dunn, have extended their main tunnel 40 feet, in addition to doing a large amount of surface prospecting and stripping. Every additional foot of work done shows an improvement in values.

On the *Alabama Group*, consisting of the *Kentucky*, *Virginia*, *Arizona* and *Alabama* mineral claims, owned by Messrs. Pettigrew and Mooney, one tunnel has been driven 25 feet long, 5 feet wide and 7 feet high. Also a large amount of shipping, cross-cutting and trail-building.

At Iron mountain, Lindeborg Bros. have driven one 4½ by 6 foot tunnel, 18 feet in solid rock; one 4½ by 6½ foot tunnel, 7 feet; one 3½ by 6½ foot tunnel, 12 feet; and one open cut 8 feet long, 4 feet deep and 4 feet wide, on the *Bimetallic*, *Bullion* and *Independence* mineral claims.

On the *Mountain Goat*, *Lucy* and *Sarah Jane* mineral claims, situated on Gardiner inlet, the owners, Messrs. Conlee and Hilton, have run a second tunnel 22 feet long, 5 feet wide and 7 feet high.

### GRIBBELL ISLAND.

The Gribbell Island Copper Company have been steadily working on their *Blue Bell Group*, and have run a second tunnel on the ledge 300 feet.

The Canadian American Mining Company, of Bellingham, Wash., have done the following work on the *Francis* mineral claim for the *Empress Group*:—Drove one main tunnel 190 feet; east drift on vein 10 feet; west drift on vein 26 feet; upraise 18 feet; and west drift 30 feet. They have also constructed one mile of solid puncheon road from mine to beach; the whole involving an expenditure of over $3,000.

### PRINCESS ROYAL ISLAND.

The *Princess Royal Group* continues to make shipments to the smelter, the returns from which maintain their values as well as their first shipments. Twenty men are constantly employed, and the C. P. R. steamers now call for ore.

On the *Homestake Group* the usual assessment work has been recorded, the work consisting of open cuts and site for shaft.

Geo. A. Kelly has driven 30 feet of tunnel on the *Bay View Group*.

On the *War Eagle Group* a shaft has been sunk 35 feet on the *War Eagle* claim. The ledge was here encountered, showing high values in gold and copper, and preparations are being made to make regular shipments.

On the *Independence Fraction*, which lies between the *Homestake* and *Princess Royal Groups* of claims, Capt Nowell has stripped the ledge and run one open rock cut 10 feet, also driven on the ledge 16 feet.

The assessment on the *Norah*, *Rose* and *Thistle* was paid in cash in lieu of work.

On Pitt island three magnetic iron claims have been located. The assays shew 54 % iron. No work has yet been done on them.

## Coal.

Considerable prospecting has been done for coal on the Telkwa and Kispiox rivers. On the former river it has been established beyond doubt that valuable coal exists in very large bodies. On the property of the Skeena Development Company there are three seams of excellent coal, the largest of which has a width of twenty-one feet on the surface.

On Moresby Island twenty-one coal prospecting licences were granted to Mr. McRae, of Ottawa, and his associates. It is their intention thoroughly to prospect their ground this season. From the surface indications, and also from Dr. Dawson's investigations, it is believed coal of superior quality exists in quantity on these claims. The fossils found on the beach are said to be the oldest coal fossils found on the Pacific Coast.

### Office Statistics.—Skeena Mining Division.

| | |
|---|---|
| Free miners' certificates | 191 |
| Mining claims recorded | 125 |
| Certificates of work | 159 |
| Conveyances | 29 |
| Certificates of improvements | 5 |

*Revenue Collected.*

| | |
|---|---|
| Free miners' certificates | $ 866 75 |
| Other mining sources | 1,255 65 |
| Total | $2,122 40 |

# SOUTH-EAST KOOTENAY DISTRICT.

## FORT STEELE MINING DIVISION.

NOTES BY W. F. ROBERTSON, PROVINCIAL MINERALOGIST.

On September 7th the Provincial Mineralogist left Nelson to make a brief visit to the lead-producing mines of South-East Kootenay.

These properties, the *St. Eugene*, at Moyie, and the *North Star* and *Sullivan*, at Kimberley, have been doing little, or no work, for the past few years, as the market for lead ores has been so very poor as to leave little or no margin of profit for ores such as they produce, running high in lead and very low in silver; but, with the aid and under the stimulus of the lead bounty, active work has again begun.

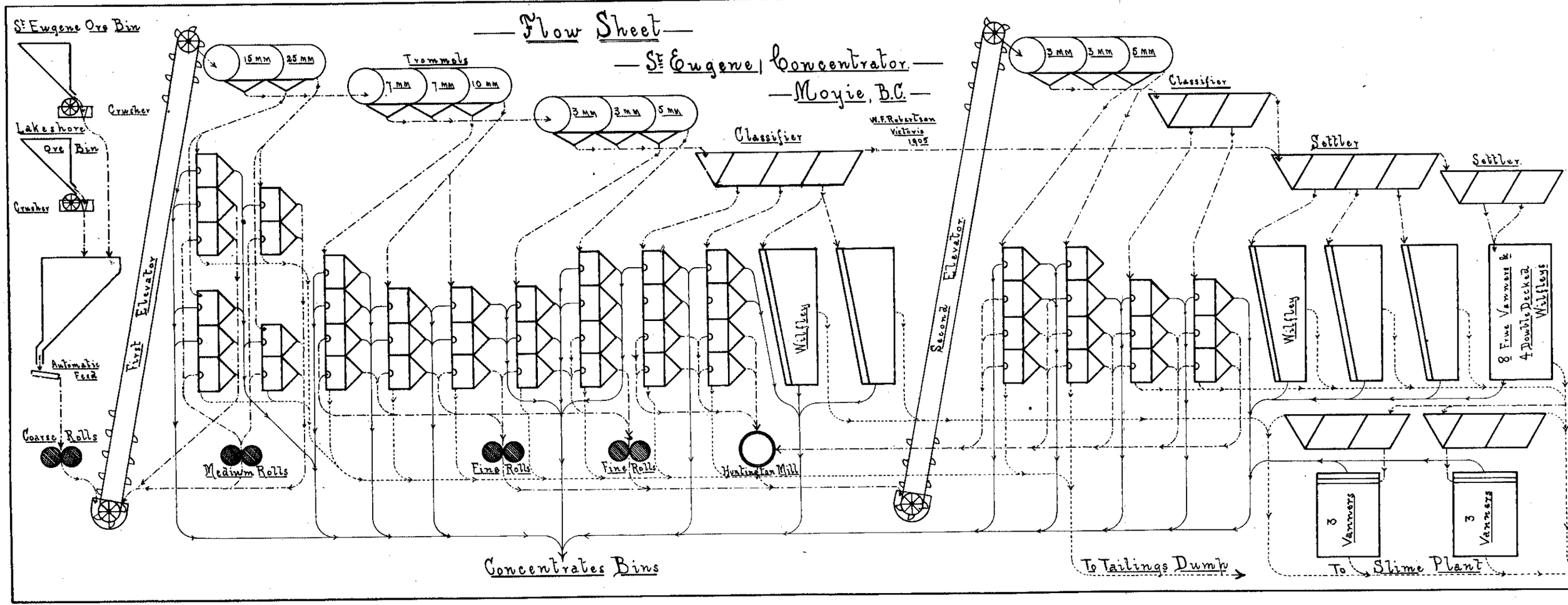
To these mines the lead bounty given by the Dominion Government was of more benefit than to almost any others in the Province, inasmuch as they were capable of producing a large tonnage of ore in which the silver values were so low, as compared with the lead, that the ore might properly be called a "lead-silver" ore, in contradistinction to those of the Slocan, which are "silver-lead" ores. To show what a material help this bounty has been, it might be well to make a roughly approximate calculation by way of illustration.

At the St. Eugene mine it takes about five tons of ore to make one ton of concentrates. A ton of concentrates contains about 33 ounces of silver and 1,300 lbs. of lead; the gross value of this (taking silver at 50 cents per ounce and lead at 1½ cents per pound as approximate figures), would be, silver $16.50 plus lead $19.50; total *gross* value, $36.00. Now, the bounty on a ton of such concentrates, if smelted in Canada, would be $9.75, or about $2 per ton on the ore as mined, the gross value of which, without the bounty, was about $7.20.

The same is nearly correct for the other properties. The result has been that there has been mined in South-East Kootenay in 1904 about 80,000 tons of ore, as compared with 900 tons in 1903, while the present indications are that a further increase will be made in 1905.

**St. Eugene Mines.**

The St. Eugene mines, owned by the St. Eugene Consolidated Mining Co., Ltd., James Cronin, manager, Moyie, B.C., is a consolidation of all the claims on the western slope of the hill at Moyie on the well known *St. Eugene* lead, which cuts the hill from its summit to the shores of Moyie lake, and which has already been fully described in these Reports. The workings extend along the outcrop for about 4,300 feet, the upper workings being about 1,800 higher than the lake. There are in this distance three distinct "pay chutes," which have been exploited by workings, and between these, while the vein is quite continuous, are barren places. Until very recently, the system of mining has been entirely by adit tunnels on the vein, with stopes therefrom. On the highest group of workings, the *St. Eugene*, there are 5 tunnels, about 100 feet apart vertically, which, starting from the top, have lengths respectively of, "A," 300 feet; No. 1, 600 feet; No. 2, 600 feet; No. 3, 900 feet; and No. 4, 600 feet. On the intermediate workings there are 4 tunnels, having the following lengths: No. 1, 1,500 feet; No. 2, 500 feet; No. 3, 900 feet; and No. 4, 750 feet.


Flow Sheet
St Eugene Concentrator
Moyie, B.C.
W.F. Robertson
Victoria
1905
St Eugene Ore Bin
Crusher
Lakeshore
Ore Bin
Crusher
Automatic Feed
Coarse Rolls
First Elevator
15 MM
25 MM
Trommels
7 MM
7 MM
10 MM
5 MM
5 MM
5 MM
Classifier
Medium Rolls
Fine Rolls
Fine Rolls
Huntington Mill
Wilfley
Second Elevator
3 MM
3 MM
5 MM
Classifier
Settler
Settler
Wilfley
8 Fine Vanners &
4 Double Decked
Wilfleys
3 Vanners
3 Vanners
Concentrates Bins
To Tailings Dump
To Slime Plant

The lower tunnel workings on the *Lake Shore* claim are about 100 feet vertical above the lake, where the No. 1 adit tunnel has been driven in 1,700 feet, and above this, at intervals of 100 feet, are levels Nos. 2, 3 and 4.

On these *Lake Shore* workings there is a second vein more or less parallel with the main vein, and known as the South vein, on which the main tunnels have been duplicated, with numerous cross-cuts joining the two.

Near the mouth of No. 1 tunnel *Lake Shore*, and at about the same level, a shaft has been sunk for 125 feet, that is, about 25 feet below the level of the lake. From the bottom of the shaft a level has been run towards the lake, westward, for about 100 feet and to the east for 720 feet, in which latter considerable bodies of good ore were met with. This shaft is most completely equipped, with a hoisting plant sufficient to serve for a considerable further depth. The shaft contains two cages and a pump compartment. The shaft-house is substantially built of heavy timber, and most conveniently arranged for economical handling of the products of the mine.

The ore from the upper workings is delivered to the mill by a Riblet aerial tramway. That from the lower workings and shaft is hauled for about ¼ of a mile on a surface tramway, a mule hauling all the ore produced on each shift.

The ore is galena in a quartz matrix, and as mined, carries about 6 to 8 oz. silver and 13 to 14 per cent. lead, requiring to be concentrated, which is done in the company's mill, where a concentrate is produced running about 33 oz. silver and 66 per cent. lead.

The output of the mines is from 400 to 500 tons of ore per day. In September last about 75 men were employed at the upper workings, about 90 at the lower workings, and some 45 at the concentrator.

**Concentrator.** The concentrator has been built and brought up to its present condition by Mr. G. A. King, the mill superintendent, and it is not only about the largest concentrator in British Columbia, but is about the best equipped and probably makes a closer saving than any other in the Province. In addition to the usual and the many unusual appliances for saving all values, a complete and supplemental plant has been erected to save the values carried over in the slimes, and to this slime plant are sent the tailings from every machine treating ore of a mesh of 3 m.m. and finer.

A "flow-sheet," drawn by the Provincial Mineralogist, accompanies this Report, which shows the details and exact operations of the mine better than any worded description.

**North Star Mine.** It has been an open secret for the past couple of years that the known ore bodies of this well-known mine have been nearing exhaustion, and that most persistent and extensive explorations have failed to discover any further body of ore. Two different managers, men of great experience and repute, successively abandoned the task; then outside mining experts were called in, and upon their joint reports it was decided to close up operations and abandon further explorations. Consequently, during the early part of this year, the property was handed over to the accountant, Mr. Neil Curran, to wind up matters and to take out the few tons of ore then known to remain in the mine. That Mr. Curran succeeded to an extent greater than was expected by even the most sanguine, is shown by the fact that during the year the mine has managed to ship over 5,000 tons of ore running from 30 to 35 oz. silver and from 35 to 40 per cent. lead.

This was not taken from any new ore-body, for none has been found, but has been obtained from extensions of the old ore-body, which were found to continue further than had been expected. What were supposed to be small quantities of ore had been left at the ends of

stopes or behind lagging, and these Mr. Curran starting to remove, found the ore extended further than had been supposed, and when the property was visited in September, there was at least one stope showing 4 or 5 feet of fair grade galena, which at the time seemed to be holding its size as work progressed, and much ore remained in other parts near the outcrop.

While it can not be said that the showings had as yet showed any great amount of "ore in sight," the fact that attempts to get out the last of the ore had always resulted in revealing more ore, gave hopes that the end was not yet, and that the following up of these ore showings might lead to ore-bodies which had escaped even the thorough and systematic explorations which had been made.

Later advices, however, from unofficial sources, do not indicate that any lasting success has been obtained.

**Sullivan Group.**

The *Sullivan Group* of claims, belonging to the Sullivan Group Mining Co., of Spokane, is situated on Sullivan hill, on Mark creek, and has been described in previous Reports. It is understood that the stock of the company has been acquired by the Federal Mining Company, of Spokane, and that the property is now under the management of General Manager Roberts of the latter company. The mine is still in charge of James Finlay as superintendent, and when visited in September it was found that very little change had taken place since it was last visited, about a year previous. No further underground work had been done except fixing up the station at the bottom of No. 5 shaft, which had previously been sunk.

As was reported last year, there is a very large tonnage of ore partly blocked out, then estimated at 300,000 tons, and what little development has been done since has shown up more ore of the same class. The ore is admittedly low-grade, about 30 per cent. lead and 15 ounces silver, and as was previously pointed out, smelting is the only possible form of concentration for the ore, and this will have to be done at or near the mine, as the values contained will not stand transportation charges.

Surveys had been made for an aerial tramway from the mine to a continuation of the Kimberley branch of the Canadian Pacific Railway, in the valley of Mark creek, and it has since been reported that the construction of the tramway has now been completed.

A railway haul of about five miles, all "down hill," delivers the ore at the company's smelter, at Marysville.

**Marysville Smelter.**

The smelter, as it was described in last year's Report, no longer exists, for it has been so completely remodelled as really to amount to a completely new construction. The site remains the same and an attempt was made by the smelter superintendent, Mr. F. D. Weeks, to utilise as much of the old plant as possible, which, however, was very little. Two new spurs from the railway, elevated on trestles, have been run into the works. The sampling plant and building have been completely remodelled, as have also the bins. The former calciner shed has been replaced by a building 72 feet wide by 240 feet long with 18-foot posts, covered with corrugated iron. The calciners have been lengthened from a 40-foot to a 60-foot bed, and connected with a common flue, run underground and connecting with an iron stack, 8 feet in diameter and 150 feet high, set on a concrete base 12 feet above ground, with which is also connected, by an opening on the opposite side of the base, the dust chamber flues from the blast furnace. The former blast furnaces and buildings had been completely removed, and were being replaced by a most substantial modern shed of heavy timbers, in which only one of the old furnaces was to be erected at first.

In September the plant was not sufficiently advanced in construction to warrant a description being given of it, but the work done was so substantial in character, and the general plan so practical and simple as to argue much for the possibilities of the plant when completed.

Late advices indicate that the construction is almost complete and that smelting operations should start early in 1905. Several points in the construction were novel to British Columbia, among which may be mentioned the extended use of concrete in place of red-brick work in furnace flues and in the stack base.

The dust collecting flues were also novel in construction and form, consisting of two walls of concrete 24 inches thick and 5 feet high, placed 11 feet 6 inches apart. Springing from these two walls was an arch in the form of a catenary curve with a rise of 8 feet, built of 8 inches of red brick laid in mortar.

The form of this curve is such as not to create any great horizontal thrust on the top of the walls of the flue; so dispensing with the usual binders and buckstays or excessively heavy bearing walls.

The arch is built in sections of 18 feet, with a space of 4 inches between each, to allow for expansion, which space is covered by an extra ring of red brick, laid on top, and overlapping the ends of the sections of the arch.

## FORT STEELE MINING DIVISION.

### Report of J. F. Armstrong, Gold Commissioner.*

I have the honour to report on the progress of mining in Fort Steele Mining Division during the year 1904.

There are now 167 mineral claims held under Crown grants or certificates of improvements, and during the year 165 new locations and 260 certificates of work have been recorded. For convenience, I have subdivided the Division into the following sections or localities:—

*Fernie and Vicinity.*—This section includes all territory east of Kootenay river and south of Bull river.

*Fort Steele and Vicinity.*—In this section is included all terrritory east of the Kootenay river and north of Bull river.

*St. Mary's River and Vicinity.*—This includes all west of the Kootenay river and north of St. Mary's river, besides all territory draining into the St. Mary's from the south above White Fish creek, inclusive.

*Moyie and Vicinity.*—This section includes the drainage areas of the Moyie lake, of the Moyie river south of the lake, and of the Yahk river.

*Cranbrook and Vicinity.*—This section includes the rest of the Mining Division.

* *See* also Report of Provincial Mineralogist, page 104.

The following are statistics of mineral claims :—

| Sections. | Held under Crown Grant or Certificate of Improv't. | Certificate of Work Issued. | New Locations. |
|---|---|---|---|
| Fernie and Vicinity | 3 | 26 | 38 |
| Fort Steele " | 34 | 59 | 26 |
| St. Mary's River " | 90 | 99 | 53 |
| Moyie " | 23 | 31 | 23 |
| Cranbrook " | 17 | 45 | 29 |
| Totals for 1904 | 167 | 260 | 169 |
| " " 1903 | 142 | 335 | 200 |
| " " 1902 | 117 | 451 | 253 |
| " " 1901 | 104 | 642 | 455 |
| " " 1900 | 71 | 704 | 470 |
| " " 1899 | 37 | 718 | 729 |

I am indebted to the newspapers of the district for the following information :—

## FERNIE AND VICINITY.

The *Hematite Group* of iron claims, 12 in number, is situated on the west slope of Fenwick mountain on the S.E. of the *Bull River Group*. The ore is reported to be a hard red hematite. It is said to be the intention of the owners to apply the method of electric smelting in use in Belgium to the development of this property when the Falls Power Company can supply the electricity. By a recent analysis the ore is said to show 61.34 metallic iron, .062 or less of sulphur, with a trace of phosphorus and no interfering substance. Limestone is plentiful in the vicinity.

Sixteen locations have been made on Sand creek during the year and 12 assessments have been recorded.

## FORT STEELE AND VICINITY.

The *Estella* is reported to show two distinct fissure veins—one 14 feet and the other 4 feet in width—the former medium grade silver-lead ore, the latter ore of a finer quality and containing some grey copper. This property is well equipped for the work of development, and has abundant water for power and concentration, besides being well supplied with timber for mining purposes.

The *Victor Group*, comprising the *Victor*, *Olive Leaf* and *J. W. Junior*, is said to show about 3 feet of high-grade galena and a blende which carries 63 % zinc.

The *Grace Dore*, *Lone Star* and *Shamrock* are on a ledge, assays from which are said to show nickel.

The *Dougherty Group*, on Brewery creek, had 315 feet of tunnel and some cross-cuts, which the owner has made single-handed. He says the quartz shows free gold and assays $16 to the ton.

The *Tiger-Poorman Group* has nine tunnels on it, some over 100 feet.

The *Star Group* has 800 feet of shafts, drifts and tunnels and was surveyed this summer for the purpose of Crown-granting. Work on an extensive scale is proposed to be done on this property as soon as transportation is afforded.

### St. Marys River and Vicinity.

The *Bracebridge Group* on the west fork of the St. Marys comprises the *Gracie, Denbigh, Bracebridge, Bracebridge Frt., Regina* and *Snowdon*, all reported as carrying copper. On the *Bracebridge* the lead is exposed by erosion, and presents a remarkable showing of copper ore. It is said that 33 feet of solid ore has been encountered in the open cuts and that masses of copper ore lie on the dump of the *Regina*.

The *Welcome Group*, which consists of the *Welcome, Enterprise*, etc., has a quantity of fine ore on the dump and a crew of men engaged in further development. A sample of 800 lbs. of galena from the *Enterprise* lead has been packed out, to be tested at the Marysville smelter when that plant is in operation.

The *Myrtle*, near Marysville, shows copper pyrites, and is conveniently situated for transport of ore to the smelter.

It is said that the *Mystery*, on Alki creek, shows a 4-foot ledge carrying bornite, and that specimens of native copper are frequently found on this and on the *Magnet*.

On the Dominion Consolidated property there is said to be a 5-foot vein carrying galena, and fine ore has been taken from the *Malachite*.

The Selkirk Mining Company has six claims on White Fish creek, with ledges said to vary from 4 to 60 feet in width, giving values in copper, silver and gold. Nearly 500 feet of tunnel has been run.

On the *Evans Group*, on a branch of this creek, assessments for three years have been done on the *Sunset, Pacific, Twilight* and *Curfew*, with good showings.

### Mark Creek and Vicinity.

The *North Star* mine is employing nine men at present, and in the month of December last shipped 700 tons of clean galena ore.

The *Sullivan* has about 300,000 tons of ore in sight. The smelter has been re-constructed and is likely to procure ores for treatment from properties now under development in the St. Marys valley, Perry creek and Wild Horse. Its operation will greatly stimulate the entire district.

### Moyie and Vicinity.

Work on the holdings of the St. Eugene Consolidated Mining Company—the *St. Eugene, Moyie* and *Lake Shore*—has been prosecuted with vigour since May last. The manager reports that from May to November these mines produced 66,153 tons of concentrating lead-silver ore. There are 43,000 tons in sight, and the average output is 2,700 tons per month. About 250 men are employed. A pump has been installed at the concentrator capable of raising 2,500 gallons of water per minute from the lake. This will enable the concentrator to work should the gravity water system again fail, as it did last summer during the unprecedented drought.

### Cranbrook and Vicinity.

Twenty-nine new locations have been made in this section during the year, chiefly on Perry creek, Palmer Bar creek, and in Isidore Canyon. Mount Baker still attracts some attention from its iron deposits, four new locations having been recorded.

### Placer Mining.

On Wild Horse, placer mining is still carried on by Chinamen, who have leased the washings from the Crown grantees. During the past season five companies have been hydraulicing on the creek in gravel varying in thickness from 20 to 40 feet, which has proved fairly rich in gold.

On Perry creek, this season, the largest and most important development has been the completion of the plant of the Perry Creek Hydraulic Mining Company, which was fully described in the Provincial Mineralogist's report of last year. The remarkable drought and low water of the past season retarded operations considerably, but the monitors were at work in September.

Six men working on the *Thompson* lease last summer, drifting on bedrock, are stated to have averaged $18 to $20 a day to the man.

The plant on the *Theis* leases during the season was moved from the south to the north side of the creek, where the indications were more favorable and less pumping was required to keep the workings free of water.

There have been eight applications for leases farther up this creek and two on Valley creek, a tributary of Perry.

The Bull River Mining & Power Company, which controls a number of leases on Bull river, has pushed construction work on its dam during the past summer, work being facilitated by the unusually low water. Bulkheads, between seven and eight feet in height, have been completed on each side of the river and concreted to bedrock. A temporary dam has been placed, and the river diverted into about 80 feet of the flume. The management states that the sawmill to cut the lumber for the flume will be on the ground in January and the heavy machinery for the power plant will begin to arrive early in the spring. It is expected to generate 10,000 horse-power.

## COAL MINING.

The following summary is given of the operations of the Crow's Nest Pass Coal Company for the year 1904:—

At Coal creek, No. 9 mine was opened during the year, and is now yielding about 5,000 tons per month.

No. 5 mine, at Coal Creek, was developed during the year and is producing 6,000 tons per month.

At Michel a new picking table and screening plant has been installed, increasing the shipping facilities by 50 %.

A most efficient system of fire protection has been installed at Michel, and at all the collieries hose and hydrants sufficient for protection have been furnished.

The extension of the Crow's Nest Southern Railway from Morrissey to Fernie has added to the shipping facilities and will open new markets.

The Imperial Coal Company is the holder of 94 coal claims on Fording river. The claims have been surveyed, trails have been built throughout its lands, and extensive development work has been prosecuted until the close of the season. Valuable beds of coal have been uncovered.

The Elk River Coal and Oil Company holds 30 claims on Elk river, 10 to 20 miles north of Lot 4,588. Several of these claims have been surveyed, and sufficient development work has been performed to warrant the renewal of their licences.

A syndicate holds 45 coal claims between those of the Elk River Company and Lot 4,588, and sufficient work has been done on these to warrant the renewal of their licences.

In the Flathead region, Lot 4,593, there have been issued 544 coal licences. Fifteen of these on Sage and Kishenenah creeks have been surveyed, and I hear that development has been commenced there.

Office Statistics—Fort Steele Mining Division.

| | |
|---|---|
| Mineral claims recorded | 169 |
| Placer claims recorded or re-recorded | 4 |
| Partnership placer claims recorded or re-recorded | 0 |
| Certificates of work | 260 |
| Payments in lieu of assessment work | 0 |
| Certificates of improvements recorded | 8 |
| Conveyances or other documents of title recorded | 59 |
| Partnership agreements | 0 |
| Gold Commissioner's permits recorded | 16 |
| Documents filed | 21 |
| Affidavits filed | 363 |
| Records of water grants and permits | 2 |
| Mining leases issued | 7 |
| Mining leases in force | 36 |
| Free miners' certificates, ordinary, issued | 396 |
| Free miners' certificates. companies, issued | 8 |
| Free miners' certificates, special (individual) | 2 |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $2,610 75 |
| Mining receipts | 4.175 15 |
| Total | $6,785 90 |

# NORTH-EAST KOOTENAY DISTRICT.

## GOLDEN MINING DIVISION.

REPORT OF J. E. GRIFFITH, GOLD COMMISSIONER.

On the *Good Luck Group* development work continues to be very encouraging, the pay streak of copper ore varying from 12 to 24 inches. The different tunnels and shafts aggregate 1,703 feet. Five men are employed during the winter.

A 700-foot tunnel was driven on the *Alpha Group* during the season, but so far apparently with indifferent results.

The *I. X. L. Group* has been purchased by a company. Development work so far consists of a 150-foot tunnel, showing about 10 inches of clean ore.

The *Falls* mica claims are situated on the north fork of Six-Mile creek. The mica appears to be a very good grade and the surface showing is said to be very encouraging. A trail has been built from the C. P. Railway and work on the claims will be pushed in the spring.

Apart from the above groups, there has been no work done during the season, other than the usual assessment work, and there is nothing of much interest to report, this being one of the quietest seasons yet experienced.

OFFICE STATISTICS—GOLDEN MINING DIVISION.

| | |
|---|---|
| Free miners' certificates | 116 |
| Free miners' certificates, special | 1 |
| Free miners' certificates, company | 4 |
| Certificates of work | 86 |
| Mineral claims recorded | 30 |
| Placer claims | 1 |
| Placer leases | 3 |
| Transfers recorded | 18 |
| Powers of Attorney recorded | 7 |
| Gold Commissioner's permits | 6 |
| Agreements recorded | 2 |
| Documents filed | 8 |
| Certificates of improvement | 8 |
| Affidavits filed | 111 |

## WINDERMERE MINING DIVISION.

Report of E. J. Scovil, Mining Recorder.

I have the honour to submit herewith a brief report of the Windermere Mining Division for 1904.

The outlook is very promising. The construction of the Kootenay Central Railway, which will traverse this Division from north to south, is considered an assured fact, and the advent of improved transportation facilities will undoubtedly mark a new era in the development of our mining, lumbering and agricultural resources.

Several claims have reached the shipping stage, and will be in a position to operate on a larger scale hereafter, and more properties will be working this winter than heretofore. Only a few new locations have been recorded, and little more than the usual assessment work has been done, but on the different properties where development work has been carried on continuously, the results have been most encouraging.

**Paradise Group.** This property is situated on Spring creek, a tributary of Toby creek. In the course of development work 6,044 tons of ore were taken out, 2,044 tons of which have been shipped to the Trail smelter (inclusive of 60 tons now at the Wilmer landing), giving average smelter returns of 57.94 ounces in silver and 58.9 per cent. lead. Development work done during 1904: No. 4 level, 612 feet; No. 3 level, drifts and cuts, 417 feet; shaft below No. 3, 40 feet; cut below No. 3, 55 feet; total, 1,124 feet. Total amount of development work done, 4,733 feet. It is the intention of the owners to install in the spring an aerial tramway from No. 4 tunnel to Pinehurst, a distance of 3½ miles, and to erect also reduction works at Pinehurst.

The *Delphine Group* situated on the north fork of Toby creek, is being worked under a lease. Twenty-nine tons shipped to Trail smelter averaged 125 ounces in silver and 30.5 per cent lead. Ore is being taken out for shipment right along, and will be hauled down to the Wilmer landing during the winter.

On the *Charlemont Group*, situated on Toby creek, development work will be continued throughout the winter, and the ore shipped in the spring. This property continues to improve with work, the assays giving high silver and lead values, with copper, and $2 to $4 in gold.

The *Mineral King*, situated on Toby creek, has a large body of shipping ore assaying well in silver and lead. Development will be continued throughout the winter.

On the *Black Diamond*, situated on Toby creek, considerable work has been done with gratifying results. The paystreak averages 11 inches of solid ore and assays well in silver, lead and zinc. Development work will be continued throughout the winter. There are about 40 tons of ore on the dump awaiting shipment.

On the *White Star Group*, situated on the Jumbo fork of Toby creek, development work consists of: Tunnel, 105 feet; drift east, 45 feet; drift west, 30 feet; besides numerous open cuts. Formation, schist and limestone. The ore is silver-lead carrying a percentage of gray copper. Development work will be resumed in the spring.

The *Sultana Group* is situated on Michelson creek, a tributary of Toby. The ledge averages about 3 feet in width and can be traced for 2,000 feet. The ore is gray copper carrying silver. Development work will be resumed in the spring.

The *Glacier Lode* is situated on the north fork of Toby creek. The ledge averages about 6 feet in width, and the pay streak averages 8 inches of clean ore, assaying high in silver and lead.

The *Black Dyke* is situated on the headwaters of Boulder creek. The ledge averages 8 feet in width, the paystreak averaging 2 feet of clean ore, assaying well in silver. It is a dry ore.

The *Tecumseh* is situated on Macdonald creek, a tributary of Horse Thief. A trial shipment of 29 tons, shipped to the Trail smelter late this fall, gave a gross value of $2,425.96. This property will be worked throughout the winter, and it is the intention of the owners to make regular shipments henceforth.

The *Big Four Group*, situated on Toby creek, consists of five claims, in a limestone and slate formation. The ledge is from 20 to 100 feet in width, and assays well in copper, with $3 in gold. Development work consists of a 30-foot tunnel and numerous open cuts.

The *Kalo* adjoins the *Big Four Group* and is on the same ledge.

The *Blackfoot* is situated on a tributary of north fork of Toby creek, known as Morpeth creek. This property has a good showing of silver-lead ore, assaying well. The ledge averages 2 feet in width, and the paystreak crops out for 400 feet.

The *Silver Glance* is situated on Michelson creek, a tributary of the north fork of Toby. The ledge averages 6 feet in width, the paystreak averaging 4 inches of clean ore assaying well in silver and lead.

On the *Bunyon Group*, situated at the base of Bunyon mountain, Windermere lake, considerable development has been done, showing a good body of ore, with a paystreak of 3½ feet, said to assay high in copper and silver.

**No. 3 Creek Camp.**

The principal properties in this vicinity are the *Lead Queen* and *Steele Groups*, on the B. D. S. creek; *MacLean Group* and *Dawn* on MacLean creek; and the *Isaac*, *Galbraith*, and *Cocola Groups* on Isaac creek. A waggon road to this camp would enable several of these properties to ship, especially the *Lead Queen Group*, upon which some hundreds of feet of tunnelling has been done.

As most of the properties in this Division have been referred to in previous reports, it is scarcely necessary to repeat them or to give work in detail.

OFFICE STATISTICS—WINDERMERE MINING DIVISION.

| | |
|---|---|
| Free miners' certificates | 86 |
| Free miners' certificates, special | 1 |
| Mineral claims located | 46 |
| Certificates of work | 111 |
| Conveyances | 17 |
| Certificates of improvement | 4 |

# NORTH-WEST KOOTENAY DISTRICT.

Report by Fred. Fraser, Gold Commissioner.

I have the honour to submit herewith the mining report for the Revelstoke, Trout Lake, Lardeau and Illecillewaet Mining Divisions of West Kootenay District for the year 1904.

The year just closed has not been noted for any unusual discovery of mineral. On the other hand, I think there was less prospecting done during the year than in the preceding ten years, yet the summer season was the finest one for prospecting within twenty years. But the unusually long dry spell affected us directly, causing forest fires which destroyed aerial trams, thereby causing a temporary suspension of operations at the *Eva* and *Gold Finch* properties.

During the year metalliferous mining in the Revelstoke and Illecillewaet Divisions has been confined almost entirely to assessment work. The Prince Mining Company uncovered an unusually large body of copper ore of very encouraging value. The properties owned by this company are considered among the most promising of the Big Bend district.

Steady development has been going on both at Carnes creek and Keystone mountain with very promising results.

In our placer mines the Revelstoke and McCulloch creek leases were worked, employing from 8 to 10 men. At Camp creek a large amount of gravel was moved, and the same can be said of the *Chicago No. 2*, on Smith creek. In the working of the majority of leases the lack of capital is painfully evident. French creek has remained singularly quiet during the greater part of the year, but since the promotion of the Buffalo Mining Company, which is now employing some 12 men on French creek, is showing considerable activity, with prospects of success. On Lardeau creek, near Trout lake, a number of Spokane investors are working good ground.

The encouragement given to the mining industry by large expenditures during the past few years by the Government for roads and trails is now bearing fruit, and several properties formerly considered inaccessible have, during the past year, made trial shipments, justifying larger expenditures in their further development.

## REVELSTOKE DIVISION.

Report of W. E. McLauchlin, Mining Recorder.

I have the honour to submit my annual report of mining operations in the Revelstoke Mining Division for the year 1904.

The past year has been very dull, as far as mining in this Division is concerned, nothing but assessment work being performed except by the Prince Mining Company, which has been steadily pushing development work for the past few years. I embody a report, for which I must thank Mr. J. M. Scott, secretary of the company, covering its operations during the past few years:—

"The Prince Mining and Development Company, Limited Liability, has for the past few years been carrying on systematic development work on its copper properties at Standard

Basin, in the Big Bend district, and during that time has opened up large bodies of copper ore. The last strike of note was made in the fall of 1904, when a cross-cut, run at the end of a drift on the ore, proved the ore body to be 15 feet in width and the ore of most excellent quality. The company is now running a tunnel to tap this ore-body at a much greater depth, and is working steadily 24 hours a day. The copper ore taken from this property is exceptionally fine in quality. It is the intention of the company to treat its ore at the Columbia river, conveying it thither by means of an aerial tramway."

Steady development work has been going on on the mineral claims on Camp and McCulloch creeks.

OFFICE STATISTICS, REVELSTOKE MINING DIVISION.

| | |
|---|---|
| Bills of sale recorded | 11 |
| Powers of attorney recorded | 10 |
| Certificates of work issued | 82 |
| Mineral claims recorded | 45 |
| Placer leases issued | 5 |
| Free miners' certificates issued | 218 |
| " " (special) | 2 |
| Money paid in lieu of assessment work | 14 |

## TROUT LAKE MINING DIVISION.

REPORT OF F. C. CAMPBELL, MINING RECORDER.

I have the honour to submit herewith my report of the progress of the mining industry in the Trout Lake Division for the year 1904:—

During the year, notwithstanding the absence of any new discoveries, development has proceeded on a very substantial basis. Owing to litigation, development has been retarded on some of the principal properties of Poplar creek; but I am pleased to report that this litigation has now been amicably settled and we may expect increased activity in this section during the coming season.

Another important matter has been the success of the combination concentrating, chloridizing and amalgamating plant operated by the Ferguson Mines, Ltd. This plant, which is situated at Five-Mile, is connected by aerial tramways with the *Silver Cup* and *Nettie L.* mines, owned and operated by the company, and has been in operation since May last, the output to date being 71 bars of bullion and 365 tons of concentrates. I am indebted to the acting manager, Mr. E. G. Hadow, for the following description of the process:—The fine ore passes through grizzlies and the coarse through two Blake crushers into storage bins below. There are twenty 1,000-lb. stamps in operation, each crushing about four tons of ore a day, through a 16-mesh screen. The pulp is classified into two products, coarse and slimes. The coarse is passed into 4 Dodd buddles where the bulk of the barren sand is removed and the galena separated from the remaining sulphurets, this product from the buddles being shipped as concentrates to the Trail smelter. The remainder, consisting mostly of zinc blende, tetrahedrite, iron pyrites and some sand, is thrown on to a storage floor and left to drain. The slimes are passed into spitzkastens and the surplus water removed. From there they are passed on to two Frue vanners, the headings from which pass on to the storage floor below, and mixed with the tailings from the buddles. After draining, the product is dried in a revolving drier, heated with the waste heat from the roasters. There are two White-Howell roasters, into

down, has a drift to the left of 140 feet and is connected at the end by a winze with the second level. The ore in the main shaft continues for the whole distance down, and is from 2 inches to about 1 foot wide. In the second and third levels the ore runs the entire length of the drifts, and is about the same width as in the main shaft. The ore, which is for the most part a galena carrying grey copper, assays about 200 ounces silver and from 20 to 30 per cent lead. The shipments this year have amounted to about 120 tons for the seven months the property was in operation.

On the *Horseshoe*, adjoining the last-mentioned property, about 90 feet of work was done, and about six tons of ore shipped. This property has lately been leased.

About 50 feet of tunnel was driven, as well as considerable surface work done, on the *Copper Queen*, with very good results. This property is situated near the head of Seven-Mile creek.

On the *No. 3*, situated in this vicinity, a cross-cut tunnel has been driven about 175 feet, with the intention of cutting the lead exposed at the surface.

On the *Winslow*, which possesses an excellent surface showing and carries good gold values, considerable work of a prospecting nature has been done.

The *Silver Plate*, situated on American hill, is covered to a considerable depth with wash thickly impregnated with large boulders of high-grade galena ore. On this property a large amount of surface work has been done, as well as about 600 feet of tunnel driven with a view of locating the ledge. So far this object has not been attained, but the owners are still showing their confidence in the property by continuing work.

On the *Silver Leaf*, situated near the last-mentioned property, considerable work of a prospecting nature has been done, with good results.

The *Handy* is situated about one and one half miles south of Gerrard, and is owned by the Handy Mines, Ltd. On this property a shaft 50 feet deep has been sunk and about 180 feet of tunnel driven, as well as some surface work done.

On the *Klondyke*, situated on Tenderfoot creek, a cross-cut has been driven about 105 feet to cut the lead seen at the surface, and a shaft also has been sunk on the lead to a depth of 20 feet.

On the *North Star*, situated on Rapid creek, the tunnel has been extended along the vein and is now in a distance of 300 feet. The vein is from one to three feet wide and assays well in gold.

The *Morning*, also on Rapid creek, has been acquired by the Spyglass Mining Company, Ltd., which has done considerable work on it during the latter part of the year.

On the *Spyglass*, the property of the above-mentioned company, and situated on Poplar creek, development has proceeded with satisfactory results during the past summer. A test shipment of about three tons was sent to the Trail smelter.

On the *Mother Lode*, development work has been carried on continuously since July last. A shaft has been sunk on the ledge to a depth of 25 feet, and the ledge cross-cut for a distance of 15 feet; a tunnel has also been driven 300 feet on the ledge, with cross-cuts at intervals. This is a silver, lead and zinc proposition.

Considerable work of a prospecting nature has been done on the *Gold Park*, with very good results. This property carries high gold values.

On the *Swede*, owned by the Great Northern Mines, about 223 feet of tunnel was run, as well as 1,500 feet of stripping done. Several veins have been exposed on this property, some of which are rich in free gold, and all carry gold values. Eight tons of this ore shipped to the company's mill at Camborne gave returns of $246.50 in all.

which the ore is charged with the requisite amount of salt and chloridized. It is then charged into amalgamating pans and the gold and silver amalgamated. The mill is operated by water power carried by a flume three-quarters of a mile long. There are two Pelton wheels and two generators of 150 horse-power each, which can be run separately if necessary.

During the year but little actual mining was done on the *Silver Cup*, owing to the fact that the mine had on hand large dumps of second-class ore which had been accumulated during previous years, these being more than sufficient to supply the Five-Mile mill. There were, however, 198 tons of coarse ore stoped and shipped direct to the smelter.

The same conditions which prevailed on the *Silver Cup* hold also on the *Nettie L.*; consequently, only some necessary development work was proceeded with, a force of 9 men being employed.

On the *Union Jack*, situated near Seven-Mile creek, about 230 feet of development work has been done during the year and the lead cut to a depth of 250 feet. I am informed that American capital has become interested in this property and will develop it on a large scale during the coming summer.

On the *Sharon*, situated on Silver Cup mountain, about 70 feet of cross-cut tunnel has been run, with a view of cutting the lead seen on the surface.

The past year has marked a new era in the history of the *Triune*, situated on Triune mountain and owned and operated by the Metropolitan Gold and Silver Mining Co., Ltd. Hitherto, owing to its high altitude (about 7,500 feet above sea level) and the presence of dangerous snow-slides, this property has only been worked for about three months in the year; but during the past summer snow-sheds have been erected which have overcome this difficulty, and the property has been continuously worked since June last, 14 men being at present employed. Eight hundred feet of tunnelling and drifting has been done and 135 tons of ore, of an average value of $133, shipped during the year. It is the intention of the company to build an aerial tramway from the mine to Ten-Mile during the coming summer.

The *Black Prince*, situated on Gainer creek, has been worked under lease during the summer months by a small force of men, and about 30 tons of ore shipped.

Development work on the *Mohican*, adjoining the last-mentioned property, has been proceeded with almost continuously during the year. A cross-cut tunnel is being driven which, it is expected, will cut the vein at a depth of 500 feet below the surface.

In September a lease was taken on the *Badshot*, also situated on Gainer creek, by Alex. McLean *et al.*, but owing to the lateness of the season suitable buildings for winter work could not be erected. During the two months of operation 32 tons of ore were shipped, giving an average value of 177 oz. of silver and 56 % lead. Three men were employed on this property.

On the *Surprise*, situated on the north fork of Lardeau, considerable work of a prospecting nature has been done during the year. At present four men are employed.

On the *Tonawanda*, also situated on the north fork of Lardeau, a cross-cut tunnel was driven for a distance of 55 feet, cutting the lead, and a drift of 40 feet made, and a winze was sunk 30 feet in the ore chute.

The *Lucky Boy*, situated on Trout creek and owned by James J. McGlone, was not in operation from about 1st May to 1st October, owing to a change in ownership. Since October a force of 16 men has been employed on development work. The main shaft has been sunk to a depth of 210 feet. The first level, fifty feet down, has a drift to the right of 100 feet and to the left of 120 feet. The second level, at a depth of about 100 feet, has a drift to the right of about 140 feet and to the left of 190 feet. There is a winze at the east end of the first level connecting it with the surface, and also with the second level. The third level, about 150 feet

On the *Lucky Jack*, the property of the above-named company, on Poplar creek, very little work has been done owing to litigation; however, a settlement of the adverse claims has now been made out of Court, and I believe it is the intention of the company vigorously to prosecute development. I am informed that a mill will be built on this property, and the *Swede* connected by aerial tramway.

The Spokane Falls Placer Mining Co., Ltd., has leased one-half mile of Lardeau creek at a point about one mile above Trout lake, and has built a dam and about 500 feet of flume, but has not as yet been able to get results. Considerable gold has been taken from this point in the creek by individual miners in previous years.

Office Statistics—Trout Lake Mining Division.

| | |
|---|---|
| Free miners' certificates issued to individuals | 501 |
| " " companies | 3 |
| Special free miners' certificates issued to individuals | 6 |
| Mineral claims recorded | 311 |
| Placer claims recorded | 8 |
| Certificates of work issued | 659 |
| Cash paid in lieu of assessment work | 5 |
| Certificates of improvements recorded | 22 |
| *Bills of sale, agreements, etc.*, recorded | 200 |
| Abandonments of mineral claims recorded | 1 |
| Gold Commissioner's permissions recorded | 4 |
| Water grants recorded | 1 |

## LARDEAU MINING DIVISION.

Report of Geo. Sumner, Mining Recorder.

I have the honour to submit herewith my report of progress of the Lardeau Mining Division for the year 1904.

During the greater part of the year very little prospecting was carried on and few new locations were made, while a large number of the older locations were allowed to lapse. Forest fires were very prevalent and did considerable damage. The Gold Finch Mining Company had to suspend operations, owing to the burning of the aerial tramway and the mine buildings. The Eva Gold Mines, Limited, also suffered considerable loss from fire, while the Ophir-Lade Company only saved its tram-lines and buildings by the most strenuous exertions, aided by a change of wind at a critical time. Now, however, as the year 1904 draws to a close, a more optimistic feeling is noticed; the companies have rebuilt, and have repaired their tram-lines; various improvements are contemplated; more good ore is in sight than heretofore, and, generally speaking, the companies are in a better position for more economical mining and milling.

**Eva Gold Mines, Limited.**

The Eva Gold Mines, Limited, is the successor to the Calumet & British Columbia Gold Mines, Limited, a reorganisation having been found necessary during last summer. This company is in a better position financially than its predecessors, and is being managed by capable men. The property is in better shape than before the fire. New mine buildings have been erected, the tramway rebuilt, and a smaller tram built to expedite the handling of the ore. Thirty men are constantly employed getting out ore, and the stamps are expected to be dropping again about the 1st January. A compressor plant is also about to be installed.

I quote herewith a report made 31st August last by Mr. A. H. Gracey, the manager for the Company :—

"For some time previous to May 1st, development had been practically suspended in the mine, and the mill was supplied with ore from a large body of quartz opened up by a cross-cut from No. 5 tunnel. This ore-body was mined for a width varying from 6 and 8 to 20 feet, and all the ore was delivered from the mouth of No. 5 tunnel by a long wooden surface chute to No. 7 level, being there transferred to another chute connecting with the bin at the upper terminal of the wire rope tram. This double handling and passing of the ore down these long wooden chutes not only added to the cost, but caused considerable trouble in the mill, on account of the chips and splinters from the chutes interfering with the discharge through the battery screens. We continued milling under these conditions until July 5th, in order to make test runs on different ore-bodies. The results were satisfactory, as it was demonstrated that the large bodies of low-grade ore could be handled at a profit. During these two months, 1,938 tons were milled, which produced $8,270 in bullion, besides $400 (estimated) in concentrates, at a total cost, including $1,200 development, of $6,800, or $3.50 per ton. Thus ore yielding $4.50 per ton was demonstrated to be profitable under rather unfavourable conditions as regards the mining (which was done by hand work), and with only a ten-stamp mill.

"We decided it would be advisable on July 1st to stop mining and milling until such time as we had completed certain development which would save the extra cost of handling the ore through the chutes previously mentioned. This work was in part to connect No. 7 level with the winze previously sunk from No. 5, thereby making it possible to drop all the ore from above No. 5 and from the surface right down to No. 7, where it can be trammed direct to the upper terminal of the tramway. This raise has been pushed vigorously and is now nearly completed.

"In addition to this, we are continuing No. 1 (the upper tunnel) to connect with the *Eva* shaft, a total distance from the portal of 275 feet. This will give us a vertical depth of over 100 feet at this point. It is also our intention to cross-cut from No. 1 and connect with the *Highland Mary* shaft, in which a large body of ore has been exposed. The mouth of No. 1 tunnel is some 650 feet above and beyond the point where the raise from No. 7 is connected through to the surface, and our idea is to install a light two-bucket wire rope tram to transfer the ore from No. 1 to this connection. This will simplify and cheapen very much the handling of the ore.

"We have also opened up by open cuts and quarry a promising body of ore in No. 1 vein, and have built a surface track 175 feet in length, around to the same point on the surface, connecting with No. 7 raise. When all this work is carried to completion we will be able to handle all ore mined above No. 5 level from both veins, quickly and economically to one main chute in No. 7 raise, and from there by tram to the terminal with large cars.

"About the middle of August forest fires destroyed our mine buildings, including the upper terminal of the wire-rope tramway. For some days it looked as though we would lose the mill, flumes and pipe-line, as well as the balance of the tram; but after a hard fight we managed to get the fires under such control that no further damage is anticipated.

"The loss of our mine buildings, although not serious, was unfortunate, as it interrupted our operations. However, underground work at the mine was resumed within a week after the fire, and new bunk-house, blacksmith shops, ore-bins, etc., are now under construction.

"The most serious loss was in connection with the wire-rope tramway. The upper terminal was completely wiped out and the cables were injured at several points. The loss on the tram is protected by insurance, and arrangements are now being made to reconstruct it. We expect, before winter sets in, again to have everything in good running order, under more favourable conditions than any previously obtaining."

**Ophir-Lade.** This property is not now being worked. The mill, after stamping for twelve months, was shut down last November, and the men at the mine were paid off. I am informed the owners are again about to open up, and will run the mill with ten more stamps. The property is fairly well equipped with stamp-mill, aerial wire-rope tramway, compressor and power drills.

**Gold Finch.** Mr. A. Rosenberger was working this property last summer, when the forest fires surrounding the property on all sides drove him and his men out. The mine buildings were burnt, with tools and supplies; some of the towers of the tram went also, causing the cable and buckets to come down and nearly wrecking the mill. Mr. Rosenberger had stoped out a lot of good ore and was soon to have milled it when overtaken by this misfortune. There is a large body of good ore in sight here, and the property could be made to pay if economically worked.

**Beatrice.** This is a silver-lead property situated at the head of Mohawk creek. Some weeks ago it was computed that there were about 3,000 tons of shipping ore in sight, and also many tons of ore which would pay to mill but not to ship. At one place was a vein about two feet wide, plainly to be seen, and carrying its width to the end of the excavations. This rich seam is now being raw-hided to Camborne over the new trail recently completed by the Provincial Government, and from Camborne will go by sleigh and boat to the smelter at Trail. The trail to the mine is six miles in length and, although steep, is of fairly uniform grade; the difference in altitude is 5,000 feet.

Altogether the *Beatrice* mine impresses one as being a valuable property, and it is unfortunate that the owners have not the capital necessary to equip and develop it systematically, instead of which they must, to keep things going, send their best ore long distances to a smelter. A mill such as has been installed at the *Silver Cup* mine would be very suitable to the *Beatrice* ore.

**Mammoth.** This property is situated above timber line on Goat mountain. The ore is galena and gray copper, some of it assaying very high in silver. A few hundred tons have been raw-hided from the mine this winter and are now *en route* to the smelter. The ore is hand-picked at the mine, and only the very best shipped, as the transportation difficulties are great and the cost heavy.

**Silver Dollar.** This property is situate on Mohawk creek and is on the same mineral belt as the *Beatrice*. The ore is of the same character, viz., galena and free-milling gold quartz. A force of men is now at work getting a compressor plant and a saw-mill on the ground, the intention being to do most of the mining with power drills. Some 300 feet of tunnels have already been driven, and ore is exposed in various places. Water power is to be used for driving the plant, and the pipes for that purpose are now being hauled on to the ground. The pipe, 18 inches diameter, is of wooden staves wound with galvanised iron wire and is coated with pitch. A dam was constructed last autumn and a site cleared for the mill buildings.

Office Statistics—Lardeau Mining Division.

| | |
|---|---|
| Free miners' certificates | 157 |
| Mineral claims recorded | 77 |
| Certificates of work issued | 259 |
| Conveyances, etc., recorded | 41 |
| Mineral claims Crown-granted | 5 |

# NELSON DISTRICT.

## NELSON MINING DIVISION.

REPORT BY W. F. ROBERTSON, PROVINCIAL MINERALOGIST.

The boundaries of the Nelson Mining Division were enlarged about a year ago so as to include all the territory of the Goat River Mining Division, which ceased to exist as a separate Division. The Recording Office of the enlarged Division is at Nelson, the former office of the Goat River Division at Creston being now a sub-Recording Office of the Nelson Division.

In the old Nelson Division the majority of the mines produced quartz carrying gold and silver values, partly "free," and partly in pyrite or galena, requiring treatment by stamp-mill and the collection of the concentrates by some form of table.

There are, however, several exceptions to this rule, notably the *Silver King*, of the Hall Mines, where the ore is essentially bornite, carrying silver values, but little or no gold, and certain smaller properties in the Ymir, where the ore is galena sufficiently clear to be shipped direct. These latter occur in a comparatively small area, which appears to consist of sedimentaries similar to the Slocan, included in an area in which the rocks are all of comparatively recent igneous origin, chiefly granite, but with many dykes and injections of a more basic character.

The district, although one of the oldest settled portions of the Kootenays, does not appear to have received the prospecting it deserves, and what was done was largely confined to the vicinity of Nelson and the line of the Nelson and Fort Sheppard Railway, but of late years, however, prospecting has been carried further afield, and a number of very encouraging locations are reported on the Kootenay lake and Columbia river slopes.

The district is exceedingly mountainous and travel by pack-train is impracticable, except along certain beaten lines, so that prospecting has to be done with packs carried on men's backs, which necessarily limits the distance which can be covered from the base of supplies.

The ores of the district are not "showy," and do not readily strike the eye of the casual prospector. Their values are only determined by assay, which the prospector seldom has made unless the specimen shows visible signs of mineral.

Many of the newer properties contain high-grade ore in small quantities, which renders them peculiarly suited to the lease or tribute system of working, which promises in a few years to form an important factor in the production of the district.

**Ymir Mine.**

The *Ymir* mine has been for some years the largest mine in the district. It was originally opened up by the London & B. C. Goldfields, Ltd., but was transferred later to a subsidiary company—the Ymir Gold Mines, Ltd.,—although it remained under the management of the parent company until the 1st of January, 1903, when Mr. R. M. Atwater took over the separate management for the Ymir Gold Mines, Ltd., of London, England.

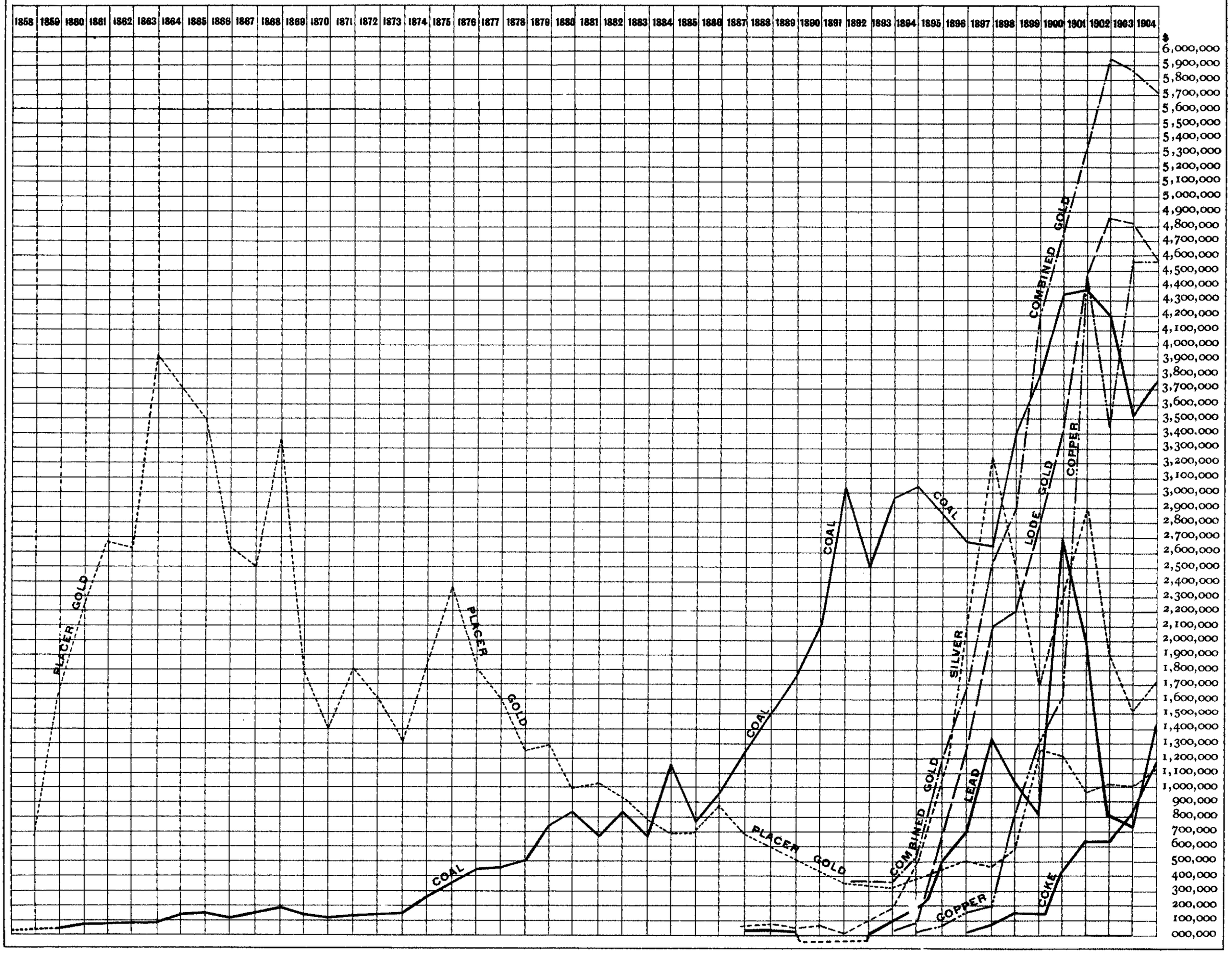
On January 1st, 1904, Mr. Atwater was succeeded by Mr. G. H. Barnhart, who had formerly been superintendent of the property under the London & B. C. Goldfields' régime, but Mr. Barnhart resigned in the fall of 1904, and was succeeded by the present manager, Mr. S. J. Speak.

# TABLE

## SHOWING MINERAL PRODUCTION

OF

## BRITISH COLUMBIA



The property is situated on the north fork of Wild Horse creek, about five miles from the town of Ymir. The mine, together with the stamp-mill and cyanide plant for the treatment of the tailings, has been fully described in the reports of the Bureau, so that further detailed description will not now be necessary.

Briefly, the ore-body is a large quartz vein, striking south 65 degrees west and with a dip of 70 degrees towards the north. The width of the vein varies, but in places it is 40 feet wide. The vein is continuous, and has been cut by the 10th level at about 1,000 feet depth. It is in schist, and about 1,000 feet from a granite contact, In the vein is an ore chute having a horizontal length of about 500 feet, on which the mining has been done, the productive workings having been above the No. 6 level. The following figures as to output are given, as showing the amount of ore produced from these workings :—

In 1900, 42,660 tons of ore, giving a yield per ton of $7.20 in gold and 1.06 ounces in silver ;

In 1902, about 50,000 tons of ore, yielding per ton $6.69 in gold and $1.27 in silver ;

In 1903, some 54,000 tons of ore, from which was recovered 11,160 ounces of gold, 5,060 ounces in silver, and 515 tons lead, having a total value of $300,000 ;

In 1904 the output was not so great, being between 30,000 and 35,000 tons.

An adit cross-cut tunnel started at the level of the top of the mill bins, and about 200 feet therefrom, cut the vein at 2,200 feet in, and from this tunnel a level, No. 10, was driven, drifting to the extent of from 400 to 500 feet having been done. The shaft in the upper workings has been connected through to No. 10 level. The ore mined in the upper levels is lowered by a bucket in the shaft to No. 6 level, and here dumped down the shaft to No. 10, where ore bins are provided, from which the ore is loaded through chutes into cars and run out by a mule, four cars to the trip.

On the No. 10 level the vein was just as strong and regular as at any place above, but, according to the report of Mr. Atwater, who did most of the work there, it does not contain the gold values found on the upper levels in the ore chute, but he was of the opinion that the ore chute proper had not yet been struck at this level, and he hoped to strike it by drifting further to the east, in which direction the chute was trending. Since Mr. Atwater left, drifting has practically been discontinued on this level, as Mr. Barnhart was confining his work under ground to the upper levels, and was getting out sufficient ore to keep about forty stamps going.

The mill, which has been previously described, is about the best equipped and largest mill in British Columbia, containing 80 stamps of from 850 to 900 lbs. weight each, and 32 vanners.

When the property was visited by the writer in June, Mr. Barnhart was doing some extensive prospecting on the hill, above the outcroppings of the present vein. He had found some very large masses of quartz, which assayed high in gold, and these masses, from the position in which they were found, could not very well have come from the vein at present known, so it was entirely probable that they were from some parallel vein higher up the hill; and in an endeavour to find this, a couple of large costeening trenches had been run, but which at that time had not revealed the expected ledge, although much additional float quartz was found, which assayed well. The ultimate result of this prospecting work has not been learned. The company employs, on an average, about 50 men underground and about 40 above.

Connected with the property is a cyanide plant, for the treatment of the tailings from the stamp-mill, and fully described in the Report of 1903. Briefly, the tailings from the stamp mill, which have been crushed to 50 mesh, pass through two spitzkastens, in which about 70 %

of the total is collected as "sand," 30 % going away with the wash water as slimes. The plant for treating this "sand" consists of six iron leaching tanks, 32 feet in diameter by 6 feet deep, each capable of holding 200 tons of sand; two solution tanks, 15 feet diameter by 12 feet deep; eight zinc-boxes, made of iron, with ten compartments each; together with all the requisite circulating pumps, etc., required; the whole enclosed in a well built house.

Close to this plant, but in a separate building, there is a well equipped testing laboratory, under the charge of Mr. J. McVicar, assayer.

Wilcox Group.

The *Wilcox Group* is situated on the north side of Wild Horse creek, about two miles above the mouth of the north fork, and about seven miles from Ymir by a waggon road, which, after it leaves the *Ymir* mine road, is rather rough. The group consists of four Crown-granted claims, the *Warwick*, *Wilcox*, *Fourth of July* and *Bywater*, and is held by the Broken Hills Mining and Development Company, Ltd., of which E. A. King, of Chicago, is general manager, and A. H. Tuttle is secretary-treasurer and local manager at the mine.

The property is equipped with a small, cheaply constructed, yet seemingly effective mill, which serves admirably the purpose of showing, by practical test, the possibilities of the property, and at the same time of providing sufficient revenue to carry on the development. The mill equipment consists of an 8 by 14-inch crusher, feeding by two automatic Challenge feeders to two Hendy triple-discharge, two-stamp mills, with 1,000-lb stamps dropping 6 inches, at the rate of about 100 per minute, using cast-steel shoes and crushing to 40 mesh, the tailings passing from the plates on to two 6-foot Frue vanners.

The capacity of the plant was given by the manager as about 13 tons a day, when running on ore heavy in sulphides, or 18 tons when the ore contained much oxidised material.

A run of 20 days, made shortly previous to the visit of the writer, the manager reports as yielding $15.26 in gold to the ton, and about two-thirds of a car of concentrates, the value of which had not then been determined. The average value of the ore is given as about $8 in gold per ton, of which about $5 is recovered from the plates, while the tailings average about $1.20 per ton.

The mill is connected with the mine workings by a back-balance aerial tramway, about 2,350 feet long, using two buckets, of 1,000 lbs. capacity each, running on a 1⅛-inch standing rope, with a ⅜-inch haulage rope. The mine workings are somewhat scattered, as is to be expected in a property where there are several very promising showings, and the primary object is development.

No. 1 Wilcox tunnel, altitude 4,000 feet, was in about 350 feet, with a 45-foot winze, on what appeared to be a small cross-cut vein containing some good ore, but not in any very great quantity.

The "Short Wilcox" tunnel was in about 120 feet, on what appeared to be the same lead, but about 75 feet higher up the easily sloping hillside.

No. 2 Wilcox is estimated as 500 feet higher up than the No. 1, and is on a fairly well-defined quartz vein, which at some distance in, appears to fork. Considerable drifting has been done here, and a little stoping.

On the *Fourth of July* claim there are two tunnels, the lower of which, at an altitude of 4,725 feet, is in about 350 feet, driven on a quartz vein, which towards the face becomes somewhat irregular, and from which some very high assays have been reported. The vein matter has been largely stoped out to the surface and sent to the mill, giving, it is reported, very satisfactory results. From this tunnel a winze had been sunk about 60 feet on quartz. A

cross-cut was being driven to the right, for the purpose of cutting at that level a dyke about ten feet wide which showed in the upper tunnel, and was said to carry there values of about $8 to the ton.

The formation is schist, very silicious in parts, faulted and cut by numerous dykes, in which there are a number of quartz veins. The values obtained by actual mill test are very encouraging, although no very large single body of ore has as yet been encountered.

Fog Horn.

The *Fog Horn* is another property situated on Wild Horse creek, about two miles up, and is owned by the Golden Monarch M. and M. Co., of which Conrad Wolfe is the manager. The property was closed down about the 28th of March and was not personally inspected, the following information being given by the foreman who had been in charge of the workings:—

The country rock is granite, and is cut by three quartz veins carrying gold values and sulphides. The first workings were on No. 1 vein, below which the other two veins outcrop. Some 900 feet lower than the No. 1 workings, a cross-cut tunnel had been driven in for 1,100 feet, cutting all three veins. Drifting to the extent of about 200 feet had been done on each of No. 1 and 2 veins, the latter being found to be rather broken. To assist ventilation, a fan is used in the tunnel. The mine stopped work, at least temporarily, on 26th March of this year, although two men were kept on until about middle of June.

On the hill rising up immediately to the east of the town of Ymir—sometimes called Dundee mountain,—there are a number of mineral claims in various stages of development, several of which have considerable promise.

Dundee.

The best known of these is the *Dundee*, owned by the Dundee Gold Mining Company, of which R. A. O. Hobbes, of Rossland, is the secretary. The property has had many vicissitudes, having at one time been extensively worked, and, it is said, with success; but for the past few years it has been completely shut down, in which condition it was found when visited, and as the shaft was filled with water, nothing of the underground workings could be seen. The surface is covered with wash, and the various open cuts on the property, in which the surface exposure of the ledge was traced, had caved in.

A fairly well-defined quartz ledge of considerable size, with a strike N. E. and S. W. and a dip from 50° to 60° to the N. W., apparently cutting through a granite formation, has been followed down by an inclined shaft for 260 feet. This is completely timbered and lagged as far down as could be seen. The shaft is provided with a skip dumping into a bin, from which the ore was run out by tram car. The total workings are reported as amounting to about 400 lineal feet. A steam hoisting plant, with vertical boiler and Northey mine pump, completes the machinery equipment. The buildings consist of an ore shed, office, bunk-houses, etc. A concentrating mill had been built on Bear creek some distance below the shaft, with which it was connected by a surface back-balance tramway, but both of these have been destroyed by fire. The assay values obtained from the surface cut are reported to have been high in gold and silver. The values reported from the working of the shaft are said to have run from $10 to $15 a ton, and in places as high as $20.

Efforts are being made towards opening up the property again, which would probably be done by running a cross-cut tunnel from lower down the hill.

Many of those connected with the mine, when it was running, have still great confidence in the possibilities of its becoming a valuable property, and are prepared to expend considerable further capital on their belief, so it is expected that in 1905 the *Dundee* may again enter into the list of shipping mines.

A fairly good waggon road extends from the town of Ymir up to the mine, but it is at present rather out of repair, owing to mud-slides. A branch from this road leads to the *Atlin* mining claim.

Atlin-Nome.

The *Atlin* and *Nome* claims are situated higher up the hill, somewhat to the north-east from the *Dundee*, and are held by Pat Daly, A. Parr and others—a working partnership. The workings consist of a shaft following the ore down for about 60 feet, at an angle of about 50°, with a cross-cut of about 50 feet to the north, all of which workings carried ore.

Some 238 feet vertical, lower down the hillside, a cross-cut adit tunnel has been run in, and at 215 feet cut the vein developed by the upper workings; it was continued for 100 feet more into the country rock, without meeting anything of importance. From this tunnel, where it intersects the vein, a drift has been run to the south, from which, at a point supposed to be in the line of the production of the upper shaft, a raise was being put up to connect with such shaft. This raise was up from the level some 170 feet on the incline, but at the time visited, the end of June, had not "holed through," which, however, it was expected to do in a short time, as could be determined by the sound of "tapping" from one working to the other, but which also seemed to indicate that the "holing through" would be into the upper drift.

The vein appears to be fairly regular and permanent in its strike and dip, and is probably a replacement vein in a much decomposed dyke, porphyritic in structure, which seems to follow close to a granite mass. The ore is quartz, heavily mineralised with iron sulphides; in places there are lenses of solid sulphide, but the bulk of the ore is as described. The values in the ore, as sorted, are from $20 to $25 a ton, which figures are borne out by such shipments as were made during last year.

Yukon.

The *Yukon* is above the *Dundee* and adjoins on the south the Atlin group, being held by certain of the same owners. It was Crown-granted in 1904. There appears to be a strongly defined vein running in a north-east direction, and having a dip of 80° to the south-west, cutting through a dark-coloured, fine-grained rock of igneous origin. The width is approximately from 4 to 8 feet, the "pay" being in a streak of from 1 foot to 2½ feet wide. The ore is quartz, carrying iron, zinc and lead sulphides, which contain values in gold and silver, reported to run from $10 to $20 a ton as shipped.

A tunnel has been driven in on the property a distance of 245 feet, but owing to the easy slope of the hill a depth at the face of only about 50 feet was gained. In the tunnel, for the first 150 feet from the portal, no ore is apparent, but at that point the ore comes in from the foot-wall, and is more or less continuous in the tunnel to the face.

Yankee Girl.

To the south of the *Yukon*, and higher up the hill, is the *Yankee Girl* mineral claim, owned by David Grobe and Jas. Graham. On this claim there is a tunnel about 200 feet long, following an acid dyke which cuts through a dark, close-grained rock, apparently an altered slate. In an open cut 20 feet higher up, there is visible a 2-foot quartz vein, lying next to the porphyry dyke, which has a strike N. 40° E. (mag.), and is reported to carry values in free gold, The property has not been worked for some time, and the workings were so obscured as to render inspection very difficult.

Porto Rico.

The *Porto Rico*, a few years ago, was an important shipping mine, but has not been worked for some time by the company owning it. During the year 1903, Mr. G. H. Barnhart, formerly the manager of the *Ymir* mine, took a lease of the property, and mined, during that year, 600 tons of ore, having a gross value of over $16,000. This he milled in the company's mill, the returns yielding a handsome net

profit, after paying a heavy royalty. In July, 1904, Mr. Barnhart signed another lease for a period of three years, on a royalty basis, the royalty under this lease, however, being lower.

The property was not working when examined at the end of June, and the lower tunnels, for some distance in, were filled solid with ice, entrance being effected by climbing through a hole in a snowdrift at the upper level, and going down an old stope and winze. The snowfall in winter seems to be very heavy here, as most of the mill buildings have been crushed in.

The vein is regular and continuous, but small, varying in width from 6 to 36 inches, with an average of about from 18 to 20 inches. The vein cuts through a greenstone country rock at a flat angle, approximately 45°, following along a close-grained, igneous dyke, much resembling the general country rock.

The property has been developed by four adit tunnels run in on the vein for a considerable distance. Most of the ore within reach from the levels now run has been stoped out, but there is virgin ground ahead, which, there is every reason to think, is as good as that already worked. The ore mined by Mr. Barnhart was taken from the old workings, and assayed in the neighbourhood of $25 a ton, the values being in gold and silver.

The mine is located on Barrett creek, on the west side of the Nelson and Fort Sheppard Railway, and about six miles from the *Porto Rico* siding, with which point it is connected by a fairly good waggon road. On the property is a stamp-mill, connected with the mine workings by a short wire-rope tramway. The mill consists of ore-bins, a grizzly, an 8 by 10-inch crusher, a battery of 10 stamps, and three 6-foot Frue vanners. The motive power is provided by a 50 horse-power horizontal engine and two boilers, all covered by a substantial building, in which is, also, installed a 5-drill Rand air compressor and receiver, which supplies air for drills at the mine. There is also a good office, laboratory and other houses nearby. Timber, wood and water are to be had in abundance.

**Spotted Horse.**

The *Spotted Horse* mineral claim is located on the *Porto Rico* waggon road, about two miles below that mine. A tunnel has been driven in for about 200 feet, following on a quartz vein associated with a fine-grained greenstone dyke. Quartz from the tunnel showed particles of free gold, but the average value of the quartz as mined could not be ascertained, although a milling test had been run through the *Porto Rico* mill, which had been borrowed for the purpose. The property was not worked in 1904.

**Hunter V.**

The *Hunter V. Group* consists of the *Hunter V.*, *Double Standard*, and five other mineral claims, active mining being as yet confined to the two named. The property is situated about two and one-half miles to the south-east of a siding on the Nelson and Fort Sheppard Railway, two miles south of Ymir, and at an elevation of 5,700 feet above sea level. It is owned and operated by the B. C. Standard Mining Company, Ltd., a company made up chiefly of local mine officials and engineers, and of which J. J. Campbell, of Nelson, is the manager; the actual mining operations being in charge of the mine superintendent. The property is in many ways unique, and is, therefore, the most interestingin the district.

The deposit occurs in a belt of limestone, in some places almost a marble, which runs in a general north and south direction for miles, and is bounded on either side by granite, of which, with other rocks of similar origin, the general formation of the locality is made up. The ore-body is practically a part of a bed of limestone, impregnated in certain parts with fine-grained sulphides carrying silver values. These impregnations do not appear to follow any visible line of fissuring, although they do seem to run in chutes, which, starting with a narrow outcrop, appear to dip at a flat angle into the hill, widening as they go, but showing no defined limits.

Towards the centre of the chute the impregnations are strong, but gradually shade away into the country limestone. The mineral-depositing solutions seem to have been highly silicious, the silica now in the ore-body often amounting to 25 per cent., being a partial replacement of the lime, while the limestone away from the local mineralisation is a comparatively pure carbonate of lime.

These local mineralisations do not seem to be directly connected with the granite in the vicinity, and they are not on, or near, the contact; in fact, no mineralisation has been dicovered here on the contact, where the limestone seems, if anything, to be purer than at more remote points. The present workings are from 1,000 to 3,000 feet from the granite on the surface, although it is a fact that the ore chutes are dipping towards the granite mass. Where the mineralisation is strongest, very high assays in silver have been obtained. In working on a commercial scale, in deposits of this class, mining is carried into the lime as far as the mineralisation is sufficient to render the work profitable, and this naturally reduces the average assay of the ore as shipped, which is found, on the large shipments made, to run about from 6 to 8 ounces of silver to the ton, and about 80 cents in gold values, with from 15 to 25 per cent. silica, the balance being lime.

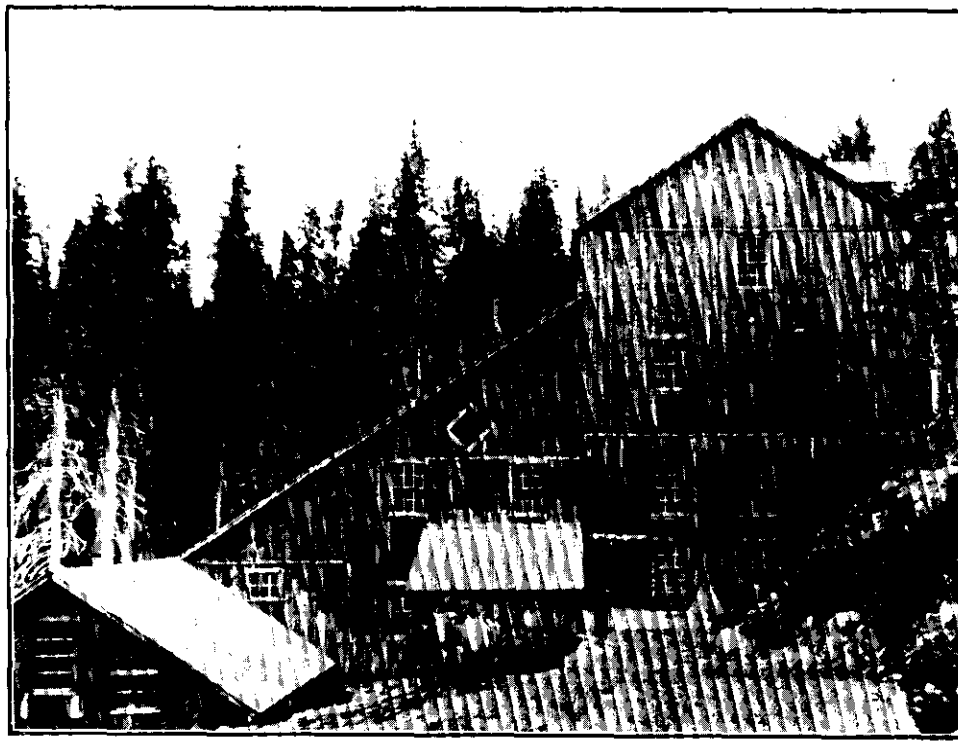
On an ordinary ore, subject to a regular freight and treatment charge, these values would not indicate a profit, but the gangue of this is so exceedingly desirable for fluxing purposes at the various local smelters, that the ore is bought as "mineralised flux," practically full contents value being paid for it. The following analysis of the ore has been obtained from one of the smelters using it in quantity:—Flux ore with low silver values; silica, 12 per cent.; lime, 45 per cent.; with a smaller amount of ore carrying higher silver values, with 25 to 30 per cent. silica and 30 per cent. lime.

The shipments during the year have been as follows: February, 541 tons; March, 1,194 tons; April, 1,573 tons; May, 1,964 tons; June, 1,258 tons; July, 1,447 tons; August, 1,703 tons; September, 1,537 tons; October, 1,508 tons; November, 2,295 tons; December, 2,146 tons.

The mine is peculiar, therefore, in that its output is practically limited by the requirements of the smelters for flux such as it produces. In June the average daily shipment ran from 50 to 75 tons, but since that time an outlet for a greater quantity of ore has been obtained, and the manager writes that the present output amounts to two or three cars daily, which will be continued during the winter months.

Mining is carried on on what is locally known as the "glory hole" system—that is, large open pits in which the general trend of the mineralisation is followed. Of these pits there were two in operation in June. An average of 20 men are employed at the mines, the drilling being done by hand. The mine buildings consist of bunk-houses, cook-house, superintendent's house and quarters, blacksmith shop, and stables.

From a point just below where work is expected to be ultimately carried on, a Riblet aerial tramway, with half-ton buckets, has been built to the siding on the Nelson & Fort Sheppard Railway, a distance of about 12,500 feet, at which point bunkers have been built, from which the ore is loaded by chutes into cars. The ore from the present workings is conveyed to the bunkers at the upper terminal of the main tramway by two separate auxiliary back-balance tramways, respectively 500 and 1,800 feet in length. The main tramway is operated by two men; the one at the top loads the ore and "brakes" the tram, while the other attends to the dumping, the loading on of supplies to be taken up to the mine, and the loading of the ore into the railway cars.



RELIEF GOLD MINING CO.'S CONCENTRATOR, ERIE, NELSON M. D.

VIEW FROM SKYLARK TRAIL--LOOKING ACROSS SLOCAN LAKE.

Second Relief.

The *Second Relief* mine is situated on the main north fork of the Salmon river, about 13 miles from the town of Erie, on the Nelson & Fort Sheppard Railway, and is owned by the Relief Gold Mining Co., J. A. Finch, Secretary, Spokane. The mine and mill are under the charge of the local superintendent, William Anderson. A good waggon road extends from Erie to the mines, and over it the concentrates are hauled. The property is developed by four cross-cut tunnels—Nos. 0, 1, 2 and 3. No. 0 is a short tunnel, cutting the vein in a few feet, and from this drifts have been run north and south for the length of the pay chute. No. 1 tunnel is about 90 feet below the surface, and it is 150 feet in to the vein, from which point drifts have been run 150 feet both to north and south. No. 2 is 225 feet long before cutting the vein, and drifting has been done to the south for 60 feet and to the north for about 800 feet. This tunnel is 180 feet vertical below No. 1. No. 3 cross-cut is 134 feet below No. 2, and it is 275 feet into the vein. on which a drift runs to the north 450 feet. The vein is of an average width of from 18 to 24 inches, and dips to the west at an angle of 85 degrees. The property is being worked most economically, with no waste labor, a total of 19 men covering the entire mine staff, both below and above ground.

A short distance below the mill, and connected therewith by a gravity surface tram, is the Company's stamp mill. The ore is received from the tram into a large bin, from which it is fed to a 6 by 12-inch crusher, which in turn discharges into the feed-bins, from which the ore is fed by an automatic feed to two 5-stamp batteries using 850-lb. stamps. The mill plates are 12 feet long, and on these is recovered about 35 % of the values. The tailings from the plates pass on to two Wilfley tables, where the remaining values are saved as concentrates.

The mill has a capacity of about 25 tons a day when crushing to 40 mesh. The tables produce about two tons of concentrates a day, which have a value of about $66 per ton. The machinery is operated by water, under a head of 178 feet, utilised through three Pelton wheels. A separate wheel is provided for the stamps and crusher, and another drives the Wilfleys and a lighting dynamo. The mill is also equipped with a small cyanide plant, consisting of 6 leachers, 2 solution tanks, 1 storage tank, and the usual zinc-boxes. This plant was in use in 1902 and 1903, but it is reported not to have been an economic success, so its further use was abandoned.

Arlington.

The *Arlington* (Erie) mine is operated by the Hastings (B. C.) Exploration Syndicate, Ltd., of which Mr. Leslie Hill, of Nelson, is the manager and consulting engineer, and Mr. Barker is mine superintendent at Erie. The mine is situated about two to three miles from the town of Erie, and is reached by a waggon road branching off the *Relief* road. The ore deposit is a flat blanket lead of quartz, occurring in a country rock of soft, black, graphitic slates, the quartz being accompanied by a light-coloured acidic dyke, inclined to be porphyritic in structure, both of which follow together the bedding planes of these slates, and are subject to all the flexures and bendings of this class of formation. Not only is the vein much affected by "rolls," but there is at least one fault of a considerable throw, which very much complicated operations before the details of such fault had been definitely determined. The quartz vein has an average width of about 25 inches, and carries through the quartz, galena, iron pyrites and zinc blende. The ore is easily sorted by hand. The values amount to about $50 a ton on the sorted ore, and are chiefly in gold, with a little silver, these metals occurring in the proportion of about $20 to $1, as to values.

The report of the company for its last fiscal year gives the average gross assay value of ore shipped during the year (1,068 tons) as: Gold, $52.40 to ton; silver, $3.73—a total of $56.13. The gross profit for each ton of ore shipped was $13.73, and the gross profit for the year was

$14,666. The tonnage output of the mine is from 3 to 3½ tons a day, and the cost of mining and hauling to the railway at Erie is given as $30.60 per ton. The total force employed about the mine, "all hands and the cook," as the superintendent puts it, was 22 men.

A small mill had been built on the property and connected with the workings by an aerial tramway. The mill equipment consists of 2 Tremaine stamps, 2 Frue vanners and 1 Wilfley. The mill has not been used of late, as the ore can be so cleanly sorted at the mine by hand as to leave little or no second-grade product to send to the mill.

In the same vicinity, on the main north fork of the Salmon river, there are a number of other mineral claims, some of which have shipped ore, but as none of them had produced, and as they were not being operated in July, 1904, they were not personally visited.

On one of these, the *Canadian King*, which in 1903 shipped over 90 tons of ore, one man was employed pumping out the mine. Between 30 and 40 tons of ore have been shipped in 1904 by the lessee.

On the *Keystone*, which in 1903 shipped nearly 250 tons of ore, two men were engaged working "on tribute."

At Craigtown, about half-way to the *Relief*, a large body of copper ore is reported, and it was expected that during the season active steps would be taken to develop the showing.

**Placer Mining.**

About the only placer mining operations being carried on in the district are near Erie, on the north fork of the Salmon river, at the canyon, just below where Whiskey creek flows in. The river in this vicinity shows evidence of having been mined for placer gold in the early days, but of the success of these operations there is no official record.

Mr. J. J. L. Peale, and Mr. W. L. Boyd have located two 250-foot claims, the *Full Dinner Pail* and the *Walla Walla*, on the north side of the river, just below Whiskey creek, on what is evidently an old channel, which contains a well water-worn gravel wash, evidently of local, and probably of recent, origin, made up of boulders of granite, porphyry, gabro and greenstone, but no slate. These two men were at work, having just about got started ground-sluicing, the work being intended to prospect the property, and if satisfactory results are obtained, it is expected the claims will be consolidated and water brought on under a head of 150 feet from Whiskey creek, which appears to be able to supply a sufficient quantity. They had recovered, at that time, a small quantity of gold, which was fairly coarse, well worn, and promising in appearance. The largest piece found was about $1 in value, although it is said that a piece worth $6 had been obtained from the claims by the discoverer.

Immediately above these claims on the main fork, above the mouth of Whiskey creek, W. A. Nichols, of Spokane, has two leases, the *Spokane* and *Erie*; and, immediately above these again, the North Fork Co., J. C. Allan, Spokane, holds one or more leases, but on none of these was there any work being done.

**Queen.**

The *Queen Group* adjoins the *Yellowstone* on Wolf creek, a tributary of Sheep creek, which latter is an important tributary of the Salmon river, entering it from the east at the town of Salmo. From Salmo to the mine there is a waggon road, the distance being about 10 miles. In 1902 this property was under lease and bond to the Holmes Syndicate, which shipped and milled about 5,000 tons of ore, containing values of about $27,000, but towards the end of the year threw up the bond.

It would look, from the appearance of the mine, as if little had been spent on development, but that all the energy had been expended in taking out all available ore. In 1903 Mr. Wm. Waldie, of Nelson, one of the owners, started in to work the property and still

continues to do so. In 1903 he leased the *Yellowstone* mill, which was lying idle, connected it with the *Queen* mine by a surface tramway and made some small shipments, and from appearances, in July, was in a fair way to make a considerable tonnage in 1904. Later reports show that nearly 5,000 tons of ore were milled during the year.

The mine occurs in a band of quartzite, here traversed by a dark igneous dyke. The mineralisation occurs in the quartzite adjacent to the dyke, and gradually shades off into barren country rock, the ore taking the form of two chimneys with a width of from 2 to 14 feet, and a greatest developed length of from 100 to 125 feet, tapering somewhat towards the top.

When visited, ore had been found on one side only of the dyke mentioned, no attempt having been made to see what was on the other side. It is reported that, later in the summer, a drift was put through the dyke and that good ore was encountered. The milling ore runs about $7 to the ton.

The mine is developed by three adit tunnels, connected by a raise, but has been so "gutted" by former lessees that the present management has difficulty in getting into systematic mining. Air drills are used in the mine, the compressed air being generated at the mill. About 10 men are employed underground and as many above.

The *Yellowstone* mill was completed in 1900, crushing that year 8,500 tons of ore. The equipment consists of two batteries of five stamps each, the weight of stamp being 850 lbs. In the mill building is a large air compressor. The whole plant is operated by water-power, under a head of about 300 feet. The *Yellowstone* mine has not been operated for two or three years.

### Summit Creek.

Summit creek has its source in the range of mountains separating the drainage area of the Salmon river, in the Ymir district, from that of the southern portion of Kootenay lake. The source of Sheep creek, on which the *Yellowstone* and *Queen* mines are situated, and that of Summit creek are only a few miles apart and separated by a divide. Summit creek is about 30 miles long and flows due east, entering the Kootenay river from the west, about opposite the flats upon which the Reclamation Farm is situated, that is, between Creston and Sirdar. It was by this route that the Dewdney trail was laid out from the Coast to East Kootenay in the '60s. Crossing the Kootenay river above Fort Sheppard, it proceeded up the Salmon river to Sheep creek, which was followed up to its source, and crossed the divide to the head of Summit creek, which it followed down to the Kootenay river, crossing it at the Flats, and proceeding up Goat river over the summit and thence up the Moyie to East Kootenay, where, in those days, extensive placer mining operationg were in progress.

Of this slope of the range, draining eastward into Kootenay lake, very little is known, and until recently it has been little prospected, although, in its geological features, it is very similar to the western slope, where several valuable properties have been developed.

The Provincial Mineralogist, in the Annual Report, 1903 (p. 147), drew attention to a property on Midge creek which had exceedingly good prospects, and now, on Summit creek, the *Bayonne Group* has come into prominence from the high assays obtained from surface showings or shallow workings. These properties were located in 1901 by

**Bayonne Group.**

G. Harrison and F. Risdon, two prospectors, who, by the expenditure of a large amount of personal labour, brought the claims to such a state of development as to enable them to be Crown-granted. The group has recently been taken over by a syndicate, composed of Montana mining men, for, it is reported, a cash payment of $80,000, and surveys of the group have been completed. The group consists of 10 claims, the *Bayonne, Oxford, Columbus, New Jersey, Ohio, Delaware, Maryland, Kentucky, Illinois* and *Virginia.*

A quartz ledge, varying in width from 2 to 15 or 18 feet, with indefinitely determined walls, cuts through the granite formation for a long distance, and has been located with considerable exactness on the surface by a number of open cuts and trenches. This lead strikes up the hill in a general east and west direction, its course being often determinable by the "gossan" capping caused by the weathering of the iron sulphides which form a part of the vein matter.

On the *Ohio* a tunnel has been run in for 360 feet on a fissure containing from 3 to 4 feet of talcose matter and quartz. The surface slopes at such a low angle that the face of the tunnel is estimated at not over 70 feet deep.

A sample taken by the writer from the walls of the tunnel at various places, and quite sufficiently general to give an approximate valuation to the exposure, gave upon assay in the Government Assay Office, $11.60 in gold and 10.22 oz. in silver to the ton. A sample taken of the 18-inch "pay streak" at the face of the tunnel gave, similarly, $26.40 in gold and 3.28 oz. in silver. A general sample taken across 3 to 4 feet of ledge matter exposed on the surface, some 220 feet above the tunnel, gave $13.20 in gold and 6.2 oz. in silver. A general sample from quartz at the tunnel gave, similarly, gold $16 and silver 4.2 oz., while a sample of certain black weathered gossan from the outcrop of one of the leads, taken merely to see if it carried anything, for nothing was visible, gave the astonishingly high assay of $320 in gold and 40 oz. in silver.

On the *Bayonne* claim a tunnel has been run in 500 to 600 feet, but seems in its course to have run off the vein, which, however, is picked up again near the face, and has been drifted on for 50 feet. This tunnel is likewise shallow.

The strongest points about the mineralisation, as so far developed, are the persistency of the lead or leads and of the good values contained, for the assays quoted above are not selected, but are the assays from all the samples taken. It is true that the development is as yet superficial, but the length and strength of the mineralisation argues strongly for depth. As it stands, the property is one of the most promising prospects seen in the district, and there is more than a probability that development will prove it to be a mine.

Encouraged by the success met with on the *Bayonne*, a large number of claims have been staked in the vicinity, as is usually the case where a fortunate location has been made, but as these stakings are mostly recent and the surface wash is heavy, there is as yet little definite to show what may be expected.

**Echo Group.**

Among those who have succeeded in obtaining results are the owners of the *Echo Group* who, after a deal of laborious trenching and sinking of test pits, have managed to uncover a ledge of quartz 3 to 4 feet wide, carrying gold values, closely associated with a light-coloured acid dyke, cutting through the granite formation. This cut was made just when the writer visited the property in the middle of July, and as the ground was more or less covered with snow from a recent storm, little could be then determined. It is reported later, unofficially, that development has proved the continuance of the lead, and that the values obtained are good. The lead is not a continuation of the *Bayonne* lead, but seems to be parallel, though some distance away.

The group lies about half a mile to the south-east of the *Bayonne Group* and is supposed to adjoin it. It consists of four claims, the *Echo*, *St. Elmo*, *Ontario* and *Echo Fraction*, owned by John Baugh, Howard Anderson and Wm. Mahar.

There are a number of other claims in the camp, reported to have equally good showings but very little work done, and they were not visited.

*Bayonne* camp is at an altitude of from 6,000 to 8,000 feet, and 28 miles, by a very inferior trail, from the navigable waters of Kootenay lake. The mouth of Summit creek is reached from Kootenay landing, or from Sirdar, by row boat or canoe, but a steamer can, at most seasons, go from the lake to a point on the west shore of the river, some three miles north of the mouth of the creek, and from this point it is proposed to build a waggon road up the creek. At present, the trail follows a little back from the shore to the mouth of the creek, where it joins the old Dewdney trail, which it follows up for about 10 miles or so, when the trail to the camp branches off to the right and, from this point, is new, having been built by the prospectors and being very "makeshift" in location and construction. The Dewdney trail must have been, at one time, fairly good, but slides and falling timber have caused breaks, around which the new trail has been temporarily carried, irrespective of grades. The camp can also be reached from Salmo, on the Nelson and Fort Sheppard Railway, by proceeding up Sheep creek and over the summit. This route is frequently used by prospectors "travelling light," but all supplies are brought up Summit creek.

**Alice Mine.**

The Alice Broughton Mining Co., Ltd., of which John Hampson is manager, is operating the *Alice*, *Alice Fraction* and *Morning Star* mineral claims, situated in the Goat river section of the Nelson Mining Division, about 2 miles north of Creston station, on the Crow's Nest Pass branch of the Canadian Pacific Railway. The mine is situated on the range of hills separating Goat river from the Kootenay at the flats, at a height above the railway of from 1,500 to 2,000 feet. A strong quartz ledge has been traced continuously on the surface for a distance of nearly 800 feet, and intermittently for much further. The ledge was primarily developed by a number of open cuts, etc., from which indications sufficiently encouraging were obtained to induce the more serious development of the property. This was done by driving in No. 1 cross-cut tunnel, which cut the ledge at a depth of 95 feet below the surface, and on this level drifting was done on the vein to the amount of 455 feet, and a winze was sunk for 82 feet, from which at this point an intermediate level was run, and about 195 feet of drifting done. About 70 feet below the intermediate level is No. 2 level, which was driven from No. 2 adit cross-cut, and on which

No stoping had been done when the property was visited in July, 1904, only the levels and cross-cuts being run, which, however, may be said to have blocked out the mine to a depth of 250 feet, and for a length of about 400 feet. The ore is essentially quartz, containing galena, which carries silver values of about $\frac{1}{3}$ of an ounce of silver to the per cent. of lead.

The property is entirely a concentrating proposition. A concentrator site was acquired on the Canadian Pacific Railway, at what is now known as Alice Siding, where, in July, a concentrating mill, designed by S. S. Fowler, of Nelson, was in process of construction, as was also a Riblet aerial tramway connecting the mine and the mill. The mill was first put in operation about the middle of September, 1904, since when it has passed through a considerable tonnage of ore.

**Granite-Poorman.**

The Duncan United Mines, Ltd., owning the *Granite-Poorman* and other claims, located on Eagle creek, some five or six miles to the west of Nelson, did not work the property this past year, but let it out under a lease to S. S. Fowler and Montague Davys, of Nelson. The lessees began operations about July, 1904, and up to the close of the year they had mined and milled about 1,100 tons of ore, gathered probably from the old workings, which is reported to have yielded nearly $10 a ton.

**Central.**

About five or six miles west of Nelson, on the hill above the *Poorman-Granite* properties, at an elevation of about 2,200 feet above the level of the lake, is the *Central* mineral claim, owned by D. W. Moore and John Whittier. The property is only just being developed, and while as yet it is nothing more than a prospect, it certainly has a very encouraging showing.

The country rock of the locality is granite, and in the vicinity of the workings is cut by several "iron-mica dykes," which have a strike about S. 55° E. and a dip of about 85°. The lead has been stripped and cross-cut for some 200 feet, and traced further. In the largest of the open cuts, where the lead has been cross-cut, it appears to be about 18 feet across, and between the granite walls is included a basic dyke, such as mentioned, which is probably associated with the mineralisation.

A few feet from this open cut a shaft was being sunk, and was down in September about 21 feet, showing a well-defined wall on one side, while the width of the shaft (6 feet), was in mineralised vein matter. The owners, who are men accustomed to sampling, sampled the shaft across at a depth of 15 feet, obtaining from such sample an assay of 5 % copper, $11 in gold, and 2.5 oz. in silver. General samples from the dump of the material hoisted from the shaft are reported as:—Sample No. 1, copper 3 %, silver 1.4 oz., and gold $7.20 to the ton. No. 2, taken at another time, gave: Copper 2.7 %, silver 1.4 oz., and gold $6 to the ton. Hand-picked samples of ore gave: Copper 9.3 %, silver 8 oz., and gold $19.

**Fluor Spar.**

A short distance to the east of Nelson, at 5-Mile point, fluor spar has recently been discovered, and, as far as is reported, this is the only known occurrence of the mineral in the Province, which gives any promise of its existence in commercial quantities. The claim lies just above the Nelson and Fort Sheppard railway tracks, and within 100 yards of the hand-car house at 5-Mile point station. The property is owned by Geo. Huston, Hawkins and others, of Sandon. The country rock here is also the Nelson granite, and running through the claim there is in the formation a fault plane or fissure, along which the granite has been much crushed, and subsequently somewhat decomposed by percolating water. Along this fissure calcium fluoride has been deposited, the crushed rock on either side being impregnated for some distance, gradually shading off into more solid granite.

Along this fissure for some 75 feet a tunnel has been run in which shows in the roof in places a seam of about 12 inches of the mineral, comparatively pure. On either side the mineral is more or less mixed with the crushed country rock. The deposit is recent, and, as a matter of fact, the water seeping through the fissure at present is depositing the mineral, as in places the walls of the tunnel, which was driven some years ago, show a distinct deposit of fluor spar deposited there recently. The mineralisation followed the fissure at least as far as the tunnel had developed it, and nothing could be seen on the surface, which is covered with underbrush.

The mineral is used commercially as a flux in smelting, and in the manufacture of hydrofluoric acid, for both of which purposes there would be a strong local market if the future development of the property proves satisfactory.

The Hall Mines smelter took hold of the property this fall, and did some work on it, mining some tons of the mineral for experimental purposes, the result of which operations has not been learned, further than that, mined in quantity from the present development, the mineral contained a higher amount of silica than was desirable.

## NELSON MINING DIVISION.*

REPORT OF ROBERT A. RENWICK, GOLD COMMISSIONER.

Marked development in the condition of almost all the mines in the Nelson Mining Division may be summed up as the result of the year's operations. On the whole, it has been a year of development rather than of prospecting.

With respect to smelting, the results secured by the Hall Mines Company were appreciably better than those of the previous year, though still leaving much to be desired, and in the same company's mine, the *Silver King*, operations under lease were sufficiently encouraging to induce the company to decide upon unwatering the lower levels, and to resume operations upon a partnership basis.

There was a falling off of results in the operations at the *Athabasca-Venus* property, both in the tonnage mined and in the recovered values, but on the *Juno*, an adjoining property, development was attended with such satisfactory results that arrangements have been made for the erection of a stamp-mill during the approaching summer.

At the *May* and *Jennie* property, in the gold belt to the south-west of Nelson, a 50-ton mill has been erected, and will commence grinding on the large reserves of ore blocked out in the mine during the early months of 1905.

On the *Poorman-Granite* property operations were carried on under lease, after an idle period of several months, and resultant development may bring about a resumption of operations on the *Granite*; while operations on the *Greenhorn*, in the same locality, have opened up a strong ledge of free-milling quartz, from which there was an extraction of 473 tons, the milling of which yielded paying values.

In the Ymir camp the only disappointment was in the *Ymir* mine. The net result here was a reduced ore extraction and a general shrinking of values. At the *Hunter V.* mine, development was carried on so effectively that the output of the mine was increased from 400 tons up to 17,168 tons. At the *Wilcox*, also, sufficient improvement in the mine resulted to warrant the management in doubling the milling capacity; and on the *Foghorn* the owners claim the opening up in the long tunnel of an ore-body of sufficient importance to warrant the erection of a concentrator.

At the *Porto Rico* mine, after a period of idleness extending over a number of years, operations have been resumed under a lease, and with such gratifying results as ensure operations upon an even more extensive scale during the coming year.

Above Erie good returns have been received from the operation of the *Arlington* mine, and the property is now said to be in a better position with respect to ore reserves than at any former period in its development. At the *Second Relief* mine profitable operations were carried on for a short period, and arrangements are being perfected for the taking over of the property by a local company, which will operate for twelve months in the year.

Near Creston, satisfactory development was followed by the erection of a 50-ton concentrator, which was in operation during the closing weeks of the year; and, at the *Bayonne*, systematic development was carried on by the purchasers with such encouraging results that expenditures aggregating several thousand dollars have been decided upon for the coming year, including the expenditure of $30,000 on a waggon road to connect the property with Kootenay lake.

*See* also Report of Provincial Mineralogist, page 122.

These conditions have resulted in a considerable gain in the mineral output of the district, and, in addition, have furnished employment for a larger number of men than for several years previous.

**Hall Mining & Smelting Co.**

The operations of this company during the fiscal year ending June 30th, 1904, resulted in a net profit of £1,696 16s. 1d. In mining, operations on the company's account were confined to the *Emma* mine, in the Boundary District, in which the company has a quarter interest, and from which the supply of fluxing ore for the smelter is drawn. Throughout the year, work was carried on in the upper levels of the *Silver King* mine by M. S. Davys, lessee, during which period 4,341 tons of ore were extracted. The average value of this ore per ton was 21.4 ounces silver and 3.66 % copper, and the tribute received by the company upon it amounted to £804 19s. The net profit shown in the company's mine account is £1,042 12s. 1d.

At the company's smelter, No. 1 furnace was in operation 204 days, and No. 2 for 324 days, smelting 22,805 tons of custom ore and 9,331 tons of *Emma* ore, and producing 6,155 tons of lead bullion. In addition to this, No. 1 furnace was in operation 27 days on *Silver King* ore, producing 140 tons of copper matte, the latter being "converted" at the Granby works. The tonnage of lead ore was made up of 14,169 tons of lead ore and concentrates, a large proportion of which was roasted, 5,915 tons of dry ore, and 2,721 tons of *Hunter V.* ore. These figures show an increase of 6,025 tons of ore, and 1,845 tons of *Emma* ore, over the previous year's smelting operations. The smelting management reports the ore supply as very unsatisfactory during the first six months of the year.

The lead bullion shipped carried 1,096,415 ounces silver and 9,201 ounces gold, while the copper matte carried 41,294 ounces silver, 130 ounces gold and 130,800 pounds copper, making the gross value for the year practically $1,000,000. Despite the volume of business represented by these figures, the profit on smelting operations was but £8,394 8s. 6d., and this in turn was subject to the heavy charge of £4,550 13s. 2d. for the maintenance of buildings and plant, reducing the smelting profit to £3,843 15s. 4d.

Respecting the outlook for the present year, it is worthy of note that the conditions during the last half of the last fiscal year showed an appreciable improvement, which was maintained during the last six months of the calendar year, and conditions generally promise better.

In the *Emma* mine, present development assures an ample supply of iron flux, and the grade of the ore has also improved. The satisfactory development at the *Hunter V.* mine is also considered important, the ore from this property carrying a very high excess of lime, thus rendering unnecessary the purchase of lime rock. The owners of the property have an expanding market, and have plans for development under way which will cheapen the cost of production and ensure also an ample supply of ore.

The outlook for a constant supply of lead ores is also brighter. This supply was materially curtailed during the last six months by the water shortage at the *St. Eugene* mine, the largest producer in the Province. To overcome this, the company has installed a pump, and for the future will draw its water supply from Moyie lake. Another factor likely to improve local smelting conditions is the probability that the entire output of the *St. Eugene* mine will be treated locally. Heretofore a considerable proportion of this mine output was exported to Europe for treatment. It is understood that this arrangement has not been altogether satisfactory, and that the export of *St. Eugene* ore will cease after June 30th next. The treatment of this ore in the local smelters would go a long way towards securing for them a constant supply of lead ore, which, with the normal increase to be expected from the Slocan

District, following its further period of development, should satisfactorily adjust this issue. It is only with respect to the supply of dry ore that the outlook has not improved, there being but one regular producer at the present time. Conditions with respect to labour and fuel supply remain the same.

Improvements made in the smelter plant during the year consist of the building of a Merton roasting furnace, and improvements in the way of increasing the elevating capacity in the handling of material. The introduction of the Merton furnace is, in a measure, experimental. It is expected to reduce roasting charges, and the successful operation of the present furnace will mean the introduction of others. There was no increase made during the year in the smelting charges upon lead ores, and the charges on dry ores were also practically the same.

During the half-year ending December 31st, 1904, the No. 1 furnace was in blast 131 days, and No. 2 was in blast 158 days. During the period 8,206 tons of lead ores and concentrates, and 9,803 tons of other ores, were smelted; and 3,821 tons of bullion of a value of $559,340 were shipped, as against 3,406 tons of a value of $518,071 for the corresponding period of last year.

The smelter furnishes employment for an average of 125 men throughout the year. The wages paid for the last six months of the calendar year aggregated $71,224.12, and for the year $141,542.62.

**Silver King Mine.** This property was operated during the greater portion of the year by M. S. Davys, under a lease which expired in July last. His work was confined to the fifth and upper levels of the mine, the ore extraction during the period being 4,000 tons, with a value slightly in excess of $16 a ton. Following the lapse of the Davys lease, and while negotiations were pending for the future working of the property, a short term lease was given to a number of miners, who, in a few weeks extracted 191 tons from the hanging-wall vein, the average value of which was in excess of $50 per ton. Operations at the mine furnished employment for 20 men during the greater part of the year.

The present arrangement for the operation of the mine is in the nature of a partnership between Mr. Davys and the Hall Mining & Smelting Company, and calls for the unwatering of the mine to the seventh level, 175 feet below the No. 5. The principal aim of this work is to reach a body of ore left in the south vein, which, where extracted in the upper levels, yielded ½ % copper and from 18 to 25 ounces silver. In the earlier stages of the mine's development this vein was stoped down as far as the fifth level, and had been opened up on the sixth in 1899, since which time no development has been done upon it. On the fifth level this vein had an average width of 5 feet of shipping ore, and between this level and the seventh it is estimated that the vein contains 10,000 tons of ore.

It is also proposed to prospect the main vein below the seventh level with a diamond drill. All work done in the mine below the seventh level has been on what is known as the hanging-wall vein, and it was this vein that "petered out." In the seventh level the main vein was faulted, and the values in the ore having fallen, work upon it was discontinued. Behind the fault mentioned, and at a depth of 1,200 feet, diamond drill cores indicated a body of solid grey copper in the main vein, assays upon which gave an indicated value of 16 to 18 ounces silver and 2 % copper. It is this ore-body which it is intended to explore by means of the diamond drill, operating from the seventh level. The tapping of this ore body would involve a very heavy expenditure on capital account, but should the exploration indicate an extensive body, and not a pocket, of ore, it will be worth going after, as the main vein has maintained an average width of 12 feet in the upper workings.

**Athabasca-Venus Mines.**

These properties were operated throughout the year by the Athabasca-Venus Gold Mining Company, but late in December operations were suspended. It is suggested that the property is not able to carry the debts of the two former companies, which were amalgamated in the new company, and to provide also means for necessary development. Some other arrangement is admitted to be necessary before operations can be resumed. During the year the *Venus* property received the chief attention of the management, and from it 6,546 tons of ore were extracted. Some work was done on the *Athabasca* property, but it was under the tribute system or lease, the ore extraction being but 479 tons.

With the exception of two months, during which there was a scarcity of water, the mill was in operation throughout the year. There were milled 7,000 tons of ore, yielding $66,260.

The mines and mill furnish employment for a crew of 35 men during the year.

**The Juno Mines.**

This property comprises a group of three claims, situated on Morning mountain, and immediately adjoining the *Venus* property. It is owned and being developed by the Juno Mines, Limited, a Montreal syndicate, with a capital of $625,000, of which one-third is in the treasury. M. S. Logan, of Nelson, is the managing director and has had personal charge of development.

Two veins have been opened up, the main or *Juno* vein running east and west, and the *Venus* vein north and south. On the *Juno* vein a shaft has been sunk 300 feet, and at the 100 and 200-foot levels drifts of an aggregate length of 500 feet have been run on the vein. An adit 800 feet long has been run to connect with the bottom of the shaft. The vein appears to maintain an average width of 4 feet, and samples all the way from $5 to $20 in gold.

The *Venus* vein has been opened up to the *Juno* side line by the Athabasca-Venus Company on the three upper levels run on the *Venus*, the lowest of which gives a depth of 550 feet below the *Juno* adit. Arrangements were made by which the Juno company worked through the *Venus* tunnels, and the No. 2 tunnel of the *Venus* has been extended into the *Juno* ground for a distance of 300 feet. At a point 100 feet in from the *Juno* side line, an upraise has been made 550 feet to connect with the *Juno* adit. The No. 1A tunnel on the *Venus* has also been advanced in the *Juno* to connect with the upraise. In these workings the *Venus* vein appears to maintain a width of two feet, and from results obtained on the ore extracted from the *Venus* ground it is anticipated that the ore in the *Juno* ground will mill $15 to the ton.

The company is now negotiating for a mill. By means of the connection established with the *Athabasca-Venus* property, it would be possible to utilise the tram and mill of that property, but if an arrangement of this nature is not made, the *Juno* company will erect, during the summer, a 10-stamp mill, capable of treating 25 tons per day. There is sufficient water available for washing the plates, but it would be necessary to raise the stamps by electric power.

The company employed on development a crew varying from 12 to 15 men throughout the year.

**May and Jennie Mine.**

This property is situated on 49-creek, and is owned by the Reliance Gold Mining Company, of Nelson. There was very little development work carried on in the mine during the year, but satisfactory progress was made in the erection of a mill for the treatment of the ore already blocked out. This mill is known as the Akron-Chilian mill, and will have a nominal capacity of 50 tons The buildings have been erected, part of the plant has been installed, and the balance of it is expected to be on the ground in 30 days. The main building is 72 by 36 feet, and the cyanide building 50 by 44 feet. A Riblet tramway has been erected, which has a length of 1,750 feet, and connects the mine with the mill, and an ore-bin capable of holding 200 tons has been built at either end.

Under the process to be introduced, the ore, after it leaves the bin, will be put through a Blake crusher and a set of rolls 14 by 36 inches, crushing to ¼ inch, and depositing into the mill ore-bin. From this it is fed into the Chilian mill, run over the plates, then into the storage tanks, and from these through the cyaniding plant. From experiments made, it is estimated that a saving of 90 per cent will be effected by the treatment to be employed.

In the mine the underground workings aggregate half a mile in length, the greatest depth being 235 feet. This has resulted in opening up ore reserves aggregating 80,000 tons, the average value of which is expected to be in the neighbourhood of $4 to the ton. As conditions permit of the handling of the output by gravity from the mine through the mill, it is expected that a good profit margin will result from mining and milling operations. The probabilities are that the mill will be in operation by the end of April, and preliminary work will be commenced in the mine a few weeks in advance.

**Gold Hill Group.**

Very little work was done on this property during the year. It has been opened up by a 650-foot cross-cut and a 100-foot drift. A 4-foot ledge was encountered in this drift, and an upraise was made on it for 35 feet, when it was found to be cut off by a dyke. A shaft was then sunk on the vein, and it was showing strong in the bottom at 30 feet. Some surface prospecting was carried on by means of ground-sluicing, but without important results.

**Poorman-Granite Mines.**

Mining operations were carried on in these properties during a portion of the year by M. S. Davys, under a lease, a crew of 15 men being employed. The *Granite* received the most attention. This vein has been opened up by a shaft down 280 feet, off which four levels have been run. The showing above the lower level consists of stringers of ore averaging from two to six inches in width, with occasional bunches widening out to two feet. In the lower level, however, there is a chute of ore 50 feet in length, which maintains an average width of 2 feet. The work done consisted in following stringers on the upper levels, and stoping out ore as long as it covered expenses, the ore extracted milling $11 to the ton. The development of the ore chute in the fourth level has also been undertaken. It is proposed to sink another 60 feet on this, and if the ore holds in value and extent, the lessee will go down another 40 feet.

The work in the *Poorman* consisted in stoping out such ore as remained available. In all 270 tons of ore were extracted, but as it did not mill above $5.50, further work was abandoned. The ore extraction from the *Granite* property amounted to 800 tons, and yielded values approximating $11.

**Greenhorn Mine.**

Considerable work on this property was done during the year by the owners, Messrs. Swedberg & Nelson, 300 feet of tunnel being driven, of which 75 feet are on the vein. Conditions for mining in the *Greenhorn* appear to be more favorable than in the adjoining properties, the vein being wider and free from the walls. Considerable ore was extracted, and 473 tons of quartz were treated in the *Granite* mill, yielding something over $10 a ton. A crew of ten men was employed during the greater portion of the year. Future operations will, in a very great measure, turn upon the terms that can be secured for the milling of the ore.

**Star Mine.**

This property, which is situate on Eagle creek, was operated under lease and bond for a portion of the year by the Sharpless Mining Company, and had been opened up by a shaft down 90 feet, from which some drifting had been carried forward, showing a vein of gold quartz varying from two to four feet in width, the ore in which milled a little better than $10. The operators made a cash payment of $3,000 upon their bond, paid about as much more for milling privileges at

the *Granite* mill, spent $5,000 on surface improvements in the way of buildings, and then entered into a contract to deliver 40 tons of ore per day. To make this good, country rock was broken down and shipped with the ore. In all, close upon 1,200 tons of material were teamed to the mill, but the average recovery was less than $3 per ton, or less than the charges for teaming and treatment, and a few weeks brought about a suspension of operations. The work done in the mine did not alter the appearance of the vein.

**Eureka Group.** This group of claims adjoins the *Star* property, and received attention from the owner with a view to giving a lease and bond upon it, under the terms of which operations are to be carried on during the ensuing year. Two ledges on the property have been opened up by shafts 86 and 75 feet respectively, and an incline of 40 feet. From these some drifting has been done and very favourable showings disclosed. One of the veins has a width of 5 feet, and the ore gives indicated copper values of $18 in gold and copper, with a rich streak on the hanging-wall, from three to six inches wide, from which assays have been had as high as $60. It is this vein that has been developed by the shafts. The parallel vein has been opened up by the incline shaft and 20 feet of drifting. It has a width of 4 feet, and the ore an indicated gold value of $5, with very small copper values.

**Molly Gibson Mine.** This property, situate on Kokanee creek, has been under development since August last, after a protracted shut-down. The company was called upon to make considerable expenditures to repair the tramway and mine buildings destroyed by the snow-slide of two years ago, when a number of the miners were killed. There are two veins on the property, which are being opened up by means of tunnels. The work accomplished since operations have been resumed consists in advancing the No. 4 and No. 5 tunnels another 100 feet each, and in advancing an upraise 90 feet, to prospect for a chute of high-grade ore which in the upper workings yielded from 300 to 400 oz. of silver. The work so far has opened up a considerable tonnage which it is estimated can be milled eight into one, making a concentrate averaging from 80 to 100 oz. silver and 25 % lead. The company has under consideration the erection of a concentrator, but the experiments, so far as they have been carried on, have not been conclusive as to the best method to be employed. These have shown a saving of but 70 % of the values, and it is not contemplated that milling results would be as good.

In the former operations nothing but high-grade ore was shipped, and in addition to the large reserves of concentrating ore in the mine, there are 5,000 tons on the dumps which, it is estimated, will average from 20 to 30 oz. silver and small percentages of lead.

A crew of 20 men was employed at the mine since operations resumed.

**Ymir Mines.** This property was operated throughout the year by the Ymir Gold Mines, Ltd., during which period there was mined and milled 32,630 tons of ore. This yielded by amalgamation $2.67 per ton, and concentrates of gross value $1.80 per ton of ore crushed, and also $0.45 per ton by cyaniding the tailings, making a total gross recovery per ton of $4.92 in gold, silver and lead. The concentrates are made by Frue vanners, which are set rather steep in order to throw some zinc blende into the tailings, and thus avoid a penalty from the smelters. The costs of concentrating, shipping and smelting amount to more than half the gross value of the concentrates. The costs of cyaniding, although very low, when deducted from the yield, show only a small profit on the treatment of the mill tailings.

With the exception of a small pillar of rich ore mined in No. 1 level, all the ore extracted during the year has been mined from the 4th, 5th and 6th levels, all the richer ore, from the oxidised portion of the vein above the 3rd level, having been previously exhausted.

The principal development during the year has been the extension of the 4th, 6th and 10th levels. Down to the 6th level the pay chute maintains its original length, and pitches regularly to the eastward. If this pitch of the pay chute continues uniform, the present faces of the 6th and 10th levels should now be very close to ore, and the 10th level is now being pushed to test this. Should this level strike ore it will mean that there is a block of ground over 400 feet deep which is at present untouched, and which will be enough to keep the mill busy for some years.

During the year, operations were considerably hampered by lack of water power, due to the unusually dry season. Through the winter months the company carried on operations by steam power. Although this increased the cost of working 20 %, it was done in order to keep a force of men available to take advantage of the cheaper conditions of working which will come with the spring and consequent abundance of water.

The mine was operated with about half a crew throughout the year and furnished employment for 90 men.

**Wilcox.** This property was operated continuously during the year by the Broken Hill Mining & Development Company. The company's fiscal year ends in July, and during the nine months constituting the operating portion of the company's first year, 2,400 tons of ore were milled, giving a gross recovery of $38,260. Development was advanced on all levels with satisfactory results, and the production for the first six months of the current fiscal year will be fully up to the best results for a similar period in the previous year. The improvements made during the year consist of an additional tramway to connect the No. 3 level with the mill, and the doubling of the company's milling capacity by the addition of ten stamps from the mill removed from the *Golden Wedge* property in the Slocan District.

**Foghorn.** The Golden Monarch Mining & Milling Co. carried on development during the year with a small crew. The system of development was by means of a long cross-cut, which, as originally outlined, called for the driving of 900 feet. This was advanced all told 1,400 feet without encountering any high-grade ore, and work upon it was abandoned. During the latter portion of the year, surface work disclosed the existence of a body of high-grade ore, lying between what had previously been considered the outcrop of the main vein and the mouth of the long tunnel. An endeavour to locate this body of ore from the long tunnel was successful, a drift being advanced to meet it at a point 600 feet in from the portal of the tunnel. In this drift the owners of the property claim to have 9 feet of shipping galena. The long tunnel also passes through a large body of low-grade galena. This has a width of 46 feet, and samples of the ore give indicated values of $6. Mill tests are being made with the ore exposed, and a concentrator is likely to be erected during the coming summer.

**Dundee.** This mine was operated for a few months during the year by lessees, who extracted two cars of ore averaging $30 to the ton. A new company has been formed out of the wreck of the old Dundee Company. It is announced, with the greatest assurance, that work will be resumed during the coming summer, when the driving of a long tunnel to tap the bottom of the 265-foot shaft will be undertaken.

**Yankee Girl.** Development was pushed on this property during the year by the owners, Messss. Grobe, Lovell, McLeod and Graham. The development consists of a shaft down 37 feet, which has been sunk on a body of high-grade ore. To tap this ore a tunnel has been started. This has been advanced 240 feet, and some good ore has been encountered, from which small shipments are being made. Work was discontinued in the shaft owing to excess of water, but an upraise is being made from the

tunnel level 33 feet below. When work was stopped in the shaft, there was showing in the bottom three feet of ore, assaying $40, in addition to a considerable body of ore which it is estimated would mill about $12.

**Atlin.** On this property the owners completed a cross-cut for 250 feet and put a raise up to connect with the shaft, giving a total depth of 165 feet. The showing consists of a strong vein of milling ore in which small stringers of high-grade ore occur, and from which small shipments are being made. It is announced that the company will move to the *Atlin* the small experimental stamp-mill erected to treat the *Gold Cup* ore.

**Hunter V.** This mine was operated throughout the year by the B. C. Standard Mining Company. The ore deposits occur in what is locally classified as limestone, and consist of gray copper and galena, with native silver frequently showing. The values in the ore are uniformly low, save when they are influenced by excess of silver; but as the property admits of working by glory holes, and exceptionally advantageous smelting rates are secured from the smelters of the Province and that at Northport, a satisfactory showing has been made by the company on the first year's operations, and, with an increased demand for the ore, and cheaper methods of mining, even better results are to be anticipated. The mine is connected with the Nelson and Fort Sheppard Railway by means of an aerial tramway 13,000 feet long, with auxiliary trams, which were completed during the year, to the mine openings. The shipments during the year amounted to 17,168 tons. The grade of this ore was lower than that of the 400 tons which made up the trial shipments from the property, but there were compensating advantages, in the way of excess of lime and lower percentages of silica. In addition to the market available during the year, the company will have the Marysville smelter to ship to during the coming year. The mine has furnished employment for a crew of 20 men during the year.

**Second Relief.** This property was operated during the high-water stage by the owners, Messrs. Finch & Campbell, during which period 3,081 tons of ore were mined and milled, yielding some $12,000 in bullion and 207 tons of concentrates, the return on which was $11,000. While in operation, the mine furnished employment for 20 men. A new company is being organised to take over and operate the property, and it is expected that the spring will see the new owners in control. There is a great deal of ground blocked out in the mine, in which three levels have been run, and the promoters express their intention of operating continuously throughout the year. The difficulty in the past has been that the mine has been saddled with an air compressor far in excess of its requirements, and for a considerable period the water supply has been insufficient to operate both the compressor and the mill, though there is always sufficient water to operate either the one or other. As the ore reserves are sufficient to keep the mill going for a considerable period, the promoters of the new company announce their intention of carrying on development during the high stage of water, and keeping the mill running throughout the year.

The *Ida D.* mine adjoins the *Second Relief*, and is owned jointly by Messrs. Finch & Campbell and J. E. Read. The owners have been unable to reach an agreement for working, and nothing in the way of extensive developement has been accomplished. During the last few weeks of the year, a couple of men took out 30 tons of high-grade ore, upon which smelter returns of $1,857 were received.

**Arlington.** Continuous work was carried on on this property during the year by the Hastings (B.C.) Exploration Syndicate, considerable new ground being opened up. The vein in this property is unduly flat, and necessitates the handling of a great deal of waste, but the ore is rich enough to stand it, and the year's operations

show a good profit on the tonnage handled. Shipments for the year were slightly in excess of 1,000 tons, upon which the net smelter returns were $49,059, the ore values being in gold, silver and lead. The company's fiscal year ends May 31st, and the statement issued shows a shipment for that period of 1,068 tons, the net smelter returns upon which were $47,360. The total cost of mining and teaming of ore to Erie was $32,694.03, leaving a gross profit over mine cost of $14,666.

Although it has been frequently stated that the *Arlington* mine was worked out, the results of the past year's work have completely disproved this, and the mine is claimed to be in a much better position with respect to ore reserves and prospects than at any former stage in its development. During the year employment was furnished for a crew of 30 men.

The *Canadian King* mine was worked under lease by William Connolly for a period of nine months during the year. The working crew was restricted to two or three men, and of the ore extracted about 33 tons were shipped to the Hall Mines smelter, the gross value of which was in the neighbourhood of $50 per ton. The lessee is said to have two more cars of ore ready for shipment. Water hampers work on the property.

The *Keystone* mine was worked during the year by lessees, who shipped three cars of ore to the smelters at Nelson and Trail. The returns on the first car were disappointing, due, it is said, to lax sorting. The close of the year found the lessees with a couple of cars ready for shipment, which, it is said, will yield values approximating $50 to the ton.

**Hydraulic Mining.** A number of companies hold hydraulic mining leases along the north fork of the Salmon, but of these the Erie Placer Company was the only one to undertake systematic work. Considerable money was spent in preliminary work between the months of July and October, in the course of which some very gratifying prospects of coarse gold were encountered. It is the announced intention of the company, as the result of the season's work, to install an hydraulic plant during the coming summer. A little individual placer mining was carried on along the stream, but with indifferent results.

A company, known as the American and B. C. Hydraulic Mining Co., has been formed for the purpose of taking over and operating three hydraulic leases on land near the mouth of Hall creek. Preliminary work will be undertaken in the summer, and if the tests warrant it, the necessary machinery will be installed.

**Queen Mine.** Operations were carried on for nine months by William Waldie, one of the owners, under lease and bond. Considerable discouragement was met with during the earlier months of the lease, but towards the close of the year the lessee got into a good body of high-grade ore. Close upon 600 feet of work was done in advancing the several levels. In the No. 4 level the lessee has developed an ore chute for a length of 70 feet, and the face of the drift is still in ore. Where it has been opened up in the No. 4 level the vein maintains a width of over 6 feet, in some places being 9 feet wide. In this there is a small body of ore which will be shipped crude, the values ranging from $40 to $50 per ton, and the rest of the vein is expected to mill from $12 to $20 in gold per ton. Stoping on this ore was not commenced until December.

Milling was commenced in April, but the value of the mill feed was so low that a loss resulted on the earlier part of the year's operations. The striking of the rich ore early in December resulted in bringing up the mill recovery and established a satisfactory balance on the year's operations. As there are 145 feet of ground above the No. 4 level, the lessee has a good ore reserve in his 70-foot pay chute. This he estimates at 4,000 tons, sufficient to keep the mill going for six months, and from which he estimates to save in all values $15 per ton. This ore is now being stoped the full length of the chute.

For the nine months there were milled 4,846 tons, the values in the amalgam being $28,850.09. From this 187 tons of concentrates were made, the values of which were $4,410.14, making the total values recovered $33,260.23.

A crew of 20 men was worked during the year. During December, Patrick Clark, who has been intimately connected with the development of the Kootenay, secured a short-term option on the *Queen Group* for $80,000, which runs until March.

**Kootenay Belle.**

This property, comprising a group of several claims, was worked under lease during the latter part of the year by George D. and John Bell. They spent upwards of $4,000 in development and uncovered ore in two veins. One vein was prospected by a shaft sunk 26 feet, in which there are 4 feet of ore showing. In this there is a streak from 3 to 6 inches wide, carrying ore worth $50 in gold, and samples of the rest of the ledge give indicated gold values of $20. The second vein has been opened up by means of a 54-foot tunnel run in on a stringer of ore from 9 inches to 2 feet wide, from which high gold values were secured. From the openings made, 91 tons of ore were shipped, the returns from which more than repaid the total expenditures on development. Patrick Clark, through his agent, visited the property, and in connection with taking a bond on it for a very substantial figure bought out the Bell lease. Under the Clark bond a cross-cut was at once started to cut the two veins at depth. This, it is figured, will cut the smaller vein in 25 feet and the second vein, when in all told, 185 feet. The Bell lease runs till July, at the expiration of which a substantial payment falls due on the bond. In the meantime a crew of 20 men is being worked.

In connection with the development of the *Kootenay Belle* and the option on the *Queen*, Mr. Clark's agent has secured bonds upon a number of adjoining properties, and it is said an effort will be made to secure the *Yellowstone* property, which has been closed down for a number of years, and to work all of the claims together. The successful outcome of this venture will mean a great advance for the mining industry, and will in a measure be the outcome of the persistent work carried on at the *Queen*, under very adverse conditions, by William Waldie.

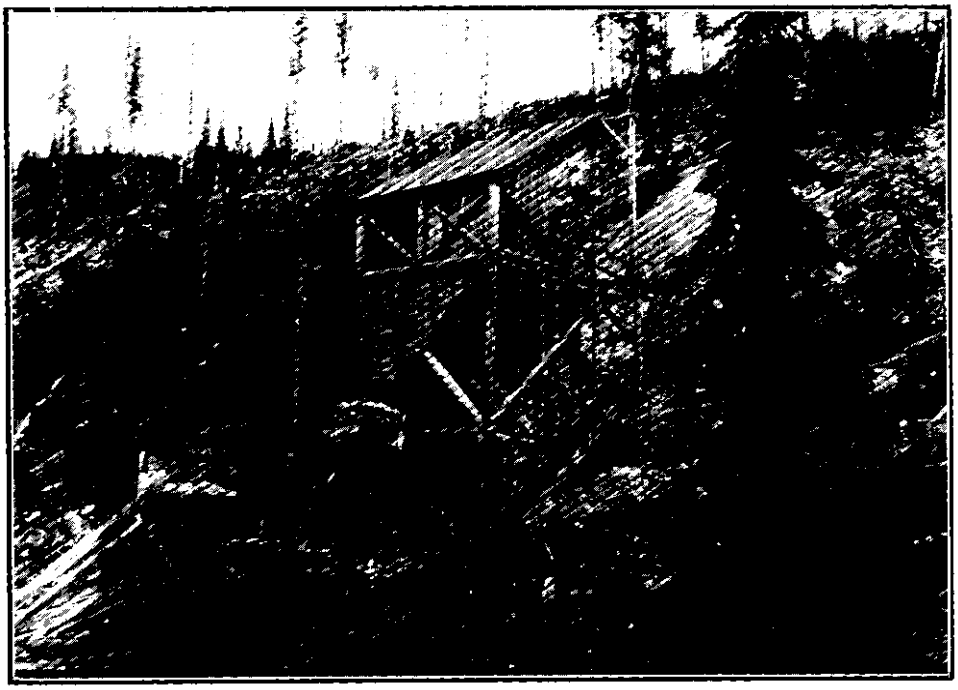
**Porto Rico.**

Operations on this mine were carried on throughout the year by G. H. Barnhardt, who has a three years' lease. During the year the ore extraction treated in the company's mill consisted of 300 tons, the yield from which was $4,500 in bullion, and 19 tons of concentrates, the net smelter returns on which were $540. In development the No. 4 adit was advanced 100 feet, and with another 100 feet it is expected to strike the pay chute. This will be undertaken in the spring. Throughout the winter a crew of five men was employed in stoping ore from the upper workings, and they are expected to get out a sufficient tonnage to warrant milling when the spring opens.

In the No. 1 level there is considerable ore yet to be taken out, the vein showing 12 inches of ore that will average $40 to the ton. In the No. 2 level there was a lens of ore that went down through the floor. This did not come into the No. 3 level, which was run 146 feet below the No. 2. Sinking on this ore has been started and a foot of ore has been developed to a point midway between the two levels. The lessee intends also to develop the veins past the fault which cut off the ore in the upper workings.

**Fern Mine.**

Work was carried on at the *Fern* under the Rammelmeyer lease during the early months of the year, when the ore stoped out during the previous winter was run through the mill. The result was very disappointing. The mill saving on the ore was very little in excess of $3 per ton, and not sufficient to pay tramming and milling charges. Later in the year a second lease and bond was secured on the property by Spokane men. They commenced work in December with a crew of 14 men.



UPPER TERMINAL TRAMWAY-HUNTER V. MINE.

LOWER "GLORY HOLE," HUNTER V. MINE, NELSON M. D.

**Alice Mine.** Work has been carried on throughout the year by the Alice Broughton Mining Company. The development accomplished consists of 700 feet of drifting, 160 feet of cross-cutting, 185 feet of raising, and 50 feet sinking. This has given 890 feet of work on No. 1 level, of which 750 feet is upon the vein, the average width of which is from 2 to 3 feet. On No. 2 level there has been about 1,000 feet of work, 540 feet of which is cross-cutting and the balance on the vein. On this level a stope has been opened up for 75 feet. In addition to these two levels there is also an intermediate, on which 230 feet of drifting has been done, and a stope opened on the south end.

During the year a concentrator, with a nominal capacity of 50 tons per day, has been erected and connected with the mine by means of a Riblet tramway 5,400 feet in length. In the milling 5 tons are worked into one, making a concentrate containing 70 % lead and about 24 oz. silver. Milling was commenced in September, but the results were not satisfactory, while working in excess of 35 % of the mill capacity. Milling operations were carried on intermittently until late in December, when the mill was allowed to freeze up, and further work was suspended. During this period 1,400 tons of ore were milled, and of the concentrates made, 113 tons were shipped to the smelters at Nelson and Trail. Exclusive of the men employed in construction, the mine and mill furnished employment for a crew of 21 men. It is said that some alterations will be made in the mill in the spring, so as to increase its capacity, as a limited mill run seriously interferes with the earning profits of the mine.

**Bayonne.** Work on this mine was carried on during the last six months of the year by a Butte, Montana, Syndicate, as a result of which the property was purchased at a price in the neighbourhood of $70,000. A good body of ore has been opened up, which it is believed can be milled. As the property is some 23 miles back from Kootenay lake, with a trail as its only means of communication, the treatment of the ore on the ground is essential to its profitable working. A crew of 15 men has been employed throughout the winter on development, and the results secured are deemed sufficiently important to warrant the owners of the property in expending $30,000 upon a waggon road. This must be built before a mill can be taken in to the mine.

OFFICE STATISTICS—NELSON MINING DIVISION.

| | |
|---|---|
| Free miners' certificates (ordinary) | 948 |
| " " (companies) | 18 |
| " " (special) | 3 |
| Certificates of work | 660 |
| Money in lieu of work | 1 |
| Locations, mineral | 310 |
| " placer | 20 |
| Placer leases | 7 |
| Transfers, etc. | 127 |
| Certificates of improvement | 66 |
| Water records issued | 15 |
| Pre-emption records issued | 41 |
| Certificates of improvement | 7 |
| Certificates of purchase | 40 |
| Crown-granted claims on tax roll | 733 |

## ARROW LAKE MINING DIVISION.

### REPORT OF WALTER SCOTT, MINING RECORDER.

I have the honour to submit my annual report on the Arrow Lake Mining Division for the year ending December 31st, 1904.

There has been more activity in mining, and, if all goes well, three mines ought to be shipping next year.

On the *Monarch Group*, consisting of the *Monarch*, *Empress*, *Delenger*, *Anna S.*, *Maple Leaf*, *Ontario*, and *Forest Chief*, a cabin was built upon the *Monarch* claim, and a rawhide trail completed a distance of eight miles to the lake. Four men have been doing development work upon the *Monarch*, which is showing up well, a width of 18 feet going from 35 to 45 per cent in zinc. The owners are ready to ship as soon as the Canadian Pacific railway builds a wharf at the mouth of Pingston creek. This, I understand, is going to be done shortly. A part interest in these claims changed hands for a considerable sum. There are 21 claims located upon the vein, all showing zinc. It is a great deposit of low-grade ore, with a width of 300 feet.

The owner of the *Millie Mack* claim has done considerable development work this season. A rawhide trail was built nine miles from Mineral City to the mine, and at the same time a force of men was working upon the property. There is a large quantity of ore upon the dump ready for shipping as soon as the trail gets in order for rawhiding.

The *Meadow Group* consists of the *Meadow*, *Skylark*, *Shakespeare*, *Boita* and *Davenport*. Two men have been working all summer on the *Meadow*, on which there is a good showing of ore. There is upon the dump some 80 tons of ore, which will be shipped next summer.

### OFFICIAL STATISTICS—ARROW LAKE MINING DIVISION.

| | |
|---|---|
| Number of mineral claims recorded | 17 |
| Certificates of work issued | 52 |
| Bills of sale, etc., recorded | 9 |
| Free miners' certificates issued | 60 |

# SLOCAN DISTRICT.

## AINSWORTH, SLOCAN AND SLOCAN CITY MINING DIVISIONS.

Report by W. F. Robertson, Provincial Mineralogist.

The Slocan District, as the term is used with relation to mining, includes the Ainsworth, Slocan, and Slocan City Mining Divisions, each of which has its own Recording Office and Mining Recorder, while the whole district is under the jurisdiction of Mr. E. E. Chipman, as Gold Commissioner, with office at Kaslo. The Slocan District is the silver-lead district of British Columbia, and within its boundaries is mined most of our output of "silver-lead" ores, and also the "dry" silver ores, although East Kootenay produces more "lead-silver" ore than does the Slocan.

The area from which the actual production of ore is made is not as great as the geographic boundaries of the district would seem to imply, for most of the mines are towards the heads of the creeks which radiate from the central range of mountains forming the divide between Kootenay lake, Kootenay outlet and Slocan lake, so that a circle 20 miles in diameter would include most of the silver-lead mines and also most of the "dry" silver ore producers.

The geological formation of the district, speaking generally, may be said to be a belt of dark slates and allied sedimentaries, flanked and often penetrated by more recent granite upheavals, the whole being cut by numerous dykes of still later origin. The galenas occur in the slates, usually associated with igneous dykes, while the dry ores are in the granites, or in the slates near the granite contacts.

The output of the district this past year will show an increase over the preceding year, but, the district has not, as yet, recovered the high standard reached in 1897 and maintained until 1902. The condition of mining in the district is, however, better even than the increased output would imply. Formerly, all visible ore was taken out as quickly as possible, and development was largely left to take care of itself, to which system the mines lent themselves most readily, as in many cases shipping ore was encountered at "grass roots," and followed down or into the hill. The inevitable day of reckoning came, finding the mines generally short of proper development. This is only now being caught up with, and receiving the attention necessary to keep the camp up to anything like a uniform production.

Only recently has the value of the zinc blende, which accompanies much of the galena, been recognised, and serious attempts made to save it. Most of the mills have, within the past two years, been altered with a view to saving the zinc concentrates, and this is now being done; but the market for such concentrates has not as yet taken a definite standard of price, partly because there is no general standard of concentrate produced, and each mine has to seek out its own market, and further, because, speaking generally, the ore is not as yet properly prepared to meet the general requirements of the zinc ore market.

This matter is, however, receiving careful attention, now that the point is recognised, and "zinc enriching" plants for custom ores are under way on both Kootenay and Slocan lakes, while certain individual mines contemplate erecting plants of their own. Formerly, the zinc shipped with the galena, when in excess of about 10 %, was a source of "penalty" by the lead smelters, so that any reduction in this penalty, effected by the separation, must be regarded as just so much to be credited against the cost of the separation.

The zinc concentrates will average about 25 ounces of silver to the ton, and as yet no adequate price has been offered for this silver, as is evidenced by the fact that all the mills throw zinc into their galena up to the penalty limit (10 %), for which zinc they get no pay, but they do get a price for its silver contents.

There is as yet no zinc extraction plant in the Province, and such sales of ore as have been made have been for delivery in Kansas or in Europe. Ore-buyers for these points have been over-running the district this past year, and, naturally, not offering for the ore any higher prices than they were obliged to, and these have, as a rule, not been acceptable to the mine-owners, who prefer to hold the ore for the present; which policy seems to have been justified, as one of the largest producers, in a letter recently received, reports that he has recently made sales at prices 50 % in advance of what he was offered during the past summer for the same ore.

With all the mines at present operating—except the *Lucky Jim*, of Bear lake—zinc ore is strictly a bye-product, although in the *Slocan Star* the tonnage of zinc concentrates is three times that of the galena produced. Until a satisfactory market is obtained and is on a settled basis, it is impossible to do more than guess what the zinc output of the district will prove to be; for, until lately, zinc has been a thing to be avoided rather than developed.

The bounty on lead mined, given by the Dominion Government, though it has not in the Slocan proper increased the output to the extent which was hoped for, has nevertheless been of great assistance to the mines working, and has, moreover, encouraged the accomplishment of an amount of development which would otherwise probably not have been undertaken. And this is, after all, about all that could be expected, for an increase in production is impossible until the development, which fell so far behind during the years of depression, is caught up with, and this will take at least another year to accomplish.

Aside from the general development noted, the most encouraging feature of the mining in the district was the numerous small properties being worked under lease or tribute by individual miners; and while each of these units is small in itself, collectively they are important, and promise in the future to be an important factor in the output of the district, at the same time constituting a form of development bound to lead to new discoveries of ore, either on new properties or on the properties being worked. In this district some 60 mines have reported their output during the past year—a greater number than is found in any other district in the Province. In the detailed reports on the different mining divisions of the district will be found descriptions of many of the individual properties.

## AINSWORTH MINING DIVISION.

Ainsworth Mining Division may properly be said to be the starting point of metalliferous mining in the Kootenays, the success of the earlier mines there stimulating prospecting, which extended over the divide into the Slocan, to Nelson and Rossland, and thence to the Boundary District. This expansion, coming so close on the heels of the first discoveries, and being synchronous with the development of the Ainsworth Division, the claims of that district in this respect are often overlooked.

The first mine to be worked in the Kootenays was the *Blue Bell*, situated on the east shore of Kootenay Lake, opposite Ainsworth, or the "Hot Springs Camp," as it was called in the early days. In those days silver was worth over a dollar an ounce, and the mine giving great promise, a smelter was erected at Pilot Bay. The *Blue Bell* contained an abundance of ore, and does yet for that matter, but the working of the deposit proved that the ore was of a

lower grade than was expected, containing only from 4 to 8 ounces of silver to the ton, and this was followed by a drop of about 50 per cent in the value of silver, which closed down this property along with many others in this district.

With this, the prime importance of the camp became overshadowed by the Slocan, where ore bodies rich in silver were found almost at "grass roots," so that mining in Ainsworth languished until, in 1902, less than 5,000 tons of ore was mined, having a gross value of about $273,000, or about $55 a ton.

This was the lowest ebb in mining, as far as tonnage was concerned, for about that time concentrators came into use, rendering possible the working of low-grade deposits, and in 1903 the tonnage of the district rose to nearly 25,000 tons, having a value of $220,000, or about $9 a ton. This tonnage was produced from nine mines, of which, however, only two produced over 100 tons during the year.

The Dominion Government bounty on lead mined has had a very stimulating effect on the mines of the district, and a number of properties have, during the past two years, been developed to an extent which, although it has not as yet increased the tonnage of the district, promises to do so within the coming year.

### Ainsworth Camp.

In the Ainsworth, or old Hot Springs camp, there was only one property, the *Highland*, doing productive mining in 1904, although the old *No. 1* mine shipped part of a car-load during the early part of the season.

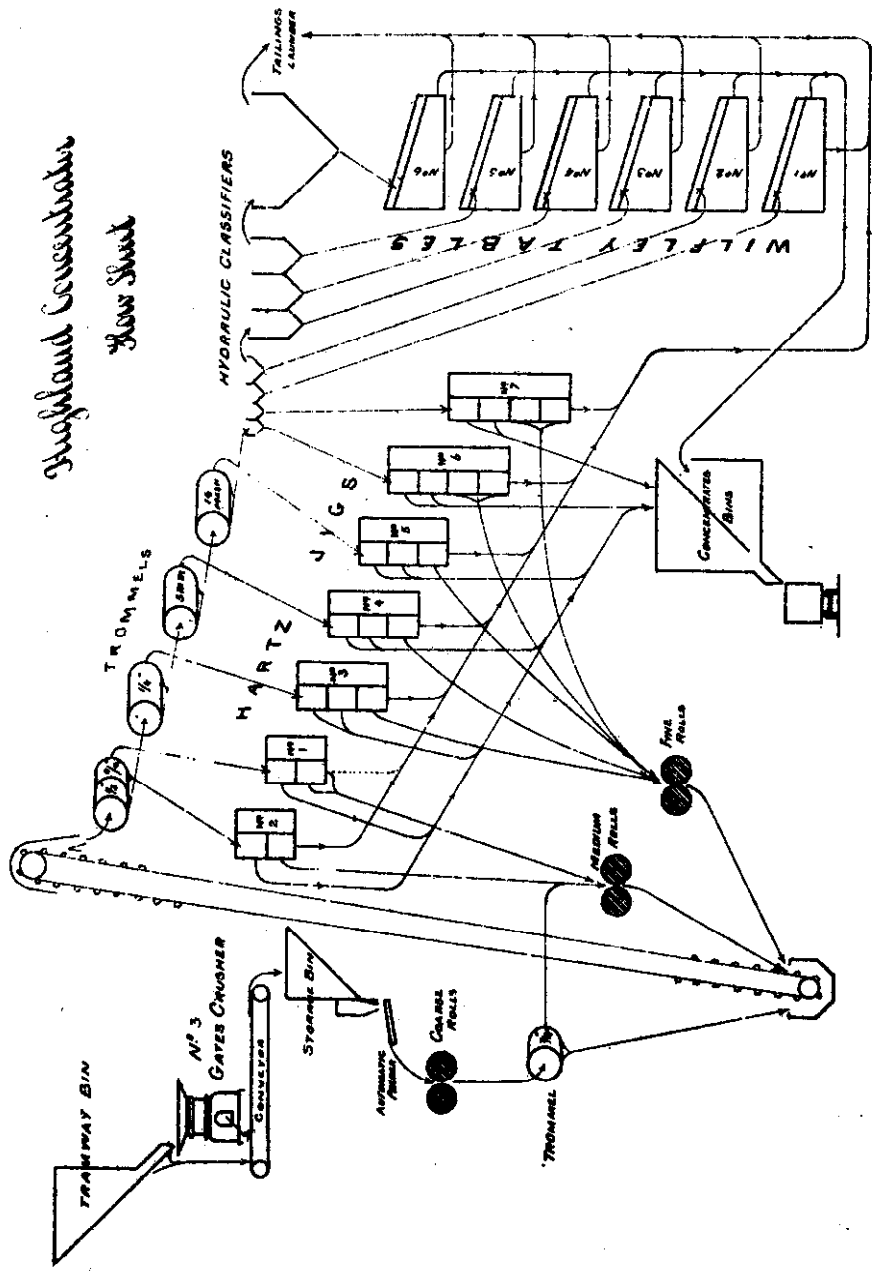
**Highland Mine.**

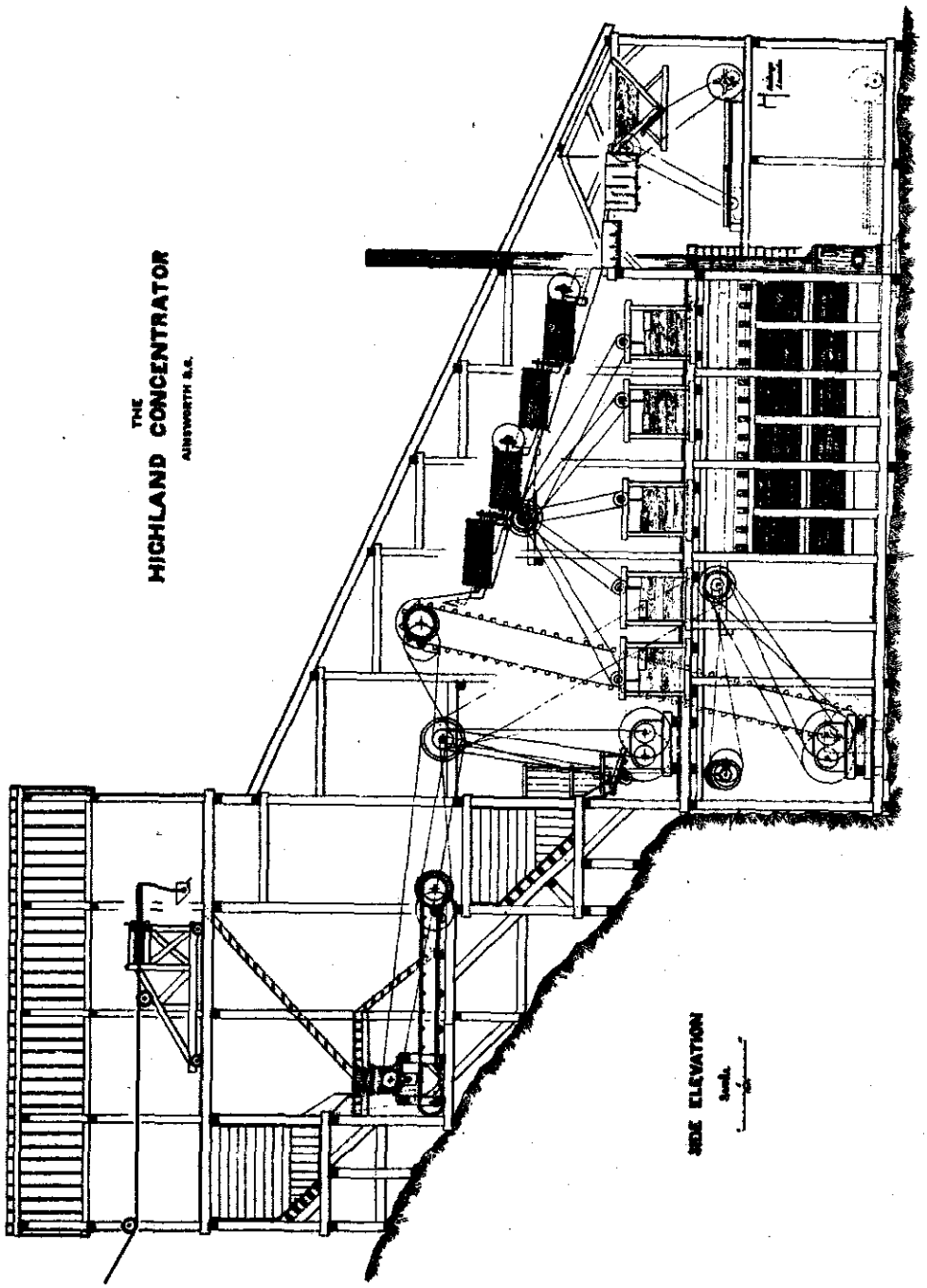
The *Highland* mine is owned by the Highland (Kootenay, B. C.) Mining Co., Ltd., of London, England, and is under the management of Mr. Norman Carmichael, of Ainsworth and Nelson. This property had the distinction, in 1903, of being the largest producer of lead in the Province, but this year it has been eclipsed by the *St. Eugene*, of East Kootenay. The mine is situated about two miles north of the town of Ainsworth, and at a distance of some 4,700 or 5,000 feet from the lake, and at an elevation of about 2,000 feet higher. The property is essentially a concentrating proposition, although a small quantity of ore is mined of a grade high enough to be shipped direct. The ore is essentially a quartz, carrying galena with low silver values, and also a small percentage of pyrite, pyrrhotite and zinc blende. The silver values are practically all carried in the galena, and no attempt is made to save any of the other minerals. The galena carries from $\frac{1}{3}$ to $\frac{1}{2}$ an ounce of silver to the per cent. of lead, the concentrates shipped running about 70 per cent. lead and from 20 to 25 ounces in silver. The ratio of concentration varies from 1 to 7 to 1 to 10, depending upon how carefully the mining is carried on.

The mine has been opened up for a vertical height of from 400 to 500 feet by a series of adit tunnels and cuts, the tunnels extending into the hill for several hundred feet. The ore from all the workings is delivered by chutes to the lowest level, from which it is trammed to the upper terminal of the aerial tramway, by which it is transported to the concentrator, situated on the shore of Kootenay lake. The quartz vein is of considerable, though variable, width, cutting through a country rock of clay, shales, etc., very much contorted and probably disturbed.

As far as could be observed, the ore appears to run in chutes in the vein, not following any defined law, although the vein seems to be traceable on the surface for some distance from the present workings, cutting the formation with much apparent regularity.

The mining was being done under the contract system by A. Cortiana, at a priced based upon a ton of concentrates produced at the mill, a system which renders it very much to the


Highland Surmise
Low Shaft
HYDRAULIC CLASSIFIERS
TAILINGS LAUNDER
WILFLEY TABLES
JIGS
HARTZ
TROMMELS
CONCENTRATES BINS
FINE ROLLS
MEDIUM ROLLS
COARSE ROLLS
STORAGE BIN
No. 3 GATES CRUSHER
TRAMWAY BIN


THE
HIGHLAND CONCENTRATOR
SIDE ELEVATION

interest of the contractor to send down *ore* rather than *rock* (the usual trouble with mining by contract), but, at the same time, leaves the contractor subject to the variances of the contents of the ore as work progresses.

The mining in the stopes was done by single-handed work, removing a cut of the softer hanging-wall and then shooting down the ore on the filling previously produced, which is supported, where necessary, on stulls. At the mine about forty men were employed underground, and ten above ground. There are excellent buildings at the mine for the accommodation of the men, and also a good office building.

The following is a statement of the work done in the mine during the year 1904:

| | | | | | |
|---|---|---|---|---|---|
| Sinking and raising, done during year 1904, | 426 | feet. | Done up to date, | 1,013 | feet. |
| Drifting and cross-cutting " | 780 | " | " | 3,719 | " |
| Total for 1904, | 1,206 | | Total to date, | 4,732 | |

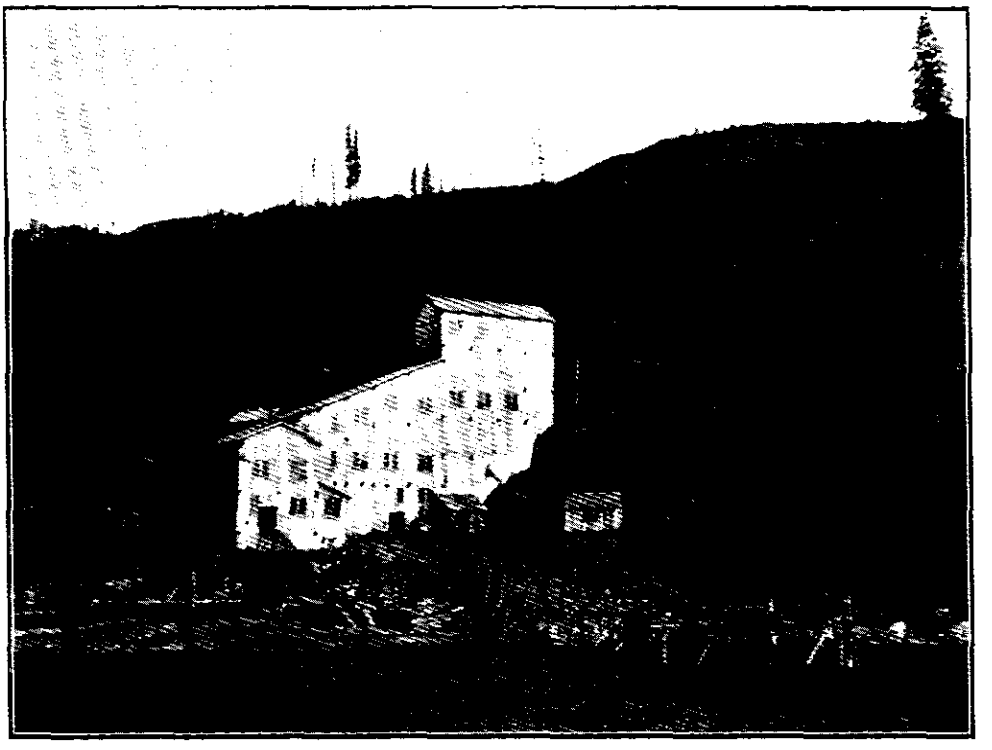
The mill is situated on the shore of the lake at the lower terminal of the aerial tramway, and is provided with excellent shipping facilities, a dock reaching out to deep water in the lake and connecting with the mill by a short three-rail gravity tramway. The mill was designed and built in the latter part of 1900, by Mr. E. R. Woakes, and has a nominal capacity of 100 tons a day. It is one of the best-lighted, most roomy, and convenient mills in the Province, and is, with the rest of the plant, kept in excellent condition by the present manager, Mr. Carmichael. A sectional elevation drawing of the mill and a "Flow-sheet" are given herewith, which convey a better idea of the mill than can any worded description. These have been kindly provided by Mr. Carmichael, and were originally prepared by him for Mr. Woakes.

The plant is operated by water-power, under a head of 450 feet, a 48-inch Pelton wheel being placed on the top floor, the waste water being used for concentration purposes. As shown in the sketch, this motor drives the crushing plant, elevator, jigs and trommels, a separate Pelton, 24-inch diameter, being provided for the Wilfley tables, while a 12-inch Pelton operates an electric light dynamo. The crushing plant consists of a Gates crusher and three sets of rolls, all of the same size and pattern (Gates Iron Works), so that the parts are interchangeable. The coarse rolls run at 85 revolutions, the medium at 95 revolutions and the fine at 105 revolutions a minute. The concentrating machinery consists of two coarse or "Bull" jigs, three 3-compartment and two 4-compartment jigs, and six Wilfley tables, with hydraulic classifiers of the Lake Superior V shape, settlers, etc. The total cost of the plant complete was:—

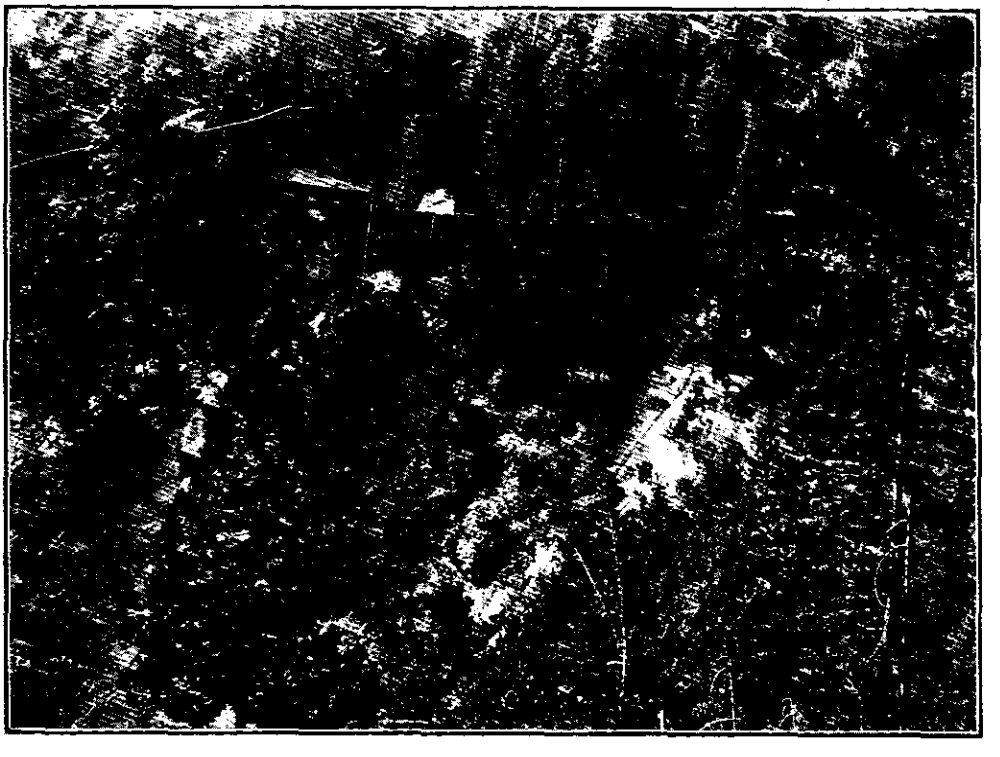
| | |
|---|---|
| Machinery and hardware | $16,693 35 |
| Freight and duty on above | 4,126 98 |
| Lumber, 290,400 feet B.M. | 3,590 66 |
| Wages and salaries | 11,555 07 |
| Total | $35,965 76 |

The crushing capacity of the mill is such that ore for the 24 hours could be crushed on the day shift only, but the mine does not now produce sufficient ore to permit of this arrangement, so the mill was being run on one shift only, under which arrangement the cost of concentration was about 30 cents a ton of ore milled. The plant is operated by a mill foreman and three men. The percentage of extraction obtained by the mill is about 80 to 85 per cent of assay values.

The following tables, showing values recovered and costs of operation, also show the bounty earned, without which this property could not have been operated to a profit, at the present market value of lead ore:—



HIGHLAND CONCENTRATOR, AINSWORTH.



ARGENTA MINES--HAMILL CREEK, AINSWORTH M. D.

# TABLE "A."

## Showing Summary of Monthly Shipments for Twelve Months ending 30th September, 1904.

| | Net dry tons. | Assay Value. | | Prices Ag. per oz. | Net Pb. per 100 lb. | Value. | | Total Value. | Freight and Treatment.* | Net Value. | | Bounty Amount. | Per ton. | Total Net Value per ton. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Silver. ozs. | Lead. % | | | Silver. | Lead. | | | Amount. | Per ton. | | | |
| 1903, Oct. —Ore and conc'ts. | 276.20 | 30.8 | 73.6 | 55½ | 1.431 | $4,552 96 | $5,512 56 | $10,065 52 | $4,143 00 | $5,342 50 | $19 34 | $3,051 17 | $11 05 | $30 39 |
| ,, Nov. —Concentrates .. | 109.33 | 23.0 | 71.7 | 57⅞ | 1.566 | 1,383 83 | 2,207 98 | 3,591 81 | 1,639 97 | 1,951 84 | 17 85 | 1,174 96 | 10 75 | 28 60 |
| ,, Dec. — ,, .. | 137.93 | 23.9 | 71.4 | 54⅜ | 1.66 | 1,709 21 | 2,944 91 | 4,654 22 | 2,683 18 | 2,508 10 | 18 74 | 1,478 37 | 10 72 | 29 46 |
| 1904, Jan. — ,, .. | 197.16 | 22.3 | 70.3 | 55½ | 1.593 | 2,306 86 | 3,974 38 | 6,281 24 | 2,957 37 | 3,323 87 | 16 35 | 2,079 08 | 10 54 | 26 89 |
| ,, Feb. — ,, .. | 198.10 | 21.1 | 66.4 | 55½ | 1.529 | 2,208 44 | 3,612 10 | 5,820 54 | 2,971 45 | 2,849 09 | 14 38 | 1,973 83 | 9 96 | 24 34 |
| ,, Mar. — ,, .. | 271.01 | 23.1 | 70.4 | 58¾ | 1.498 | 3,451 05 | 5,146 08 | 8,597 73 | 3,990 03 | 4,607 70 | 17 00 | 2,862 75 | 10 57 | 27 57 |
| ,, April— ,, .. | 309.78 | 23.3 | 68.4 | 58½ | 1.525 | 4,019 32 | 5,814 07 | 9,833 39 | 4,509 09 | 5,324 30 | 17 18 | 3,177 07 | 10 25 | 27 43 |
| ,, May — ,, .. | 301.23 | 22.0 | 72.2 | 57 | 1.525 | 3,594 29 | 5,976 93 | 9,571 22 | 4,386 97 | 5,184 25 | 17 00 | 3,266 10 | 10 84 | 27 84 |
| ,, June — ,, .. | 285.10 | 20.3 | 66.8 | 57¾ | 1.566 | 3,155 35 | 5,347 35 | 8,502 70 | 4,130 24 | 4,372 46 | 15 35 | 2,856 15 | 10 00 | 25 35 |
| ,, July — ,, .. | 236.22 | 22.0 | 71.6 | 58 | 1.768 | 2,871 99 | 5,384 30 | 8,256 29 | 3,411 57 | 4,844 72 | 20 51 | 2,537 85 | 10 74 | 31 25 |
| ,, Aug. —Ore and conc'ts. | 286.64 | 23.9 | 66.7 | 59⅛ | 1.795 | 3,851 24 | 6,174 14 | 10,025 38 | 4,217 88 | 5,807 50 | 20 26 | 2,866 36 | 10 00 | 30 26 |
| ,, Sept. — ,, .. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Totals and averages— Ore and concentrates ... | 2608.74 | 23.3 | 69.8 | 57½ | 1.593 | $33,105 14 | $52,094 80 | $85,199 94 | $38,426 53 | $46,773 41 | $17 93 | $27,323 69 | $10 47 | $28 40 |

* $14.73 per ton.

COST OF OPERATING THE HIGHLAND CONCENTRATOR.

October, 1903, to September, 1904.

| | Cost per Ton. | | | Tons Milled. |
|---|---|---|---|---|
| | Labour. | Supplies. | Total. | |
| Running cost | $0.2303 | $0.0213 | $0.2516 | 17,690 |
| Repairs and renewals | .0555 | .0934 | .1489 | |
| Tools | .0083 | | .0083 | |
| Permanent improvements | .0100 | .0104 | .0204 | |
| Additions to plant | .0030 | .0015 | .0045 | |
| Water power, maintenance | .0152 | .0050 | .0202 | |
| Loading wharf, " | .0076 | .0090 | .0166 | |
| Total | $0.3299 | $0.1406 | $0.4705 | |

The above cost of repairs, renewals and supplies is the total of the ex-store charges for the period, and is misleading. The following figures show the actual cost more correctly, taking the total tonnage treated by the concentrator and debiting the value of the new wearing parts at the beginning, and crediting the estimated value of the wearing parts in partially worn condition at the end of period, we have, for 39,418 tons treated, a cost per ton of $0.1425, analysed as follows :—

| | |
|---|---|
| Crusher | $0.0195 |
| Rolls | .0495 |
| Trommels | .0191 |
| Jigs | .0091 |
| Tables | .0000 |
| Launders | .0066 |
| Elevators | .0096 |
| Belting | .0074 |
| Dynamo | .0029 |
| General | .0188 |
| Total | $0.1425 |

**Highlander Mine.**

The Highlander Mining & Milling Co., of Philadelphia, under the management of Henry M. Stevenson, has been operating for the past five or six years on a group of claims about two miles south of the town of Ainsworth. The group includes the *Little Donald*, *Black Diamond*, *Highlander*, *Eagle* and *Ivanhoe* claims, and extends from the shore of Kootenay lake well up to the top of the hill, about 1,300 feet above the lake, as was described by the writer in the Report of 1899. The three mentioned claims first were worked at that upper point, producing some very good galena ore carrying moderate values in silver. The veins ran more or less parallel with each other and with the lake shore, that is north and south, and dipped to the west or into the hill. To cut all these leads at a depth of about 1,000 feet below the old workings, the company

started, in 1899, a long cross-cut tunnel from the *Eagle* claim about 300 feet above the lake level, which, it was calculated at the time, would have to be run 2,000 feet before it would cut the *Highlander* lead, if this lead extended down that distance. This tunnel was driven in by compressed air supplied from the Taylor air compressing plant on Coffee creek, and was 8 by 8 feet in the clear, inside of the timbers, which were of sawn lumber, 12 by 12 inches, with 2 by 12-inch sawed lagging. It was not found necessary to carry the timbering far, as the rock roof was found to be good. It must be admitted that this tunnel proposition was looked upon by mining men at that time as, to say the least, a very "venturesome undertaking."

The tunnel, however, has since been driven in over 2,600 feet and has cut the *Highlander* and two *Black Diamond* leads, and has thereby proved one point, very important not only to this property but to the whole district, namely, that the leads do go down for a considerable distance, and the workings show that they carry galena to that depth.

The property was visited in July last, and it was found that, at about 2,000 feet from the portal, a strong lead has been struck, which, from its position, is in all probability the *Highlander* lead that was developed 1,000 feet higher up. This lead is essentially a quartz vein, in which occur lenses of galena of greater or less size. From the tunnel, drifting has been done to the north and south on this lead; to the south for a considerable distance, estimated at about 500 feet, in which length three or four ore-bodies were cut and slightly developed, which, from their appearance in the floor and roof of the tunnel, certainly give promise of considerable extent. For some reason not made public, the company has not given these ore-bodies the development which their appearance would seem to justify, and their extent is, therefore, somewhat a matter of speculation.

The main tunnel was being pushed ahead by two shifts of men, using air drills, and while, at the time the property was visited in July, no further leads had been cut, the following extract from a letter received by the Provincial Mineralogist from Mr. Stevenson tells of continued success:—

"Since you were at Ainsworth in July, and examined the *Highlander* and *Black Diamond* properties, I have cross-cut two of the veins on the *Black Diamond*, the first, at a distance of 2,520 feet from the mouth of the tunnel, being 20 feet in width, and the second, at 2,610 feet, about 6 feet in width. Both veins have first-class indications, carry values in silver, and contain some zinc and lead mineralisation. The dip of the formation changed after you were there, and is now running 26° to 28° west, instead of about 48° west, as it was in the *Highlander*. I expect to be back at Ainsworth within two months, at the latest, and shall probably start to ship from the *Highlander* then."

The company is not using its mill nor making any shipments, but it is understood that active mining operations will shortly be resumed.

*No. 1* mine, which has been worked intermittently for the last few years, under the management of Mr. Leander Shaw, shipped about a carload of ore during the first part of the season. Mr. Shaw has since left the camp, and the property is now under the management of Mr. H. Giegerich, of Kaslo.

### Woodbury Creek.

Woodbury creek flows into Kootenay lake from the west, about half way between Ainsworth and Kaslo, and is one of the important creeks of the district. On this creek are situated a large number of mineral claims, from which some exceedingly fine samples of ore have been obtained, and a number of properties which have been developed into mines of considerable promise, and from which a quantity of good ore has been shipped.

From the steamboat landing on the beach, many years ago a trail was built, which runs all the way up the creek to the glaciers at its head, but which, having been carelessly laid out and constructed, was found to be in very poor condition. This matter was, however, being rectified by the Government trail force, and what will be practically a new trail was nearing completion.

At the mouth of the creek there is a concentrator of a nominal capacity of 50 tons a day, which was built by the Canadian Pacific M. & M. Co., and which was described in the Report of 1899, but it is reported that it has stood idle since that date, the mines belonging to the company, and situated a short distance up the creek, not having proved successful.

**Baltimore Group.**

The only property which actually shipped any ore in 1904 was the *Baltimore Group*, which consists of six claims, the *Baltimore*, *Chance Fract.*, *Maple Leaf*, *Grafton*, *Foothill* and *Nipper*, and is owned by the English Brothers and Stott, of Kaslo. The property is situate about seven miles from the lake, on the north slope of the valley of Woodbury creek at an altitude of 6,700 feet, or, approximately, 3,000 feet above the creek bed, and is reached from the creek trail by an excessively steep and poorly built trail. About 20 tons of ore were packed out from the *Baltimore* in 1902, and in 1903 no shipments were made, while in 1904 only about 5 tons were packed down to the lake, the ore in this shipment assaying, however, about 400 ozs. silver to the ton. The development work has been done on a well-defined quartz vein, cutting through a country rock of schist and shales. The vein has a strike S. 70° W., and a dip of almost 80°.

The ore has been taken out mostly from shallow workings, within 25 feet of the surface, along the outcrop of the vein, but a shaft is down 110 feet, connecting with an adit level below, 220 feet long on the vein. From, and above, this level a raise has been started which was up 12 feet, and a stope 10 feet high by 20 feet long had been made, both in what was apparently a continuation of the pay chute of the upper workings. Along the side of the shaft stoping had been done on one side to a depth of 25 feet, and about 30 feet from the shaft, and on the other side of the shaft, to a depth from the surface of 50 feet by 30 feet wide.

The ore is essentially galena in quartz, but as the vein is much crushed and soft, much of the lead in the upper portions is in the form of carbonates. The "pay streak" in the vein is not clearly defined, but was estimated at about 6 inches wide. The workings extend along the vein for 200 or 300 feet, but the vein has been traced for a long distance on the surface by shallow cross-cuts and pits. There is little good timber in the immediate vicinity of the mine, but there is plenty in the valley below. There is a good cabin on the property, but no water.

**Pontiac and Tecumseh.**

The old *Pontiac* and *Tecumseh* properties, mentioned in the Report for 1899, have recently been taken over by the Nelson and Slocan Development Company, an Eastern Canadian company, and are now being developed under the local manager, Mr. C. F. Caldwell. As was then reported, some 200 tons of sorted ore had been packed out from the old workings, most of which had been mined by an English syndicate which had a bond on the property, and in taking out this ore no regard had been paid to timbering, so that three tunnels had caved in.

These claims are on the south slope of the creek valley, at an elevation of about 6,800 to 7,000 feet above sea level. There is a well-defined and persistent quartz vein traced through six or eight claims in a general S. 20° W. direction, and on the *Pontiac* claim this is cut and faulted by a strong igneous dyke, the vein being, however, found intact on both sides of it. The old levels have not been re-opened or worked, but the company is driving a lower tunnel, which should be under the ore chute found in the old workings.

In driving this tunnel, two small quartz veins were cut, containing high values. These are distinct from the main vein and have not been tested by development, other than stated, but from their appearance, and the values obtained, give much promise. There are several openings on the vein, and in several places small bodies of high-grade ore are shown up, which would pay to ship direct if there was a waggon road, but the grade is scarcely high enough to leave much margin if packed out by horses. At a rough estimate, this ore, as developed, might amount to from 500 to 1,000 tons. With these bodies of first class ore are connected, apparently, quite extensive bodies of second class ore, that is, ore mixed with quartz, too low grade to ship until concentrated, which must be done on the spot, a plan which the Company has in view, for the property is essentially a concentrating proposition, and a mill could be located in the valley bottom of the main creek and the ore taken down by aerial tramway.

Whether this plant will be built or not is understood to be dependent on what success is met with in the lower tunnel, now being driven; but from the extended development and the appearance of the exposures and dump, it would seem that the expenditure for such a plant would be justified, in which case a waggon road will first have to be built from the lake shore, unless, as it is rumoured there is a possibility of, the company operating at the head of the creek puts in an electric tram line. There were about six men working about the camp.

In close proximity to this main vein are several other veins and properties, giving much promise, but as yet having little proved by development.

Continuing to the south-west from the *Pontiac*, over a dividing ridge into the next basin, there is a string of connected claims, the *Daniel*, *Scranton*, *Mingo*, *Grand View*, *Sunrise* and *Granite*, all presumably on the same main vein.

On the *Daniel* the vein is reported as being light and containing little mineralisation other than iron sulphides.

Scranton.

On the *Scranton* a couple of men were working, the vein showing up strongly, and being well mineralised with iron pyrites and some solid galena, which showed in one place 12 inches wide for 20 feet. The selected ore is reported by Mr. Caldwell, the manager, to assay 70 % lead, 70 oz. silver, and $10 in gold, which latter is associated with the pyrites. The conditions are somewhat similar to those found on the *Pontiac*, although not nearly as much work has been done. This main vein, or a similar one, has been traced more or less connectedly throughout most of the other claims mentioned, by shallow workings or open cuts, in which some good ore was uncovered.

Some two or three miles further up the main creek, at its head, among permanent glaciers, the King Solomon mines, an American syndicate, has taken up a large number of claims, which are being surveyed and Crown-granted as fast as the requisite amount of work can be done, and for this work a number of men were employed most of the past summer. This camp was not personally inspected, as time did not permit, and the work is reported as being scattered, apparently with the requirements for Crown-granting in view before the actual development of ore-bodies is undertaken, a plan which has the merit of avoiding adverse litigation.

The claims, as surveyed, are partly on the glaciers and at an elevation which renders the working season above ground very short, which difficulty would be somewhat obviated by underground workings. The management appears to be very well satisfied with the general outlook, and some very good samples have been brought out.

On the lower portion of the creek there are a number of claims on which assessment work is being performed, and some small amount of development is being done at intervals, but no regular work was being carried on.

SOUTH FORK, KASLO CREEK.

The south fork enters Kaslo creek from the south-west about six miles from Kootenay lake, at Kaslo, that is, at Six-Mile station on the K. and S. Railway, from which point a fairly good waggon road has been built up the south fork for about six miles. On this creek a great deal of prospecting has been done, and a number of very promising properties located, several of which have previously been reported upon by the writer.

Of these older mines the *Montezuma* was probably the best known, but it has been shut down since 1900, as the amount of zinc present in the ore rendered it unprofitable. While until quite recently there has been no market for zinc ore, the increasing inquiries for this product, with the material advance in the price offered for it by the buyers, have again aroused interest in this property, and development work has again begun, and it is hoped that the *Montezuma* will become once more a shipping mine.

The *Silver Bell* property has already been described in these Reports, and some small shipments of exceedingly good ore have been made, but no active work was in progress in 1904.

Of the *Joker Group* and *Gibson* and *Palouse* claims, formerly described, and situated at the very head of the creek, little could be learned, but no active development was in progress on either, and they were not visited.

Bismark.

The *Bismark* is situated on the south side of the valley of the south fork, on Briggs creek, about 12 miles from Kaslo, and lies above the *Black Fox* claim, further up the hill, and at an altitude of about 6,500 feet. It is owned by a local syndicate, composed of N. F. Mackay, C. N. McAnn, C. Hanson and J. B. Gerrard. The property is opened up by three tunnels, the lowest of which, at an altitude of 6,360 feet, has been run in for about 480 feet on a fairly well-defined lead, somewhat crushed, but apparently continuous. No. 2 tunnel, which is about 240 feet higher up, is not connected with the lower tunnel, and is in some 170 feet, with, at 30 feet from the face, a raise extending 112 feet up to the upper level, which has been run in some 290 feet.

The ore is essentially oxides of iron, with lead carbonates and galena, in a quartz matrix, which, as shipped, will assay about 6 to 10 per cent. lead and 130 ounces in silver a ton. The occurrences of ore in the vein are somewhat irregular in size, and while the property does not give promise of any large tonnage, the indications are good for continued shipments on a small scale of such ore as mentioned, which, for its gangue, should command low treatment rates. The shipments during 1904 will amount to about 100 tons of ore, mined by two or three men. The country rocks in the vicinity are shales and sandstones, with limestone, cut by numerous dykes.

No. 2 tunnel seemed the most promising, chutes of ore showing near the mouth of the tunnel, near the first cross-cut to the left, and again in this cross-cut is a second small chute parallel with that in the level. Near the face in the main tunnel is a chute of ore, while another crosses the tunnel here, and has been followed by drifts to both right and left. The country rock at this point appears to be twisted and faulted, producing fissures, in which the mineral was deposited.

A short distance below the last-mentioned property and lying to the north-east, there is a string of adjoining claims, through which what appear to be the same veins cut, and which have been developed at several points. These claims are the *Black Fox*, *Daisy*, *Dublin*, *Cork* and *Province*. The main lead is a large interbedded quartz vein, having a strike about N. 50° E., and is on the average about 8 feet wide, although the width varies, sometimes swelling out to large dimensions.

Parallel with the main vein are four or five others which, as far as known, are of secondary importance, although they may, of course, upon development, prove to be valuable. Scattered through this quartz are a few bunches of galena which might be sorted out for shipment, but the greater amount of the mineral is so disseminated through the quartz as to require concentration. Fairly clean samples of galena were found to run from 60 to 80 ounces of silver to the ton, with gold to the extent of from $4 to $6 a ton.

On the *Daisy* claim, owned by the Black Fox Mining Co., some 1,000 lineal feet of development work has been done, disclosing some small bodies of clean ore and large bodies of concentrating ore, which, however, are not continuously connected. The property has lain idle for several years.

**Cork Mine.**

The *Cork* claim and two or three adjoining claims have been acquired by the Silver Star Mining Co., a French company of which Mr. P. Maris is the local representative, with office at Kaslo. This company has done extensive development work on its property, and has developed a large chute of concentrating ore, the limits of which have not been defined; but work sufficient has been done to show it to be of such a size as to justify the erection of a concentrator for its treatment. The rock formation of the vicinity is the same as that of the district generally—shales, schists and lime cut by numerous dykes—which in the vicinity of the ore-deposits seem to be close-grained, light-coloured and highly silicious, and which seem from their association to have had some direct relation to the mineralisation.

No. 1 tunnel is in about 116 feet, and cross-cuts, near its portal, an ore chute carrying galena and zinc, with some arsenical pyrites carrying gold, which chute, as the tunnel advanced, seemed to dip under at an angle of about 50 degrees, and the inner part of the tunnel is barren. A winze from the tunnel, when sunk 10 feet, recovered the ore chute, and was sunk in it for about 54 feet, or to the level of No. 2 tunnel. No. 2 tunnel was a barren cross-cut for about 118 feet, or until it struck the ore chute from the upper tunnel, on which drifting to the right and left had been done for some distance in ore of a concentrating grade.

Satisfied with the development at this level, the company started a long cross-cut tunnel from a point as low on the hillside as was consistent with leaving height sufficient for the installation of the proposed concentrator. This cross-cut tunnel is at a level about 250 feet lower than the No. 2 tunnel, and had been driven in 925 feet, cutting the ledge and ore chute, on which drifts had been set off, to the west for 213 feet, and to the east for 250 feet, from each of which drifts a raise had been started up, and had progressed in July about 50 feet, while, from later reports, one of these raises has since been connected with the upper workings. The dip of the ore chute here is greater than above, being about 70 degrees.

In the driving of this lower tunnel a vein was cut through some distance to the north of the main lead, and this is supposed to be the *Black Fox* vein, and on it a drift has been run, to the west for 17 feet, and to the east for 36 feet, which had not, however, disclosed ore in workable quantity.

The upper workings were regarded as of a prospecting nature, but this lower tunnel has been run as a working tunnel, and is a most creditable piece of work, the timbering, track-laying, drains, etc., having been laid with an accuracy and care seldom seen in the Province, and this will have a direct influence in lessening the working costs when actual extraction begins.

Near the No. 2 tunnel a comfortable bunk-house, dining hall and office, together with other buildings, had been built, but since the lower tunnel is in all new work is being centered around its outlet. Here a small but convenient building has been put up, in which is installed a 4-drill Ingersoll-Sergeant air compressor, operated by a Pelton wheel capable of generating

200 horse-power. A saw-mill had been erected, and was in operation making lumber for the mine's use, and also getting out the timbers for the concentrator building, which it was planned to erect a couple of hundred yards from the tunnel, and on the lower side of the waggon road, the latter being crossed by an elevated tram track. This concentrator had not been begun in July when the property was visited, but has since been completed, and should be in operation during the early part of 1905. The mill was designed and the plant constructed by the Allis-Chalmers Company, of Chicago, while the mill was erected by Mr. Charles Culver, for several years the mill man of the *Slocan Star* of Sandon. At the end of the year the "value of plant" is given by the management as $8,000. As an average for the year, about six men were employed at the mine under ground, and about twelve men above ground, this being in addition to the construction force employed in the latter part of the year.

**Province Mine.**

The *Province* mineral claims adjoin the *Cork* on the east, the development on both claims being adjacent to the dividing line, and it is certain that the ore-body in the *Province* is a continuation of that developed in the *Cork*, which has been shown to extend across the boundary for about 100 to 150 feet. The main tunnel of the *Province* is a cross-cut to the south for 173 feet, when, at a point about 220 feet east of the *Cork* side-line, it was turned off sharp to the west towards such side-line and continued as a drift in that direction for 180 feet. Here a cross-cut was made to the north for about 50 feet which cross-cut the ore-body coming in from the *Cork*, and on this a couple of small winzes have been sunk. The main tunnel had passed through the line of the ore-body without encountering it, indicating that this particular ore-body did not extend into the property for that distance.

To the east of the main tunnel, nearly in line with the ore-body, is a loose slip filled with oxidized iron material which has been followed in for 60 feet, and was found to be very loose and soft, rather indicating a water-course, but containing no commercial values as far as explored, although the writer was of the opinion that it was a continuation of the series of lenses met with in the previously described property, and gave sufficient promise to be well worth following up.

This main tunnel was below the surface at its face from 100 to 120 feet, estimated. Some 70 feet above this tunnel a small tunnel had been run into the lead and some good ore found.

As compared with the development of the *Cork* that on the *Province* is slight, but the success of the former has added much to the value and importance of the latter claim. The two properties are on the same ore-body, and it would greatly increase the economy of working both if they were worked as one mine through the *Cork* tunnel.

## Kaslo Creek.

The Whitewater camp was not visited, the important properties there not having been worked by the companies owning them. The *Whitewater* was worked by leasers, who shipped about 100 tons of ore. It is currently reported that a plan for the amalgamation of the *Whitewater* and the *Whitewater Deeps* is under way, and that until this matter has been settled no great amount of work will be done on either property.

The *Jackson* mines, in Jackson basin, have not been worked this past year. The ore in this property is galena, carrying a considerable percentage of zinc, and until the market for the zinc contents can be arranged satisfactorily, Mr. Alexander, the manager, says the property will not be worked.

## Hamill Creek.

Argenta is a townsite situated on the east side of the upper end of Kootenay lake. The present permanent inhabitants are a rancher and family, and two packers, Crawford and Anderson, who own five horses.

In 1899 the Great Northern Railway built a railroad grade from Argenta to Duncan lake. The grade follows along the shore of Kootenay lake, and up the stream connecting the two lakes, but no ties have been laid, the land along the stream being submerged by the spring floods. The road-bed is not completed and has been abandoned, but at present serves as a waggon road from Argenta to the mouths of Hamill and Glacier creeks, which enter the Duncan river above navigation. This road-bed ought to be acquired by the Government to connect the Hamill creek waggon road with Argenta, the nearest point reached by steamer, a distance of about three or four miles. Hamill creek flows in a south-westerly direction into the upper end of Kootenay lake, and is a wild stream in spring, and until August, having a grade of almost 200 feet to the mile. The first mile of its course from the mouth is in comparatively easy and open country; the next three miles is in canyon, with limestone walls, nearly perpendicular. The bed is completely occupied by the stream. The next two miles is a gorge, with a little bottom land, and this is sometimes on one side and sometimes on the other side of the creek. The sides are very steep, composed of rock bluffs and mud slides. At six miles up, the hills slope more gradually, with sufficient bottom and easy hillside to admit of a waggon road for say 15 miles further, which is as far as could be seen, but it is said that a waggon road could be built to the summit.

**Trails.** The trail from Argenta rises by a gradual grade to a height of about 1,500 feet above the lake, through a narrow pass, and drops by a fair trail grade into Hamill creek, at an elevation of about 800 feet above the lake, and four miles from the mouth of the creek. The trail follows the creek up from here, the next two miles being very "up and down" and not good going, and crossing the creek twice. The rest of the way to the summit is reported as good going, the grade being fairly easy.

From the summit eastward into the Windermere district, the only possible place for a waggon road is reported to be along the present trail, which zig-zags from the summit along a steep sidehill above the glacier of Toby creek, and thence follows down the creek, meeting the Toby creek waggon road some 20 miles from Wilmer. The estimated distance from Argenta to Wilmer by trail is 80 miles, or about 2½ days by saddle horse. This trail is used somewhat by prospectors going over to the Windermere district, and it is reported that cattle have been driven over it from East to West Kootenay, but not lately.

The summit, about July 1st, 1904, was so covered with snow that Richard Gallup, who had a lumber camp six miles to the east of the summit on Toby creek, had to leave his horse and come through to Argenta on foot.

There is reported to be some good timber on the upper stretches of Hamill creek.

**Mining Developments.** The only properties on Hamill creek which have received any material development are the *Lavina* or *Lavenah Group* and the *Argenta* mines. The trail to both these properties leaves Hamill creek trail at "Clinton's cabin," which is located in the creek bottom about six miles up from the mouth, and at an elevation above sea level of 2,800 feet, or say 900 feet above Kootenay lake. About one mile up this trail and 1,000 feet above Hamill creek, a short branch trail leads to the *Argenta* mines. The trail to the *Lavina Group* is about three miles long, and the mines are from 3,000 to 3,500 feet above the valley. Both trails are very steep, but good otherwise.

**Lavina Group.** The *Lavina Group* was described in the 1899 Report, since when very considerable development work has been done and some galena ore shipped. The quantity was not ascertained, but was probably a couple of hundred tons, which, sorted, will run about 50 % to 60 % lead, and 60 to 70 ounces silver, and is worth, delivered at Kootenay lake, from $25 to $32 a ton. It is judged that the ore taken out has

not paid for the extensive development work. There is at the mine at present on the dump about 50 tons of such ore, some of it sacked up. The property extends over the summit on to the Glacier creek slope, and development has been made on both slopes, the cabins being on the summit.

The ore-bodies are small, and are cut off by faults so as to be extremely irregular as to size, and to admit of no accurate estimate of their probable continuity. The ore, galena, is clean, with no body of concentrating ore of any size, although there is a considerable body of so-called "carbonates," which, upon assay, is found to run as high as 40 % lead and 13 oz. silver, and which ore-buyers state to be of low value according to their samples.

A rough estimate of "probable ore" of first grade would give a fair expectancy of from 500 to 1,000 tons. Of ore in sight (not on dump), there is little. Of "carbonates," there may be 2,000 to 5,000 tons, though it is doubtful if this will pay for shipment at the present price of the metals, of which there is no present prospect of a material rise.

The company is a flotation of John McKane, late of Rossland, and is at present practically dormant, no work having been done on the properties for the last two years, nor is it understood that any is contemplated. The property is suited for leasing under royalty system, but will not sustain company management.

**Argenta Mines.**

The *Argenta* mines were visited on Sunday, July 10th. They are situated, as stated, above Clinton's cabin, to which point an aerial tramway could be run most cheaply. The manager, Mr. Hanna, of Kaslo, had not been at the property for a month. No one was left specially in charge, except possibly the cook, whose knowledge did not extend underground; consequently, no information could be obtained from the management, and the men "did not know." There were five men at work, miners and muckers, three in No. 2 tunnel and two in No. 3 tunnel.

The "discovery" was made on a steep hillside on a quartz vein, here from 5 feet to 8 feet wide. Subsequent development has shown it to be of an average width of about 3 feet, and to dip into the hill with the bedding of slates at about 50°. This quartz vein follows a fault fissuring and crushing plane, and is very persistent, with depth, as far as traced, showing considerable regularity. This quartz has been followed and mined in all the drifts.

In this crushed zone, which is from 10 to 20 feet wide, and following the bedding, are a number of quartz stringers, which sometimes make into bunches. The walls of the zone are "slickensided" and very marked and plain. The greatest width of quartz seen was at the "discovery," which, "widening," seems to have been followed by the raise from the No. 2 drift to surface. In this thicker part of the vein the quartz carries a small amount of copper sulphide, and from the No. 1 workings there has been separated out and stored in a blind cross-cut, about 25 tons of selected ore, which the writer would estimate by the eye to average about 2 % to 4 % copper. The values are reported by the miners to be confined to the quartz vein, and to be chiefly in copper. This is all the ore that could be seen as piled up to be saved, from all the 1,300 feet of workings on the lead. In places in the drifts, small patches of copper sulphides were visible, but in no place was any large amount to be seen.

The present workings give some 375 vertical depth on the lead, which holds its size and strength for that depth, and the drifts and cross-cuts, etc., on the lead amount to about 1,300 lineal feet.

The "discovery," as noted, was on a hillside, so steep as to be almost a bluff, and on this showing of quartz some work was done and some very pretty samples of copper ore were obtained, some of the surface black gossan giving very high assay. No ore has been shipped

from the property. About 25 feet vertical below this showing, No. 1 cross-cut tunnel was run in 40 feet to the ledge and 35 feet beyond it; drifting had been done to the left for 60 feet and to the right for about 250 feet.

No. 2 cross-cut tunnel is about 100 feet lower than No. 1 and is 150 feet to the lead, through shales and schists. Drifting on the lead has here been done for 120 feet to the left and about 500 feet to the right, while from the latter drift three or four small cross-cuts have been run, and a raise put up to connect with No. 1 tunnel.

The outcrop of the lead to the west cuts over a shoulder of the bluff and crops out down the side of the hill, and in this outcrop, some 250 feet below No. 2 tunnel, a tunnel was being run in on the vein. This is No. 3 tunnel, and in July last was in about 100 feet. The vein holds its own very well to this depth, although its strike was a little more to the north than was No. 2, being about N. 30° W.

It was currently reported that the management intends to drive a No. 4 tunnel and drift for which purpose an air compressor and drills are required, and for this reason the waggon road is desired.

When the mine was visited two men were at work in No. 2 tunnel and two in No. 3, and these, with the cook, made up the force on the property.

## SLOCAN CITY MINING DIVISION.

The ores of the Slocan City Mining Division are chiefly dry ores—that is, they are smelting ores, containing but an unimportant percentage of lead, the values being in silver and gold; and as such ores are almost necessary to the lead smelters for the economic handling of the galena ores of the Slocan and of East Kootenay, which are chiefly lead concentrates, they command the most favorable smelting rates. The success of the district from an economic point of view is, therefore, of more than local importance, and is consequently watched with more than usual interest. The surface geology of the district may be said to be a series of repeated contacts of the granites with sedimentary rocks, which to the north form the Slocan shales, etc., and which there carry the argentiferous galenas of that section. These dry ores are not by any means so "showy" as the glittering galenas of the adjoining district, their values being determinable only by assay, and they failed to strike the eye of the old-time prospectors, who, many of them, looked upon assays as more or less "expensive luxuries," with the result that these less brilliant ores were in many cases passed by, and the possibilities of the district have not yet been developed.

From a general survey of the camp and an inspection of most of the working properties, the opinion was formed that the district would prove to be one of small, high-grade properties, calling for careful and skilful individual work, both in the mining and following up of the ore-bodies, which class of mining is particularly suited to the "tribute" or leasing system of working, since, by this system, the success of the miner is dependent on his personal care and watchfulness of minute details and indications, which are liable to be overlooked by one not at all times actually in contact with the work. It seems, therefore, that the successful development of this district will be achieved by a large number of small producers, rather than by company management on a large scale.

That there are, and will continue to be, exceptions to this rule, is unquestioned. The *Kilo* group, for example, demands a stamp mill for its economic development and working, and such is likely to be erected only by a company; but even here it is a question whether a properly run custom stamp-mill would not be of greater benefit to the camp than a mill owned and operated by any one mine.

Under the limitations stated, the demand from the smelters for "dry ores," together with reasonably good transportation facilities, makes the outlook for this camp as bright as for any in British Columbia. The tributor and leaser are only beginning to operate to any extent in the Province, and their advent is regarded with much interest, as this class of work is the best school for independent, careful miners, who depend, not on day's pay, but upon the output of ore they make; and as their success means the success of the camp, there are no conflicting interests.

The following claims visited are but a few of those in the district which give promise of successful development:—

Ottawa.

The *Ottawa* mine has this past year been one of the most successful mines in the Slocan, and the largest shipper in the Slocan City Mining Division. The shipments amounted to about 1,330 tons of ore, which netted from the smelter $120,000, and which was mined and shipped with the expenditure of $50,000, leaving an actual profit on the year's operations of $70,000. The net value of the ore at the point of shipment (Slocan City) for the year was, therefore, slightly over $90 a ton, which was practically entirely in silver, the ore running from 175 to 200 ounces to the ton in silver, with 22 per cent. lead and 20 per cent. zinc.

The group consists of the *Ottawa*, *Ottawa Fraction*, *Jennie*, *Toronto*, *Hamilton*, etc., mineral claims, situated on the north side of the valley of Springer creek, about five miles from Slocan City, with which point it is connected by a good waggon road. The mine workings are about 1,000 feet above the level of Springer creek. The original claims were acquired two years or so ago, by a Pittsburg syndicate, of which Mr. T. A. Noble is president. Since making the original purchase the syndicate has bought a number of adjoining claims, and has obtained bonds on others. The local management of the company and of the mine is in the hands of Mr. R. J. McPhee, whose office is in Slocan City.

On the *Ottawa* there are two distinct veins, developed by adit tunnels, known respectively as the Ottawa or east vein and the Noble or west vein. Both veins are strong and clearly defined, and both have a general north and south course, and a dip to the east, but neither in strike nor dip are they quite parallel, and as they are traced to the south and to the dip they appear to be approaching each other, leading to the belief that they may eventually be shown to join in that direction. The actual mining was found to be confined practically to the east vein. The west vein outcrops on the edge of and in a small cross gully subject to snowslides, which rendered it difficult to prospect. It has been cut by No. 1 tunnel and a short cross-cut and drift on the vein, at a high level, and some very good ore has been obtained, but these workings belong more properly to the prospecting days, and have been abandoned for the deeper workings, consisting of cross-cuts from No. 4 tunnel on the east vein.

Tunnels Nos. 2 and 3 are run from the side of the cross gully to the eastward and cut the east vein at levels 100 feet apart. No. 2 tunnel and drift followed the vein for several hundred feet, but pay ore was found only in one place, and then but for a short distance along the tunnel. No. 3 tunnel and drift is about 500 feet long, and in this the ore chute was found about under where it was noted in No. 2, but in this tunnel it was discovered to have lengthened to about 94 feet, while in No. 4 tunnel the same chute appears to be from 250 to 300 feet long. That is to say, the ore chute, which in No. 2 was very small, has been found to lengthen in 200 feet depth to nearly 300 feet.

The No. 4 tunnel also started from the gully to the eastward and cut the *Noble* vein, the strike of which had at this level carried it across the gully to the east side. This vein was followed some distance to the north, but proving to be barren at this point, a cross-cut was

made eastward to the east vein, which was drifted on to the north, until the ore chute was cut for the distance already mentioned. Until this work was accomplished, the success of the property was problematic, and as this was finished only about a year ago, the development and equipment of the property have not yet taken definite shape. Surveys and plans were, however, being prepared for a No. 6 tunnel about 200 feet lower than No. 4, which would cross-cut to the vein in a distance estimated at about 500 feet, cutting it at a point much to the south of the present workings, so that a long drift to the north will be required to get under the known ore chute.

Pending the final decision as to the location of this tunnel, the permanent equipment of the mine has been delayed, but when completed it will include an aerial tramway to the valley of Springer creek, with probably a concentrating plant of some form, and also air compressors, etc., for which purposes surveys were being made, and a location and water rights secured, a short distance below the old *Arlington* saw-mill.

In July, the greater part of the production was being made from an intermediate level or drift between levels Nos. 3 and 4, from which stopes were being raised, with a face of about 160 feet in ore, of a width of from 1 to 3 feet of first-class ore, and of a greater thickness of second-class ore. This second-class ore will probably be concentrated eventually, but will require some process other than the ordinary hydraulic concentration, as the values are largely in gray copper, finely disseminated through a close-grained, highly silicious matrix.

The present mine plant, which is temporary in character, consists of a lumber cook-house, bunk-house, sorting shed and bins, and an office, while at the mouths of Nos. 3 and 4 tunnels are cheaply constructed timber-framing sheds and a blacksmith shop, the whole equipment, as valued by the management, being worth about $7,000. Some 48 men were last season employed underground and 13 above. The total amount of tunnelling done is about 3,500 feet, exclusive of raises, etc.

**Arlington Mines, Limited.**

About three miles farther up Springer creek, and on the same slope as the last-mentioned mine, are the *Arlington* and *Speculator* properties, which have in past years made large shipments of ore, but which are now closed down, and were found to be locked up and in charge of only a watchman. These properties are on a great crushed zone some 100 to 200 feet wide, filled with talcose matter. This zone has a strike of N. 10° E. and cuts from the valley of Springer creek diagonally up the hillside into the basin at the head of Ten-Mile creek, on which the *Enterprise* mine is located, and represents a very extensive fissuring and movement in the formation.

The *Arlington* has been very extensively opened up by a series of adit tunnels, A, B, C, D, E, F, G and H, and a small shaft, while, connected with these, extensive drifting operations have been carried on in the crushed zone. The filling material of this zone is reported as being fairly firm when first opened up, but the mine has stood for some time idle, and being very wet, the weather and water have acted on the filling, converting it into a talcose clay, which completely masks the formation and any ore which might otherwise be visible.

The first-class shipping ore is reported to have been found in "kidneys" of quartz carrying gray copper and silver-lead sulphides, which occur throughout the zone, but not, apparently, with sufficient frequency to permit of the mine being worked for these alone, without utilising the second class ore, of which there is a large quantity on the dumps, separated by hand-sorting from the shipping ore. For the treatment of this second-class ore the manager, Mr. J. F. Collum, has been investigating a number of processes of concentration, and is reported as having found one applicable to the conditions, which it is expected will be installed at no distant date.

The mine is elaborately equipped with all requisites, and is provided with offices and officers' quarters, assay office, ore-sorting building and bins, stables, blacksmith shops, bunk and mess-houses, etc. When shipments were being made the ore averaged about 75 ounces of silver to the ton and about 5 per cent. lead.

The *Speculator* is on the same zone, some half-mile further to the north and up the hill, and in this the conditions are practically identical with those of the *Arlington*. The *Speculator* also is lying idle. The two properties are owned by the same people.

**Pioneer Mining Co.**

The Pioneer Mining Company is a comparatively recently organised company, of which W. J. Wilson, of Nelson, is president, and J. W. Moffat, B. A. Sc., is managing director, and also manager of the company's mines. Although the company is new, it has acquired a number of properties which have been well-known shippers. The claims held by the company are the *Bank of England, Two Friends, Montreal, Black Prince Fraction, Slocan Prince* (*Black Prince*) and *Summerseith*, all Crown-granted, and the *Four Friends, Doirest, Dundee* and *Zip* mineral claims, in all some 380 acres. These properties are situated two or three miles in a direct line south of the *Arlington*, but over a low divide, in a basin at the head of the second north fork of Lemon creek, but are reached by a trail and sleigh road branching off the *Arlington* waggon road, near the Basin Hotel. The present company took possession of the properties only in the early part of this past season, and when the writer visited the properties in August, had scarcely had time to explore the old workings.

There are a number of strong leads on the various properties, somewhat faulted and difficult to trace out, and requiring careful and systematic work and surveying to unravel, but ore of high grade has been found in each of the openings, not in great quantity, very "bunchy" in its occurrence, but very persistent, and giving strong promise of a successful enterprise. The individual properties were formerly worked very much on the "rule of thumb" principle, but since the amalgamation, Mr. Moffat has gone in for a thorough and accurate system of mapping the leads, dykes, faults, etc., which should go far towards solving a complicated mining problem. The new work that was being undertaken was on the *Slocan Prince* (formerly the *Black Prince*) and on the adjoining *Black Prince Fraction*.

The country rock formation of the vicinity is a coarsely crystalline granite, somewhat cut by dykes, and faulted. The lead in which the ore occurs is essentially a crushed zone in the granite, possibly following along the line of one of the dykes, now obscured by the crushing and weathering. This zone is as wide as 35 feet in places, and is bounded by well-defined and fairly smooth walls, on which there is a distinct gouge clay. Infiltrations of silica through the lead matter have in many places rendered it quite solid again, and apparently with the silica came the mineral forming the ore, which is usually found in the hanging-wall side of the lead. The ore is quartz, carrying galena and zinc blende, with which is associated gray copper and other antimonial sulphides.

The grade of the ore is best indicated by shipments already made from the property by previous owners, who from 1900 to 1904 shipped about 225 tons, averaging gross value $74 a ton, or net value $64.85. The assays averaged about 132 ounces silver to the ton, 6 per cent. lead and 8.5 per cent. zinc. The present company had mined some 64 tons of ore in 1904 from below No. 1 tunnel, which averaged 177 ounces silver, 11 per cent. lead and 21 per cent. zinc. There is no appreciable amount of gold in the ore, but specimens showing native silver are found.

The underground workings here consist of No. 1 tunnel, a cross-cut 129 feet long to the lead, on which drifting to the extent of 400 feet has been done, and also sundry raises, cross-

cuts, etc. About 110 feet vertically below this, No. 2 adit tunnel was driven in, and as the lead dipped into the hill at an angle of 60 degrees, this tunnel was 419 feet long when it struck the lead, or rather what was supposed to be the lead, but which, in the light of further work, may prove to be a spur from the main fissure. From this tunnel a drift has been run to the left for about 175 feet, near the face of which a raise was just being started to connect eventually with a winze on No. 1 tunnel level. Much inconvenience is caused at this point by the wetness of the mine.

To the right of the tunnel, the drift had followed the fissure for about 50 feet, when it was decided that the main fissure must lie to the north, and, consequently, a cross-cut was made in that direction, and the main fissure found in about 40 feet, along which the drift was driven for about 100 feet further to the east. From this east drift, about 40 feet from the face, a vertical raise had been put up 77 feet, and ore was struck at 47 feet up, from which point four carloads of ore were taken out last winter, indicating the possibility that No. 2 drift was under the ore. A connection from this raise to the No. 1 level was contemplated.

On the *Two Friends* the fissure is from 4 to 12 feet wide between walls, on one of which the ore occurs in a solid and well-defined body. No new work was in progress here, and the No. 2 or lower tunnel was so caved as to be unsafe to inspect. No. 1 tunnel is a cross-cut for 25 feet, from which about 280 feet of drifting had been done. As to ore taken out by previous owners, only partial returns were in possession of the present management, but these showed 215 tons of ore shipped, averaging $126.38 gross value and $99.81 net, with assays of 188.5 ounces silver, 24.6 per cent. lead, and 23.7 per cent. zinc.

On the *Bank of England* there are two defined veins, the south and the north, which have a general east and west trend, and are developed by two cross-cut adit tunnels with drifts therefrom. The work done indicates that the particular location chosen for the tunnels was very much cut by dykes and faulted. From the upper or No. 1 tunnel about 350 feet of drifting has been done, and from the lower about 750 feet. The ore is galena in quartz, carrying high silver values, with a small amount of zinc. There are good cabins and bunk-houses on the property, and a small but well-equipped assay office was in course of erection.

Following is an extract from a letter from the Manager, Mr. J. W. Moffat, giving later information with regard to the operations of the Pioneer Mining Company:—

"The ore shipped is from the *Black Prince Fraction* mineral claim. It we bought outright; we only bought a part of the *Slocan Prince*. Since you were here, we have acquired the outstanding interest in the *Two Friends*, under a bond, and have been driving a deep tunnel on the *Bank of England* east end line, to get under the old ore chute at the west end of the *Two Friends*. We have built a first-class sleigh road from the mines to the Springer Creek road—3½ miles in all. Since you saw the mine I have blocked out at least 1,200 tons of ore that, with some sorting, we are able to ship out, with an assay value of approximately 55 to 60 ounces. Since the first of the month it has been leaving the mines at a rate of seven tons per day. To pack such ore out in the summer is impossible, owing to the cost; hence the necessity of a waggon road. Other development at the *Prince Fraction* has proved most satisfactory to us. Another nice body of ore has just been found at the west face of *No. 2 Prince Fraction*, and it, with the one already blocked out, and the certainty of reaching the old *Two Friends* ore chute in 80 days, assures us of being in 1905 one of the largest producers in the southern Slocan country."

From the Basin hotel, on the *Arlington* waggon road, the *Howard Fraction* trail leads over a pass into the first north fork of Lemon creek. On the range between these two creeks there are a number of small properties from which some very high assays have been obtained, but most of which have, as yet, received only scant development, usually by individual miners. As a rule, the leads are small, and although well defined, are much faulted.

The *Howard Fraction* is situated on the summit of the range, and formerly shipped some high-grade ore, of which the values were largely in gold, but the property has lain idle for some time.

The *Meteor*, also a former shipper but now idle, is at an elevation of 7,000 feet, and is upon a small fissure, faulted both ways, and the vein was apparently not found by the lower tunnel. Assays of ore ran as high as 512 ounces of silver and $20 in gold to the ton.

On the *Tailholt*, owned by — Ferguson, there is a flat quartz vein from 1 to 3 feet thick, dipping at an angle of 20° into the hill, the outcrop of which follows, for a number of claims, almost horizontally, along the hillside to the south, and which in the various openings is reported to give very good values in gold. On this claim a tunnel had been run in level for a short distance, with a short cross-cut therefrom, while some 20 feet lower an inclined slope had followed the vein down for some 70 feet.

The *Duplex*, *Alberta*, and six or eight other properties, are located along the hillside, on what is supposed to be the same vein.

Following down the first north fork of Lemon creek, a number of quartz veins of considerable size and permanence were found, which contained iron sulphides carrying gold values, and while few of these contained ore sufficiently concentrated in form to permit of shipment direct, there is a very large tonnage of quartz which would appear to offer excellent concentrating propositions, in which some free gold would be caught on plates, and concentrates made of a grade which would stand the costs of waggon transportation and leave a good profit.

**Legal.**

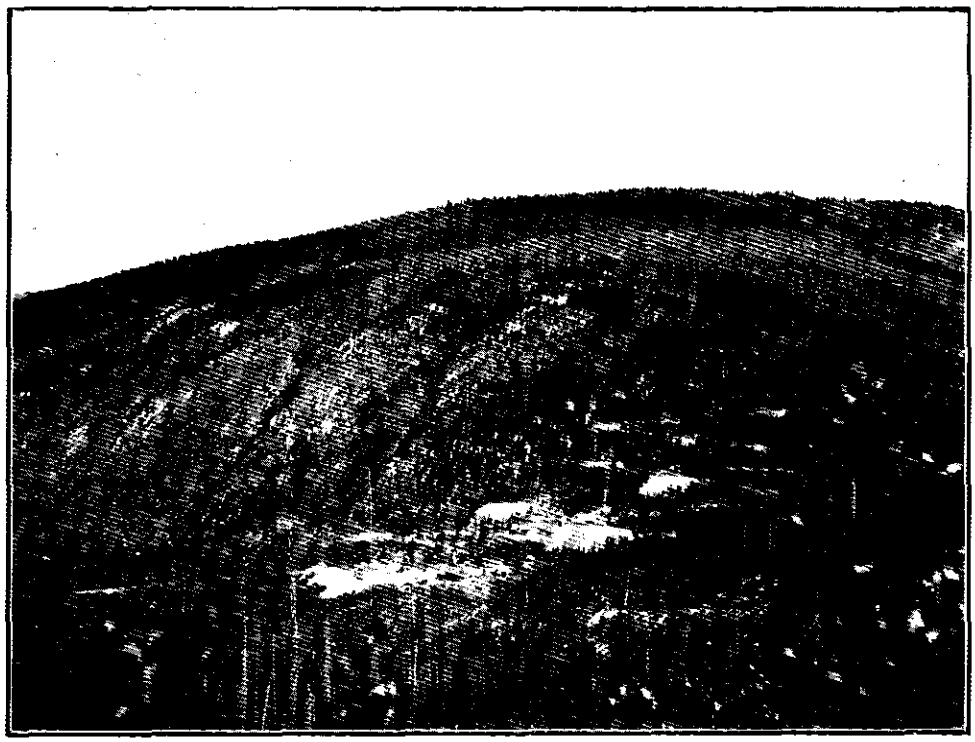
The first of these properties visited was the *Legal*, on which are one or more well-defined quartz veins from 1 to 3 feet thick, exposed by numerous open cuts and a couple of tunnels with drifts therefrom, amounting in all to about 300 feet of underground workings, which show the vein to be strong, but much faulted and bent. The quartz is white, scattered through with bunches of iron sulphides carrying gold, which it was roughly estimated would concentrate about 40 to 1.

**Kilo.**

Following down the right side of the north fork for about a mile to Violet creek, a small tributary from the north, the trail came to the *Kilo Group* of some 26 claims, which Mr. N. F. McNaught, of Silverton, has consolidated into one holding for development purposes, under the name of the "Slocan-Kilo Co.," with the expectation of erecting a stamp-mill to work the more developed properties and to assist in the development of the others, in which the values are scarcely as yet determined. These claims are the *Violet*, *Kilo*, *Superior*, *Skylark*, *Ranger*, *Bassett*, *Wedge*, *Ruther Fraction*, *Superior Fraction*, *Skylark Fraction*, *Woodland*, *Central Fraction*, *Ruther*, *Saddlerock*, *Copper Jacket*, *Susan Fraction*, *Valley*, *Gold Crown*, *Spring Valley*, *Susan G.*, *Susan S.*, *Kilo No. 2*, *Defender*, *Vigilant*, *Columbia* and *Shamrock*.

The most important of the recent work has been carried on near Violet creek on the *Kilo*, *Violet* and *Superior* claims, where a strong, well-defined quartz vein, from 18 inches to 4 feet —average about 2 feet—in width, occurs in a granite formation, having a general N. 25° E. course, and a dip of 30°. This vein has been cut by Violet creek, and in this cutting some very high grade ore has been taken out from pits and from the bed of the creek. The lead, continuing to the east, disappears under the very heavy wash which fills the valley of the creek.

To the south-west, the lead has been traced up the hillside for a long distance, and developed by extensive tunnelling. Of these tunnels, No. 1 is almost at creek level, and is in 240 feet, with a raise up 100 feet to No. 2 tunnel, which is in 160 feet, with a 50-foot raise



ARLINGTON-SPECULATOR MINES, SLOCAN CITY M. D.

ENTERPRISE MINE, 10-MILE CREEK, SLOCAN CITY M. D.

from near the face connecting with No. 3 tunnel, which has been run in on the lead for 400 feet, with two short blind raises put up from the same. No. 4 tunnel is about 75 feet above No. 3, and is in about 300 feet on the vein with a raise to the surface. Still further up the hill than the head of the raise from No. 4 tunnel is an inclined shaft, down 120 feet.

In all of these extensive workings the quartz of the vein remains strong and regular, is white, and carries a little sulphides. Of workable ore there appear to be two chutes, the first in tunnels 1 and 2 and extending up to No. 3 near its portal, while the second is developed by the shaft and is touched, but not cut through, by No. 4 tunnel.

The average value of such a vein, or of even the ore chutes, can be satisfactorily determined only by actual test in a stamp-mill, as sampling is very unsatisfactory and misleading, while the eye gives no indication as to values contained in a large quartz vein. To these facts the manager, Mr. McNaught, is keenly alive; hence his anxiety to install even a small mill at the earliest opportunity.

That such a mill is amply justified is shown by returns on a test lot of ore sent as a trial run to the *Chapleau* mill, a few miles down the creek, and which Mr. McNaught reports to have given mill returns of $20.50 a ton. Shipments made by previous owners of 35 tons of ore are reported as giving gross returns of $70 a ton, while the present owners shipped some 80 tons, ranging from $72 to $126 a ton. A shipment of 20 tons to the Hall smelter, in the latter part of 1904, ran $84 in gold and 5 ounces in silver to the ton. The sulphides carried by the quartz are chiefly iron pyrites, with a little galena and zinc blende, and these sulphides carry most of the values, although occasional samples show free gold. One specimen seen was a cube of galena with a good-sized crystal of gold imbedded in it.

A waggon road has been built some distance along Lemon creek, and can easily be continued up these properties, which lie only a short distance above the creek valley on a gently sloping hillside, and are abundantly supplied with timber and water for power purposes.

**Chapleau.**

The *Chapleau* mine, comprising one full claim and a fraction, is situated on a small gulch entering into the first north fork of Lemon creek from the west, and almost adjoining on the south the *Kilo Group* properties. The mine is at an altitude of about 5,800 feet above the sea level, or approximately 2,500 feet above the level of the valley of Lemon creek. By trail over the *Skylark* and *Ranger* summit, the property is about seven miles from Slocan City, from which point, however, there is a waggon road running up Lemon creek, a distance of 15 miles, to the bottom of *Chapleau* gulch. The property was staked in 1896 by Tattersall and Robertson, and later re-staked by Gwillim and Dick.

After the shipment of some two carloads of sorted ore, which gave very good results, the property was bonded in 1896 to the Hall Exploration Company for, it is reported, $60,000, under which company development was carried on for the winter; but, losing the vein at a fault, this company threw up the bond, and the owners taking hold of the property again found the vein and two more cars of ore were shipped, after which the property was sold to the present owners, the Chapleau Mining Company, for, it is reported, $35,000. This company extensively developed the mine, built a stamp-mill on Lemon creek, and connected the mine and mill by a Hallidie tramway.

The development has taken place on a quartz vein cutting a granite formation in a general easterly and westerly direction, and dipping to the north at an angle of about 20°. The vein varies in thickness from a few inches up to about 4 feet, but was estimated to be from 20 to 24 inches wide on the average. The vein appears to be accompanied by a light-coloured acid dyke, and is very much faulted, a principal fault occurring in the lower tunnel at about 250

feet from the portal, there throwing the vein 30 feet; this same fault appears also in the upper workings. The vein quartz is a dull white, in many places devoid of mineral, while in other parts it is heavily mineralised with iron pyrites, carrying gold, which occur in stringers and bunches, often of considerable size, throughout the vein. There is also a little galena and zinc-blende present in the lead, but the values are practically confined to the iron sulphides.

The mine has been opened up by three adit tunnels for about 400 feet along the vein and 200 feet on its dip. Very little timbering has been required and the workings are in a fair state of repair, but the mine buildings have been allowed to go to ruin.

**Mill.** The stamp-mill is situated in the valley of the main north fork and at the upper end of the Lemon creek waggon road. The mill contains ten stamps—Fraser and Chalmers pattern—two Frue vanners and one Wilfley table, operated by a 50 horse-power Pelton water-wheel under a head of about 100 feet, the water being obtained from the fork some distance above. There is also a small electric light dynamo run by a separate Pelton. The mill was run for two months and crushed about 500 tons of ore, and is reported to have saved about 55 per cent. of assay values, about half of which was in free gold. About a year ago the mill was run on a test lot of ore from the *Kilo*, but has since been idle and in the charge of only a caretaker. The tramway is about 3,000 feet long, and is of the Hallidie type, and at present is out of repair, some of the towers being down.

**Club Mineral Claim.** The *Club* mineral claim is a property on the head of Robertson creek, a tributary of Springer Creek, and is just being opened up by N. F. McNaught and associates. From this claim have been packed out this year, as a trial lot, about 5 tons of ore, which yielded about $10 in gold and 50 ounces in silver to the ton. The property is reached by a short but very rough trail, opening off the *Republic* waggon road about four or five miles out from Slocan City.

There are apparently two distinct veins on the property, nearly at right angles in their strike. The first of these shows about 36 inches of quartz occurring in a crushed zone from 5 to 7 feet wide, in which is included much crushed country rock, which appeared to be a light-coloured eruptive rock somewhat allied to granite. This vein and fissure have a strike S. W. and N. E., and a dip to the N. W. of about 30°. On the outcrop of this, an open cut some 30 to 50 feet long exposes the vein, and from this an inclined shaft has been run down for 20 feet, which, when visited, was filled with water. The slope was timbered in a crude way, and the side-rock so broken as to obscure its characteristics. From these workings some phenomenally rich specimens have been obtained, but it is safe to say the average of the face will run about from $7 to $10 in gold and 15 ounces silver to the ton. Across a small creek from the workings just mentioned, there is a second large outcropping of quartz from 6 to 8 feet wide, and apparently having a strike of N. 54° W., the dip being very uncertain. A short tunnel 15 feet long, and gaining 10 feet of depth, has been run in on this showing, and from this ore was being taken out, which, it is expected, is the 5 tons mentioned as shipped later in the season. The property is essentially an undeveloped prospect, but the results so far obtained give much encouragement for the making of a small mine.

**Slocan-Republic.** The *Republic* is a property in the same locality, and formerly attracted much attention, but has of late lain idle. There is here a 2-foot white quartz vein having a strike N. E. and a general dip of 30°, occurring very much as does that on the previously mentioned property, but which seems to be step-faulted by a series of small faults about parallel with the strike. The prospectors owning the claim had put down an inclined shaft about 25 feet deep, dipping at 60°, from which some very good ore was taken out, of which small shipments were made, said to have assayed $10 in gold

and 150 ounces silver. The property was then taken up by the Slocan-Republic Company, under management of R. C. Johnston, who gouged the outcrop for a length of about 75 feet and a depth of from 40 to 50 feet. It is reported that at 70 feet down another fault cut off the vein, but as the workings were partially filled with water, this could not be verified. This company started also a cross-cut tunnel from an adjoining gully, some 200 feet vertically lower, to cut the vein at that level. This tunnel had been run in for about 1,000 feet, but had not succeeded in cutting the lead when work was stopped.

Enterprise.

The *Enterprise* mine is situated at the head of Ten-Mile creek, at an elevation of about 2,700 to 3,700 feet above Slocan lake, and consists of the *Enterprise* and *Slocan Queen* Crown-granted mineral claims. The property has for some years been one of the largest shippers of ore in this camp, under the ownership and management of the Enterprise (B.C.) Mines, Ltd., of which S. S. Fowler is the engineer and local manager. About three years ago the company leased the property on a royalty basis to W. E. Koch, who has since that time operated the mine on his own account, shipping in 1903 about 900 tons of ore, and in 1904 about 775 tons, which averaged from 150 to 160 ozs. of silver to the ton, with 20 % lead and 20 % zinc. The property has been extensively opened up by a series of some seven adit tunnels driven in on the vein, of which tunnels No. 2 is in about 1,100 feet.

The vein runs in a N. 55° E. direction, with a dip of from 70° to 80°, cutting through a granite formation, which, although of rather varying width (from 0 to 24 inches), is very persistent and is traceable through both claims. The quartz gangue is enclosed in well-defined walls and carries, in chutes, galena with tetrahedrite and about an equal percentage of zinc blende, which latter mineral appears to be in increased proportion in the lower levels.

The lessee is confined to the levels of the mine above No. 2, and was obtaining most of his ore from between No. 3 and No. 4 levels, employing about 18 men underground and 8 above. The development is kept up on the levels being worked, the lessee being obliged to make proportionate advances in the levels, as he stopes the ore from above.

The property is well equipped with mine buildings, etc., and has also on Ten-Mile creek a fully equipped concentrating mill, and an air compressor, driven directly from a Pelton wheel, supplies compressed air to the mine through iron pipes. The water for power is taken out of Ten-Mile creek about a mile above the mill, and conveyed to the pressure box by flume and ditch. Beside the mill is a well-equipped laboratory, and houses for assayer and mill-men. The mill was not in operation, as no great difficulty was found in hand-sorting the first-class ore, and but a small amount of second-class ore was being mined.

## SLOCAN MINING DIVISION.

The Recording Office of the Slocan Mining Division is at New Denver, on Slocan lake. The Division comprises the drainage area of all streams flowing into Slocan lake above a point half-way between Eight and Ten-Mile creeks, on the east shore of the lake, and above a point one-half mile north of Indian creek, on the west shore of the lake.

Of this area the watershed to the west of Slocan lake, which is chiefly granite and allied rocks, does not appear to have produced any productive mines, although the superficial geology is very similar to areas on the eastern side of the lake, which have well repaid prospecting, but it must be admitted that in the latter case the mineralisation has been found nearer the contact with the Slocan slates and shales.

On the slope of the hills to the east and draining westward into Slocan lake, there has been a great deal of mining going on for years, in the vicinity of Silverton, of New Denver, and on Carpenter creek and its tributaries, which latter include the vicinity of Three Forks, Sandon and Cody, the most productive portion of the famous Slocan District, wherein were discovered in the early 90's the wonderfully rich silver-lead deposits, which "paid from grass-roots," and brought British Columbia, as a "Mineral Province," so strongly before the notice of the world.

Of the famous early producers a number are still being successfully worked—as the *Slocan Star*, the *Reco*, the *Ivanhoe*, etc., with every indication of continuing to produce for some time to come, but many others, after all the visible rich ores, which were found near the surface, had been "gutted out" to pay dividends, without the development necessary to permanent mining being kept up, have collapsed, their ownership has changed, and many have lain idle for the past two or three years, while little or no systematic attempt has been made to prove by development whether they are dead or only dormant. They are simply held, under Crown grants, idle.

Relief from this condition, however, appears to be at hand, in the system of leasing, which is just beginning to come into vogue in the district. The local business men, or miners who had worked in the various properties and had faith in them from knowledge so obtained, have, in several instances, secured leases to work the properties on "tribute" and under bond, which has been in some instances done successfully, revealing further ore-bodies. These discoveries will probably lead to the further development of the properties, which, as they now stand, may be said to have reverted to the rank of prospects.

As to the geological features of the Division, the shore of Slocan lake is chiefly granite, while to the east lie the Slocan slates, the contact being not far distant from the lake. Inland, the granites constantly crop out through the slates in knobs and mountain peaks, the whole being cut by igneous dykes, sometimes of great size, suggesting the thought that the slates had been "floated up" in an immense igneous upburst, and, while in evidence on the surface, and often for considerable depth, they may still be underlain by a general granite mass.

It seems permissable here to make passing mention of Slocan lake, for of the many beautiful lakes in British Columbia which it has been the writer's good fortune to see, Slocan lake is certainly the most beautiful. The lake is about 25 miles long, and two or three miles wide, flanked on the west by a rugged range of grand granite peaks, timber-clad on the lower portions, but bare and broken towards the summits, where lie glaciers, which, seen of a summer evening, glistening and flashing in the setting sun, form a picture not easily forgotten. On the eastern side of the lake the hills slope more gradually and are rounded, while along their foot-hills is some very good agricultural land.

The towns of Silverton and New Denver are on the eastern side of the lake, and for situation have few rivals in America, and aside from any future they may have from mining in the vicinity, seem destined to become summer resorts for those tourists who are not rushing through the country by the fastest trains, but who have time to take a breath of the mountain air here found in perfection.

Slocan lake is at present off the line of general travel, but can be reached at its northern end by railway from Nakusp, on Upper Arrow lake, or at its southern extremity, from Nelson *via* Slocan Junction, while on the lake a first-class steamer makes a double trip daily, connecting with the trains. The towns along the eastern shore have very fair hotel accommodation for a limited number of guests.

The writer entered the district from the south, at Silverton, proceeding later to New Denver, Three Forks and Sandon, noting the mineral development successively at these points, in which order it will be found described in the following report :—

### Silverton and Vicinity.

Noonday.

The *Noonday* claim is about 1½ miles south-east of Silverton, on the *Hewitt* waggon road, and is located on a small creek flowing west into Slocan lake, at an altitude of 2,800 feet. The property is held by Wilson Smith and the Bank of Montreal, and is now idle and has been for a year or so, having last been worked by leasers more intent on extracting ore in sight than in keeping up development.

The rock formation of the vicinity is slate, in which there occurs a crushed zone, having well-defined walls, between which is the crushed country rock and a vein of quartz about two feet thick, which evidently carried, in rather irregular bunches, galena and zinc blende, but in what amount could not be seen, as the property was not being worked. The vein dips at a flat angle, and No. 1 tunnel has been driven in on the lead for a total distance of about 250 feet, but with branches, bringing the lineal feet of work here done up to about double that amount. No. 2 tunnel has been driven in at 50 feet lower level, for about the same distance. A fault is apparent which dislocates the vein towards the inner part of both tunnels. Some attempts at concentrating the ore had evidently been made, as a Cornish jig, driven by water-power, was erected in the creek.

L. H. Group.

The *L. H. Group*, owned by A. R. Fingland *et al*, is situated some four or five miles south-east of Silverton, at an altitude of 5,500 feet. The property was being developed by two men most of the summer, but when visited by the writer the owners were temporarily absent, only a Swede, who knew nothing of the property or workings, being found at the cabins, so that only the tunnel mentioned was seen, the upper workings on the bluff not being heard of until later. On the top of the bluff is an exposure of quartz some 15 feet wide, running about $8 in gold, and associated with arsenical iron pyrites. At this point there were found a number of nodules of native arsenic, carrying 1,000 oz. of silver to the ton. These occurred in a calcite veinlet.

About 80 feet vertically below this exposure, a tunnel had been started in the face of the bluff, and was in about 300 feet, with a short cross-cut to the right, while at 60 feet from the face of the tunnel a cross-cut had been driven to the left for 110 feet, from which cross-cut a drift had been run for 70 feet nearly parallel to the tunnel, and was being pushed ahead. This tunnel starts in an altered shale rock, strikes a porphyry dyke, and follows a slip plane. It cannot be said that there was any vein showing, or any marked line of mineralisation, but the dyke matter contains a small percentage of arsenical iron pyrites and pyrrhotite, with quartz, which shades off into the dyke matter. The percentage of mineral showing is not great, but the manager reports the gold values as sufficiently high to permit of treatment at a profit.

Rocklands.

The *Rocklands Group* consists of the *Willard*, *Rocklands* and *Rustler Fraction* mineral claims, owned by J. C. Graves, Frank Watson and Judge Spinks, and is under the management of Mr. Hamilton, of Silverton. The group is situated about three miles due south-east of Silverton, at an altitude of 4,150 feet, on a small creek, between the forks of which, in a knoll, about 300 feet of tunnelling has been done, cross-cutting in the schistose country rock, a mineralised zone about 60 feet wide, carrying copper sulphides with gold values. On the opposite side of the small creek, the mineralised zone appears in a bluff, and is apparently of considerably greater width than the tunnel has as yet proved. Mr. Hamilton reports the zone to run about 1 % copper and $6 in gold.

These values are not high, but taken in conjunction with the extent of the mineralised zone, make the property well worth serious investigation. During August of 1904 one man was employed.

The waters leaching out of this zone, and carrying sulphates of copper, had filtered down the creek through an old log-jam, the rotten wood of which had precipitated small nodules and sheets of metallic copper, also forming oxides and carbonates. To this source, and not to the lead, must be attributed the samples of this description which were being so freely exhibited throughout the district, but not by the management.

Hewitt.

The *Hewitt Group* is about 3½ miles south-east of Silverton, and consists of the *Hewitt*, *Rincon Fraction*, *Tranquillity*, *Crow Fraction* and *Mole* mineral claims, the local agent and part owner of which is Mr. C. T. Cross, of Silverton. The company owning the property is not working it at present, but has leased a portion of the mine to Mr. M. S. Davys, of Nelson, who has kept a small force of about seven or eight men employed all summer, and has shipped this year over 400 tons of ore, running about 150 ounces of silver to the ton, 5 % lead, and 13 % zinc.

The deposit is in a contact between slate and granite, which has been opened up for a vertical distance of 830 feet, by four adit tunnels run in on the vein and two "blind" levels, Nos. 4 and 5, all connected by raises. No. 1 level is 260 feet vertically below the outcrop, and is 200 feet long with about 100 feet of raises, etc., and has been run to within 75 feet of the boundary line of the adjoining claim, the *Lorna Doone*. No. 2 tunnel is 1,090 feet long with 150 feet of raises, etc., and is 118 feet below No. 1. No. 3 is 1,590 feet long, and 104 feet below No. 2. No. 6 is 2,250 feet long, is some 350 feet below No. 3, and has been run out to the boundary mentioned. From the No. 3 level a cross-cut is driven into the hanging-wall 72 feet, at the end of which a connection is made down to the level of No. 4, where another cross-cut was made and a straight connection made with No. 6 tunnel. The levels Nos. 4 and 5 have only been started, No. 4 having been driven 60 feet and No. 5, 37 feet. From Nos. 2 and 3 levels, in addition to the contact deposit, there are a couple of north and south ore-chutes which cut into the granite foot-wall, and on these, on the No. 2 level, drifts to the extent of 100 feet have been driven, and on the No. 3 to the extent of about 405 feet.

These north and south ore-chutes are the portion of the mine which has been leased to Mr. Davys, and from which he has this year stoped out over 400 tons of first-class ore. Up to 1904, including the Davys shipments, there has been taken from the mine of sorted first-class shipping ore, 3,054 tons, and of second-class, now on dump, 3,878 tons; total, 6,932 tons. The sorted ore runs about 150 ounces silver to the ton, 4 to 5 % lead, and about 13 % zinc. The ore, as mined, will run from 30 to 40 oz. silver, 1.5 to 7 % lead, and 6 to 12 % zinc.

The ore-chute on the contact is, at the No. 2 level, about 270 feet long, or say an average of 150 feet. The ores of the upper levels were richer than those below, this being possibly due to secondary enrichment. In the lower levels comparatively little shipping ore was noted, but there is a large tonnage of second-class ore which would pay well to concentrate.

The mine is well equipped with bunk and mess-houses, and an office and quarters for the foreman. An aerial wire tramway connects the workings with the flat below, where at the lower terminal an ore-shed has been built. From this ore-shed a good waggon road connects with the dock at Silverton, and a zig-zag trail goes up to the mine, but timber and supplies are sent up on the tramway.

Galena Farm.

The *Galena Farm*, or, as it was formerly called, the *Currie Group*, consisting of five Crown-granted claims, the *Currie*, *Grover*, *Stephenson*, *Katie*, and *Peerless*, is situated 1½ miles S. E. of Silverton, and is owned by the Galena Mines Co., Ltd., of London. This property has been idle for some time and the

workings were filled with water, so that nothing could be seen underground. The mine was formerly considered as having great promise, which the present surface showing would seem to justify, but if one may put any reliance on local reports, the property would seem to be another victim of over capitalisation and "across the sea" management.

There is showing on the surface, and cutting through a granite formation, a strong quartz vein, 9 feet wide, which can be distinctly traced on the surface in an east and west direction for a long distance, and which contains chutes of ore consisting of argentiferous galena, zinc blende and spathic iron. The lead dips to the north at an angle of about 50°, and it is locally reported that the workings showed, at about 150 feet down, a vertical east and west fault which cut off the vein, upthrowing it for some distance, as was afterwards shown when the vein was subsequently picked up by a cross-cut to the north. The property is essentially a concentrating proposition, and would run from 10 to 12% lead, with about 10% zinc and 15 oz. silver to the ton, making concentrates of about 60% lead and 100 oz. silver. The zinc blende would have to be separated and should, with the improving market for such mineral, prove an additional source of revenue, rather than as formerly, the reverse.

The plant is splendidly and expensively equipped with every appliance. There is a vertical 2-compartment shaft down 220 feet, equipped with hoisting plant, cage, etc., driven by a Pelton wheel under a water head of 300 feet, the water being brought from Gold creek, on which a dam is constructed, by a ditch, and a pipe-line 3,500 feet long and 30 inches at intake, reducing to 16 inches. There is also in place an old steam hoist and boiler, which are still serviceable. A separate Pelton is geared to the half of an 8-drill air compressor, formerly used for two drills and the pumps, of which there are three, a Northey, a Knowles and a Cameron. With the very complete equipment, and the really good showing, the property seems attractive for investigation, and under reasonable management should become a producer. The machinery and plant are kept in good repair by a caretaker who lives at the mine.

Wakefield.

The *Wakefield Group* includes the *Wakefield, Cazabazhua, Beaven, Robertson, Jennie Lind, Dalkeith, Kelso* and *Ben* mineral claims, situated on Four-Mile creek about two or three miles north-west of Silverton, at an altitude of 5,900 feet. The lead is a fissured zone from 15 to 20 feet wide, occurring in black slate, dipping to the south at an angle of about 20° to 25°, with a lime band on the foot-wall from 2 to 8 feet wide, which carries galena, although the ore is sometimes found also on the hanging-wall side. The property is opened up by a series of tunnels, of which No. 1 is in 700 feet, and above which the ore is pretty well stoped out, though one man was working there getting out ore. No. 2 is in about 1,100 feet and is largely stoped up to No. 1. Nos. 3, 5 and 6 are each in from 500 to 600 feet on the vein, but do not appear, as yet, to have struck pay ore.

The property has been under lease for the past two years to the Anglo-Slocan Syndicate, Ltd., of which the manager is Mr. J. T. Lane, who employed this past summer 10 miners, 10 muckers and trammers, with 2 or 3 men on tram-lines, extracting about 40 tons of ore a day, which was concentrated in the company's mill at the foot of the hill on Four-Mile creek. The ore concentrated in the ratio of 12 to 15 into 1, producing a lead concentrate running 64 % lead and 50 ounces of silver to the ton, and at the same time a zinc concentrate running about 45 % zinc and 20 ounces of silver. The present company's lease has about expired, so it is perhaps not to be wondered at that the development has been neglected and little ore blocked out ahead.

In the upper levels the ores were higher grade, carrying gray copper, but more zinc blende is coming in with depth. Of the latter mineral there is a large quantity which is not mined more than is necessary, as a market for the zinc has not been obtained, the concentrates

being stored at present on the dump, the present price of $10 a ton for 45 % zinc and 20 ozs. of silver, offering no inducement to sell. The ore is taken out at No. 2 tunnel, where it is trammed 100 feet to a bin, from whence it is run in a short tram 400 feet to a second bin, which in turn discharges into a third bin; it is then loaded into the buckets of the main aerial tramway, which is 1¼ miles long, with a fall of 3,000 feet.

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

**Emily Edith.**

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

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

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

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

**Comstock.**

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

MOUNTAIN RANGE, SLOCAN M. D.

assists with the ore sorting. The property is situated on Fennel creek, a tributary of Four-mile creek, at an altitude of 6,400 feet, and is 13½ miles from Silverton. It includes the following mineral claims: The *Comstock, Blue Peter, Isabelle Fraction, Kentucky Girl, Ruby Fraction, Silver Cup* and *Silver Chief.*

The rock formation of the vicinity is granite, and at the mine appears to be cut by a porphyry dyke. Following the fissure, and seemingly in places replacing the dyke, is a quartz vein from 1 to 5 feet wide, having a strike N. 30° E., with a dip of 30° to the south, carrying, in bunches or chutes, up to 24 inches, galena and gray copper.

When the property was visited in August last, from 1½ to 1⅔ tons of sorted ore were being mined daily, which would assay about 50 per cent. lead and 100 ounces of silver to the ton. This ore was sacked and hauled by waggon to Silverton, at a cost of $5 a ton, the team making one round trip in a day.

The mine is developed for a vertical depth of 400 feet, by a series of adit tunnels of the following lengths: No. 1, 40 feet; No. 2, 200 feet; No. 3, 360 feet; No. 4, 540 feet; No. 5, 720 feet; No. 6, 280 feet; No. 7, 160 feet; No. 8, 360 feet; No. 9, 140 feet. Stoping had taken place between levels 2 and 3 for a length of 50 feet, and between 5 and 7 for a distance of 360 feet, although not continuous. In No. 9 there is a small streak of very rich ore, running as high as 360 ounces silver to the ton.

Towards the foot of the hill and near Four-Mile creek, a concentrating plant has been erected, for which the character of the *Comstock* ore, which is easily sorted by hand and of which little is second class, does not seem to offer justification. This mill is very complete and well equipped, and was erected in 1897 at a cost of $23,000, and after running a couple of months was closed down in 1898, since when it has been unused. The ore was hauled to it by teams from the mine, a distance of 1½ miles down a heavy grade, and dumped into the mill storage bins, from which it was trammed to the mill bin. The mill was designed to crush the ore by Blake crushers, from which it was fed by automatic feed to rolls on the lower floor, from whence it passed to an elevator, and was raised to a 3-screen trommel at the top of the building. The product of the first screen went to the classifier; of the second, to a pair of fine jigs; while material from the third screen, and the oversize, went each to a pair of coarser two-compartment jigs. The products of the classifier went as follows: First product to two-compartment jig; second and third products, each to a three-compartment jig. The overflow from the classifier went to a V-shaped settler, the slimes from which were fed to two double-decked Evans revolving tables.

**Fisher Maiden.**

The Troy Mines, a company of which C. Twitchell, of Spokane, is secretary, is operating the *Fisher Maiden Group*, as it was formerly called, under the superintendency of C. D. Long. The properly includes the *Troy* and *St. Helena* Crown-granted mineral claims, and is situated on Four-Mile creek, about 1½ miles by trail above the point where the *Comstock* waggon road leaves Four-Mile and turns up Fennel creek. The main and original workings are some 1,000 feet back from the creek, on a small gulch near Porcupine creek, where three tunnels have been driven in. The No. 1 has 50 feet depth at the face; No. 2 is some 75 feet lower, and has 150 feet of drifting on the vein, preceded by a cross-cut tunnel 150 feet long; while No. 3 tunnel is a cross-cut from Porcupine creek valley, 200 feet long, with a drift on the vein for 350 feet, and is 100 feet lower than No. 2.

The vein has been traced over a small rise on to Four-Mile creek, where No. 4 tunnel was driven in for 275 feet on the vein, at a height of 100 feet above the creek, or at a level 230 feet lower than was No. 3 tunnel. No. 5 is from about 30 feet above the level of Four-Mile creek, and some 70 feet below No. 4. This tunnel is being continued on the vein to cut the ore chute seen in tunnels Nos. 1, 2 and 3, at a depth of 300 feet lower than No. 3, which it should do in a distance of about 1,000 feet from the portal.

The vein is a true fissure in syenitic granite, having a N. E. and S. W. strike, with a dip to the N. W of from 75° to 80°, and appears to accompany, and possibly partially replace, a porphyry dyke, the mineral occurring on either granite wall for from 4 to 12 inches thick in the ore chutes, while the vein proper is from 1 to 4 feet wide.

The company is at present confining its energies to the Four-Mile creek workings, and is operating with 4 miners and a car man, pushing the long No. 5 tunnel ahead as fast as possible, and incidentally taking out a little ore from the ore-chute between levels 4 and 5. The ore-chute above No. 1 is reported as stoped out, and while some stoping has been done above Nos. 2 and 3, there is still ore in sight. The ore-chute on No. 4 is about 110 feet long and contains a heavy percentage of zinc.

The company shipped, in 1903, some 14 cars of ore, and in 1904 5 cars, or about 100 tons, running about 90 ounces of silver to the ton, and 4 or 5 per cent. lead. The property is provided with most comfortable bunk and mess-houses and office and stables. The mine buildings are sufficient, but are temporary in character, awaiting the completion of the long tunnel.

**Alpha.**

The *Alpha* is a group of Crown-granted claims situated about two miles from Silverton, and some years ago shipped 1,200 tons of ore, chiefly from a large body of galena and lead carbonates found practically on the surface. For a number of years the property has lain idle, originally on account of litigation, the causes of which are said to have been adjusted, and the property is now held by N. F. McNaught, *et al.*, of Silverton.

The formation is a black slate and limestone, much disturbed and cut by faults. The original discovery was the immense pocket of ore already mentioned, which has been mostly extracted. Leading into this is a vein having a north-east and south-west strike, and a dip to the east of apparently 30° to 40°, accompanied by a light-coloured dyke. The dip has caused some trouble, as apparently the No. 1 tunnel was run under the main vein and missed it, as inclines in ore, from the main showing, later indicated. The showings of ore in the tunnels are not encouraging for this reason, but there is a very promising showing in the shallow upper workings, which might be proved and worked by cross-cuts from the present tunnels. The lead here appears to be as wide as 48 inches in places, of iron oxides and lead carbonates carrying good silver values, and locally, a stringer of 20 inches of calcite was noted on the foot-wall, carrying a secondary deposit of ore of good value.

No. 1 tunnel is about 300 feet long, with upraises, cross-cuts, etc. A secondary tunnel on the same level and started from near the portal of No. 1 was run N. 70° E. for 50 feet, and immediately below this was No. 3 tunnel. About 80 feet below this is No. 4 tunnel, a cross-cut for 100 feet through very much contorted country rock, with a drift of 110 feet on the vein but with no ore showing. No. 5 is still below No. 4, and is on a well-defined lead which did not show ore. It is very much a question whether these last tunnels are on the lead, which, in the upper workings, carries ore.

A gravity 3-rail surface tramway 1,200 feet long runs from No. 1 tunnel at a slope of about 30° down the hillside, at the bottom of which are bins and an ore-shed, from which a waggon road 2½ miles long leads to Silverton.

## VICINITY OF NEW DENVER.

**Mollie Hughes.**

The *Mollie Hughes Group* is situated on the flank of Goat mountain, about one mile north of the town of New Denver, and on both sides of the Nakusp and Sandon branch of the C. P. Railway, at the trestle. The property is owned by T. Avison *et al*, of New Denver, and consists of five Crown-granted

claims. The country rock is a syenitic granite, cut by a number of parallel and well-defined fissures, running east and west or along the flank of the mountain, in which occur quartz veins of greater or less width, carrying, in chutes, ore high in silver.

On the *Kincara* vein, just below the railway trestle, there is a quartz ledge, with an E. and W. strike and dip of 70° to the north, which is a clean, well-defined fissure vein in granite, from 4 to 12 inches wide, and on this a tunnel has been driven for about 80 feet, in which the vein appeared for about 60 feet, when it pinched down to a seam, but came in again towards the face. From here, about 12 tons of ore were shipped in the early part of 1904, which yielded 146 ounces in silver and about $4 in gold to the ton. The vein has been opened up on the surface by various open cuts, etc., for about 1,000 feet, and a cross-cut tunnel has been started to cut the vein at a depth of 70 feet. This has been driven 70 feet, and it is calculated that it will have to go another 40 feet before striking the ledge.

On the *Real Idea No. 2*, one of the group, above the railway track, almost a quarter of a mile from, and 600 feet higher than, Slocan lake, in a large open pit, a quartz vein, here from 7 to 8 feet wide, is being developed and had been proved on the surface for 400 feet. This is also in granite, with free, well-defined walls, and although no shipment had been made from this opening, about a carload of ore was ready to ship, which, from rough samples, was expected to go about 150 ounces in silver and $40 in gold to the ton.

About 75 feet above the railway track, at the first trestle, another quartz vein has been opened up with a north and south strike, on which Mr. Sandiford, of the *Bosun* mine, is reported to have sunk a shaft for 65 feet, obtaining therefrom a carload of ore, one-fourth of which is said to have assayed 556 ounces of silver and $40 in gold to the ton, while the remainder went 100 ounces silver and $10 in gold. The owners have shipped from these workings a carload in bulk, which assayed 72 ounces in silver and $10 in gold to the ton. Connecting with the bottom of this shaft is a 100-foot tunnel, which was supposed to be a cross-cut, but which, in fact, follows along a small east and west vein carrying values. From the shaft, at 40 feet from the surface, levels have been run north and south for short distances. The ore is wheeled from the lower tunnel to a bin beside the railway track, where, when enough for a carload has been accumulated, it is loaded.

From the *Mollie Hughes* eastward the face of Goat mountain is seamed with small quartz veins, on a number of which mining in a small way is being carried on. The country rock on this upper part of the mountain is granite, and the veins have a general north-east and south-west trend.

Capella.

Of these the best known is the *Capella Group*, comprising five Crown-granted mineral claims, owned by W. R. Will and N. F. McNaught, from which was taken what was probably the most valuable carload of ore ever shipped from the Kootenays. This carload of ore yielded $10,100 smelter returns, and assayed 879 ounces silver and $7.80 in gold to the ton. The property was not personally visited, as Mr. Will reported it as stoped out over the level, and he was only driving a lower cross-cut to the vein, which was not through, and so there was nothing to be seen. Mr. Will supplied the following general information:—On the south face of and near the summit of Goat mountain, at an elevation of 2,500 feet above Slocan lake, a quartz vein 5 or 6 inches wide cuts the granite in a north-east and south-west direction, dipping to the west at an angle of 35°. There are four other parallel veins on this property. The main vein is opened up by No. 1 tunnel, which is an 80-foot cross-cut to the vein, with a drift of 200 feet on the vein, above which the vein has been stoped to the surface. Below this there is No. 2 tunnel, a cross-cut of 260 feet, with a drift of 120 feet, and upraises therefrom to No. 1.

The ore-chute is about 100 feet long, and the values are chiefly on the hanging-wall side. There are several faults throwing down to the north, cut by the tunnel, and a fissured zone in the rock, 6 or 8 feet wide, cuts the lead without faulting it, near which, in the vein, the best values have been found to occur. The ore-chute mined has been found to continue to the tunnel level, being still in the bottom, and the lower tunnel is being driven to develop it at a lower level. On another and lower vein, tunnels have been run in 55 feet and 120 feet, with raises.

The shipments made to date from the property amount to from 150 to 160 tons of ore, of an average value of $100 a ton, but no shipments were made in 1904. The drifting at present going on is being done by contract.

**Bosun Mine.**

The *Bosun* mine, situated a short distance from Slocan lake, about half-way between New Denver and Silverton, is owned by the Bosun Mines, Limited, 5, Fenchurch Avenue, London, England, and has for the past year or two remained idle, being now in charge of a local watchman. The property was last under the management of Mr. Sandiford, who is well known in the district. The property is extensively developed by a series of five adit tunnels on the lead, for a vertical depth of 365 feet and a total length of nearly 1800 feet. The lowest, or No. 1 tunnel, is 1,000 feet long, connected by raises with No. 2, 130 feet above. No. 2 is 800 feet long, and 80 feet below No. 3, which is 1,000 feet long, and 85 feet below No. 4. No. 4 is 500 feet long, and 60 feet below No. 5, which is 300 feet long, and, at the face, 60 feet below the surface.

The lead is a large fissured zone filled with crushed material, in which occur, with quartz, lenses of galena and zinc blende. Of the interior of the mine little could be seen, as all the levels are well-timbered and lagged, and the "sloughing off" of the clay, from water and air, obscured everything.

**Mowich.**

The *Home Run* or *Mowich Group*, owned by C. Greenlee, Moran and Kingsbury, is situated on the south slope of Carpenter creek, about two miles from New Denver, and a short distance above the old New Denver-Kaslo waggon road. The property includes the *Home Run*, *Mowich*, *St. Clair*, *Rosemarie*, *Grand Stand* and *Ronald Fraction* claims, and is in the "slate belt." The main lead is a quartz vein, from 3 to 6 feet wide, cutting the slates, and on this there is a 100-foot tunnel, with lower down a 500-foot tunnel, from which some very good ore was taken and some small shipments made.

During the summer of 1904, work was confined to a cross-vein of quartz occurring 800 feet lower down and running with the formation, between very contorted slates, having a strike about S. 55 degrees E. and a dip to the S. W. of 80°. On this vein No. 1 tunnel was in about 300 feet, at which point there was a raise up 35 feet, while 80 feet above No. 1, was No. 2, then in 100 feet. The quartz carried, in chutes, gray copper and galena, and one carload shipped ran 114 ounces silver and $2 in gold to the ton. Part of a carload was ready in the ore-shed, and it looked probable that about two more carloads would be shipped during the year.

**Mountain Chief.**

The *Mountain Chief* almost adjoins the last-mentioned property, and has been idle for some time. It is owned by George Hughes ($\frac{1}{3}$) and McCune, of Spokane ($\frac{2}{3}$). The property was one of the famous mines of the district, and during 1892, 1894 and 1897 is represented to have shipped $150,000 worth of ore. There is a strong vein in limestone and slate cutting N. 20° E., and dipping about 45° to the S. W. The ore was galena with zinc blende. On one dump there is a pile of black zinc ore estimated at 50 tons, and at a lower tunnel 100 tons of similar ore is piled up. This ore is reported to carry 40 per cent. zinc and 50 ounces of silver to the ton.

### Vicinity of Three Forks.

Before the Kaslo and Slocan Railway and the Rosebery branch of the Canadian Pacific Railway were constructed, the town of Three Forks, situated, as its name implies, at the junction of the three forks of Carpenter creek, was a town of considerable importance, as it was at the junction of the waggon road from New Denver to Kaslo and the branch road from Sandon, over which route, in the early days, many tons of very rich galena ore were taken out by pack-train and waggon. This traffic induced the construction of the two railways, but, as is usually the case with such intermediate stations on a waggon road, the advent of a through railway practically killed the town, and to-day it is deserted, save by a few people having local interests which still keep them there.

There were formerly in the vicinity three or four mines of importance, which have been passing through a period of inactivity, from which they are only now recovering; in addition to which, the recent development of a number of small rich "dry ore" properties again gives promise of renewed mining activity in the vicinity, and of a renewed vitality to the old town, which, even now, can boast of two hotels and a store. The town is a station on the Canadian Pacific Railway branch, and is the railway headquarters for the upper end of the branch, as the grade from here up to Sandon is so steep that trains have to be split up and taken on in sections.

**Monitor Mine.**

The *Monitor* mine, including the *Monitor* and *Hustler Fraction*, is owned by the Monitor and the Ajax Fraction, Ltd., of 42 and 44, Effingham House, Arundel Street, London, and is under the local management of Mr. Maurice Gintzburger, with Mr. Fingland as mine superintendent. The mine is now idle, pending the installation of machinery at the mine, and the construction, near Rosebery, of a plant for the separation and recovery of the zinc blende, which occurs with the galena to such an extent as to have been a cause of penalty at the smelter. Its removal from the galena will permit that ore to be treated at a lower figure, while the zinc, if properly prepared for market, will have a distinct value of its own. Formerly the mine shipped extensively, the total shipments amounting to 3,185 tons of ore, which netted $192,401, of which there was shipped prior to 1901 (when the present company took possession), 688 tons, valued at $68,869.60, the present company having shipped 2,497 tons, valued at $125,531. The property is situated on the south slope of the south fork of Carpenter creek, opposite the town of Three Forks.

The country rock is slate, and is cut by a well-defined quartz vein having a general N. 10° E. strike, and a dip to the S. E. of from 60° to 90°, cutting the bedding of the slates nearly at right angles. The vein varies in width, but is as great as 48 inches, and carries galena and carbonates, with silver values and a certain amount of gold, also, in parts, a considerable percentage of zinc blende. The property is developed by five adit tunnels, of which the upper, or No. 1, is 450 feet long, and in its course cuts one fault with a throw of 40 feet, beyond which the vein has been again picked up.

No. 2 tunnel, 78 feet lower and 650 feet long, has about 200 feet of additional exploratory workings off it, and cuts through two faults, the first, near the portal, with a throw of 32 feet to the right, the second being that noted in No. 1. The work has been pushed through both these faults, but was finally stopped at another fault, which dips into the hill with the bedding at an angle of 60°.

No. 3 tunnel is 50 feet below No. 2, and meets at the portal a fault with a throw to the right of 20 feet, and also cuts through the 32-foot fault coming down from the level above. This tunnel likewise is stopped at 850 feet in, by the same fault which blocks No. 2.

No. 4 tunnel is 122 feet below No. 3, and is 1,080 feet long, and cuts the same two faults as does No. 3, but has not, as yet, been driven out to the main fault.

No. 5 tunnel is 217 feet lower than No. 4, and is a cross-cut for 400 feet with 120 feet of drifting on the lead, in which is encountered a new fault not previously met with. It is estimated that this level would have to be extended 1,000 feet before it struck the line of the main fault. There has been good ore in the upper levels, which, although pretty well mined to these levels, is still continuing into the floor, so that the long tunnel is expected to cut these ore-chutes with depth. Besides this, No. 5 cuts a new ore-chute, on which some stoping has been done and an intermediate level started.

Rowse Fraction.

The *McAllister Group* consists of four claims, including the *Rowse Fraction*, situated about six miles from Three Forks, up the north fork, and is being operated by Hunter, Fairbairn, *et al.* The country rock here is a schist on the foot-wall, and an argillite on the hanging-wall, of a well-defined quartz vein with a strike N. E. and S. W. and a dip of 50° to the S. E., or into the hill. The quartz vein, from 3 to 4 feet wide, was followed down for about 30 feet, when it was completely cut off by a fault. A cross-cut tunnel, started 30 feet lower down, passed under the line of the upper workings without encountering any vein, but at 150 feet in, the vein was again picked up and drifted on for 20 feet. The tunnel cuts in its course a second small vein, on which a short drift had been run, but with no great results. A short distance above the vein there is a large porphyry dyke about parallel with it. The vein quartz carries galena, with gray copper and silver sulphides, the ore, as shipped, running over 250 ounces in silver to the ton. About 300 feet to the S. W. of the workings just mentioned, and some 150 feet higher up the hill, an open cut and tunnel developes a second vein of quartz, which gives much promise, but had been little developed.

Jo-Jo.

The *Jo-Jo* is situated about a mile to the north of the last-mentioned claim, and is of about the same character. The property has been worked during the past season by two leasers, who have shipped about 25 tons of ore, running 150 ounces in silver. During the summer some samples of ore were met with in the workings which gave phenomenally high assays.

Messrs. Cory and Foster operated the *Cinderella*, in the same neighbourhood, under lease, and shipped between 175 and 200 tons of ore during the year. The property is owned in England.

Idaho-Alamo.

The old *Alamo* and *Idaho* mines, which formerly were among the largest producers in the Slocan district, have been amalgamated under one company, the Idaho-Alamo Consolidated Mines, Ltd., an English company, of which Mr. P. D. Ahier is superintendent and engineer. The properties are situated on Howson creek, which enters Carpenter creek about a mile below Three Forks. At the head of this creek, near the summit, are two short branch streams ending in semi-circular basins surrounded by steep bluffs, through which the leads cut, and from which point they have been worked. The rock formation of the vicinity is slate, cut by porphyritic dykes, much contorted and bent, and in places faulted, although in the properties under review no important faults were noted.

The *Alamo* vein was formerly worked from the *Alamo* basin, from which a cross-cut has been driven through into the *Idaho* basin. The claim has been developed for a vertical depth of 288 feet, by four levels driven in for from 1,000 to 1,200 feet, and systematically laid out with raises, etc. Above these levels the known ore has been pretty well extracted. There was, however, good ore in the floor of the bottom level, and in a winze, so there is reason to believe that it continues downwards, and it is reported that a tunnel will be driven this winter to prove this. The vein is from 3 to 8 feet wide, a fissure in slate, with a dip varying from 45° to 90°. The last shipment was made in 1898, when 400 tons of ore were shipped, running 40 % lead and 180 oz. silver to the ton.

A Riblet aerial tramway, 6,000 feet long, with a rise of 3,000 feet, runs from the mill on the railway up Howson creek to the junction of the *Alamo* and *Idaho* basins, and can be produced in a straight line to the *Alamo* workings, if desired. In the meantime a "baby tram," 1,800 feet long, runs from the upper terminal of the main tram to the *Idaho* workings, and over this all the *Idaho* ore is transported.

During last summer, all the work was confined to the *Idaho* basin, and while a little underground work was in progress, most of the work was being done on the outcrops, and on the surface of the claims in the basin, from 25 to 30 men being employed. The property is opened up by a series of adit tunnels, not all of which are connected.

There was exposed on the surface of the lead a large body of ore which was being quarried, while in the basin above the claim a gang of men was employed removing about 2 to 3 feet of the surface soil of the basin, which was found to contain nodules of galena to such an extent as to yield about one ton of 200 oz. silver concentrates for 15 tons of soil. This "outside" work was being pushed to take advantage of the fine weather, which accounted for apparent neglect of "inside" work, which could be performed in bad weather.

The total shipments from the mine are reported as amounting in value to about $1,000,000, from which the various companies and owners have paid in dividends $400,000.

There are in this basin two well known veins, the *Idaho* and the *Cumberland*, which are parallel for part of their course, but the *Idaho* branches off abruptly to the south about the middle of the basin. The concentrates from the *Cumberland* ore run about 65 oz. of silver to 55 % lead, and from the *Idaho* about 106 oz. of silver to 55 % lead, while the concentrates from the soil of the basin, mentioned previously, run nearly 200 oz. of silver, which has led to the belief that the ore thus found in the soil of the upper basin came originally from the disintegration of the *Alamo* vein, which outcrops high in the bluff above the *Idaho* basin.

Mill.

The *Idaho* mill is on the Canadian Pacific Railway at Alamo, about one mile below Three Forks, and at the lower terminal of the aerial tramway already mentioned. The terminal storage bins have a capacity of 1,000 tons, and the mill has a capacity of 100 tons in 24 hours, but when visited, was running only on the day shift, putting through about 50 tons a day. From the storage bins the ore passed through a crusher to an ore bin with a capacity of 40 tons crushed ore, from which it is fed by an automatic feeder to rolls, from which it goes to the first elevator and trommels, etc. The plant consists of crusher, 3 sets rolls, Huntington mill, 2 elevators, 10 jigs, spitzkasten, 4 Wilfleys, and 2 extra Wilfleys to treat tailings from the first four.

The following assays were given by Mr. Ahier:—

| | Silver, oz. per ton. | Lead, %. | Zinc. %. |
|---|---|---|---|
| Lead concentrates | 64 | 56.5 | 13.2 |
| Zinc " | 30 | 1.2 | 40 |
| Jig tailings | 4.1 | .2 | .. |
| General tailings | 5.7 | .4 | |
| Third screen, No. 7 jig | 30.5 | 1.8 | 42.1 |

A saving is claimed for the mill of 95 % of the lead contents.

## Vicinity of Sandon.

Slocan Star.

The *Slocan Star Group* of mines has been, and still is, one of the most successful of the district, having paid in actual dividends a larger amount than has any other metalliferous mine in British Columbia. The group

includes the following Crown-granted claims:—*Slocan Star*, *Silversmith*, *Jennie*, *Slocan King*, *Emma*, *Windsor*, *Morning Sun*, *Shogo Fraction*, *Wyoming* (in part), *Echo Fraction*, *Ophir No. 3*, *Silver Star Fraction* and *Hidden Treasure*. The first five of these are reported as located under the old Mineral Act, and, consequently, have "extra-lateral rights," that is, they can follow the lead to the dip across their side lines, while the rights of the remaining claims are bounded by vertical planes through their respective boundary lines.

The property is owned and operated by the Byron N. White Co., of Milwaukee, Wis., of which Byron N. White is the president, and J. W. Dadmun secretary-treasurer, while the local manager is Oscar V. White. The capital of the company is $500,000, over 95 % of which is held by three persons. The company has paid in dividends to date $525,000, of which the last was $25,000, paid August 8th, 1904. The total shipments up to July 1st, 1904, were 32,453 tons, of which about one-third was shipped as crude ore, and the remainder as concentrates, and this carried 2,673,248 ounces of silver and 18,549 tons of lead.

The property is situated on a gently sloping hillside on Sandon creek, about half a mile from its junction with Carpenter creek, at the town of Sandon. The mine is opened up by five levels, all entered by cross-cut tunnels. The lead is a regular quartz fissure vein, cutting through and across the bedding of the black slate country rock, and accompanied by a zone of crushed slate country rock, having a normal width of 4 feet, but occasionally widening out to 30 feet. The outcrop of the vein, as it appears on the surface for 3,000 feet, is in shape like the letter "S," the general strike being east and west, while the dip is variable, averaging about 50°, and is south, or into the hill. The mineral usually occurs on the hanging-wall side of the vein, but occasionally ore is found on both sides. The ore occurs in chutes in the vein, of which there are two main chutes developed by the workings. These are from 100 to 150 feet wide, and extend from the surface as far down as the workings have gone, the silver values continuing with depth. Nearly parallel with the outcrop is a porphyry dyke or boss, which seems to be associated with the fissure and its mineralisation.

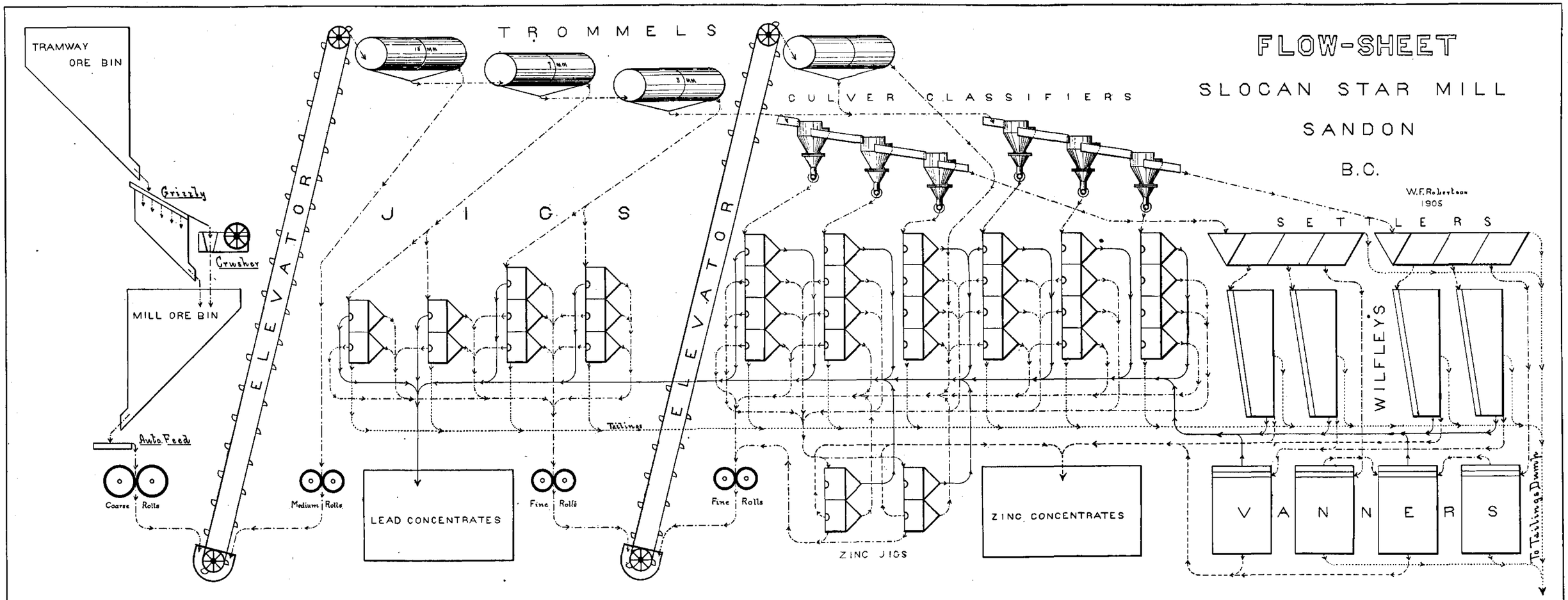
The company is at present engaged in litigation with the owner of the *Rabbit's Paw*, an adjoining claim, over "extra lateral rights," and as the mode of occurrence of the ore-body, etc., forms a strong determining factor in the suit, it is not considered proper at present to enter more fully into the occurrence of the vein.

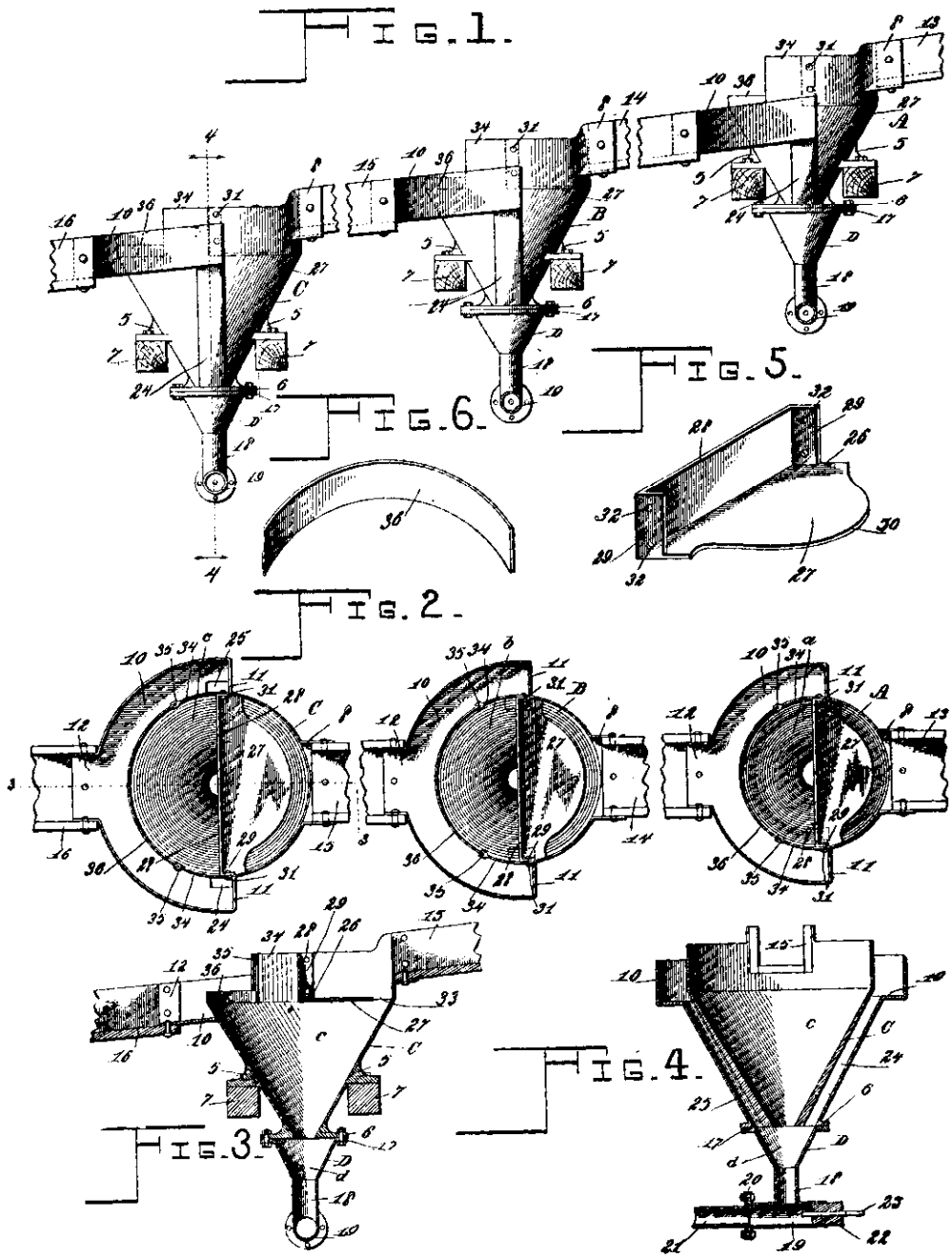
The ore is argentiferous galena, carrying a little gray copper, and associated with zinc blende, spathic iron and iron pyrites, with a little manganese. While some ore is shipped as mined, the greater part of the product of the mine is concentrated in the company's mill on the property. The ore being mined at present comes, for the most part, out of No. 3 tunnel, from which it is trammed for about 100 yards to a temporary ore pocket of 200 tons capacity, and it is thence conveyed by a surface gravity tramway a distance of 1,500 feet to the mill-bins.

The old mine buildings were swept away by a snow-slide in 1903, and have been replaced by temporary structures, pending the completion of a No. 5 tunnel, which is to be run in from near the level of the mill-bins, much lower than the present workings, and out of the way of snow-slides.

The mill feed from July 3rd to 15th, 1904, ran as follows:—

| Mill Feed. | | | | Galena Recovery. | | | | Zinc Recovery. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Assay. | | | | Assay. | | | | Assay. | | | | |
| Tons. | Ag. oz. | Pb. % | Zn. % | Tons. | Ag. | Pb. | Zn. | Tons. | Ag. | Pb. | Zn. | Fe. | Mang. |
| 1,553 | 21 | 5.1 | 12 | 92.3 | 95.4 | 61 | 9.5 | 334 | 46.5 | 2.5 | 35 | 15 | 3 |


FLOW-SHEET
SLOCAN STAR MILL
SANDON
B.C.
W.F.Robertson
1905
TRAMWAY
ORE BIN
Grizzly
Crusher
MILL ORE BIN
Auto Feed
Coarse Rolls
TROMMELS
16 MM.
7 MM.
3 MM.
ELEVATOR
JIGS
Tailings
Medium Rolls
LEAD CONCENTRATES
Fine Rolls
ELEVATOR
Fine Rolls
CULVER CLASSIFIERS
ZINC JIGS
ZINC CONCENTRATES
SETTLERS
WILFLEYS
VANNERS
To Tailings Pump




CULVER CLASSIFIER- USED IN SLOCAN STAR MILL.

As will be seen from the above, the zinc forms an important factor in the output of this property, and about 3,000 to 4,000 tons of zinc concentrates was found stacked upon the dump, the company having had no acceptable offer for it from the zinc ore-buyers, who offered an inadequate price for the silver, and objected to the percentage of iron and lead present. It is now reported unofficially that the company intends to erect a plant for the separation of the iron, etc., so enriching the zinc product as to meet the market requiremets.

**Mill.** The company's concentrating plant is in charge of Mr. Chas. Culver, who has the reputation of being one of the most expert mill-men in the district, and who has brought the mill up to a high state of efficiency and economy. A "flow-sheet" of the mill accompanies this report, giving details of the mill and process. A cut is also given of the Culver classifier, with which the mill is provided, as it is efficient and contains some novel features. The mill is operated by water power, the water being taken from Sandon creek, and used under a head of 400 feet. The mill force consists of, on each of two shifts, 1 crusher man, 2 jig men, 1 tableman, and 1 trammer, with the occasional assistance of a blacksmith and a labourer.

**Payne Mine.** The *Payne* mine is probably the best known silver-lead mine in British Columbia, and since 1892 has been one of the largest shippers. The ownership of the property changed about four years ago, and it has since been held by the Payne Consolidated Mining Co., a Montreal company, of which Lt.-Col. F. C. Henshaw is president, and C. H. Law is secretary, while the local management was in the hands of Mr. A. C. Garde until the late fall of 1904, when active operations ceased, since when the company's accountant, Mr. Geo. F. Ransom, has been acting manager. The property is situated on the north slope of Carpenter creek, about two miles below the town of Sandon, and on the line of the Kaslo & Slocan Railway, while from the mill a short wire-rope tramway leads to the Canadian Pacific Railway tracks in the bottom of the valley, permitting shipments to be made by either road. The property is well equipped with all essentials as to plant, buildings, etc.

The following statement, prepared by the manager, Mr. Garde, on August 31st, 1904, gives a correct idea of the plant and mine, while the accompanying plan and section of the mine, copied from a blue print plan, also kindly furnished by Mr. Garde, conveys a better idea than could otherwise be given, of the mine and the occurrence of ore:—

"This property was discovered in the fall of 1892, and has been in continuous operation ever since. More than 50,000 tons of silver-lead ore has been shipped, representing a gross value of nearly $4,000,000. Average value per ton for this period was $77.30. Average value per ton of concentrates for year 1903 was $83.32, assaying 124.5 ounces silver and 67.29% lead. Dividends paid since 1897 up to the present date, $1,438,000. Besides silver-lead, the *Payne* has within the past year produced between 3,000 and 4,000 tons of zinc concentrates, averaging about 50 per cent. zinc, 14 ounces silver, low in iron, lead and other impurities. Since 1901, the character of the ore in the *Payne* has changed from a clean galena into a concentrating ore, heavily mixed with spathic iron and zinc. The company has, therefore, during the past three years, completed a concentrating plant capable of handling 200 tons in 24 hours, and more than 125,000 tons of concentrating ore, including stope fillings and dumps, has been treated in this plant. The company has also within the past year added a zinc separating plant, by which the iron is separated from the zinc by means of magnetic concentration. Both of these plants are in operation now. The concentrating plant is located on the K. & S. Railway tracks above the C. P. Railway, and is conveniently situated for the handling of concentrates over either railway. The entire plant is run by water power, and to help out during the dry season of the year, an auxiliary 150 horse-power compound condensing steam engine is available.

There are two pipe lines, one 1,800 feet and the other 2,600 feet in length, furnishing power for four Pelton water wheels, two of which are 24 inches in diameter, one 18 inches, and one 12 inches. The maximum capacity of the high pressure line, under a 750-foot head, is 300 horse-power, while the capacity of the low pressure line, under a 450-foot head, is approximately 50 horse-power. Three of the water-wheels are used for driving the concentrator proper, while one 24-inch wheel is coupled to a 100 horse-power generator, furnishing power for the mine over a three-wire pole-line 5,500 feet long. The electric power at the mine is used partly for driving a three-drill compressor and partly for running a 50 horse-power hoist, besides furnishing light for the mine and all buildings at lower and upper terminals. The compressor and hoist are geared direct to induction motors, and the current of 2,200 volts is transformed to 220 at the mine. The high current for the hoist motor is carried into the mine by special insulated lead-covered cable.

Machinery.

"List of machinery comprising power plant, exclusive of concentrating machinery:—One three-rail gravity tramway, extending from the concentrator at the K. & S. Railway tracks to tunnel No. 5, a distance of 5,500 feet—average degree of incline 25°; difference in elevation between upper and lower terminals, 2,300 feet; capacity of bunkers at upper and lower terminals, 100 tons each; maximum capacity of tram cars, 5 tons; maximum capacity of tram per 24 hours, 500 tons. One high-pressure pipe-line, 2,600 feet long, 11 inches diameter at the upper end, working under a static head of 750 feet, designed to develop 300 horse-power; one low-pressure pipe line, 1,800 feet long, 4 inches diameter, working under a static head of 450 feet, capable of developing 50 horse-power; two high-pressure 24-inch special Pelton water-wheels, each 160 horse-power capacity; one high-pressure 12-inch special Pelton water-wheel, 30 horse-power capacity; one low-pressure 18-inch standard Pelton water-wheel, 30 horse-power capacity; one 75 K.W. three-phase alternating current generator, 2,200 volts, capacity 100 horse-power; one 2½ K.W. direct current dynamo used as exciter for above generator; one 7 K.W. direct current dynamo used for magnetic separator in zinc mill; two 2 K.W. dynamos, driving dust fan in zinc mill; one 150 horse-power compound condensing steam engine, at present developing 90 horse-power; one 90 horse-power tubular boiler, 54 inches by 12 feet, working under 90 lbs pressure.

"At the mine:—One 50 horse-power duplex three-drill air compressor, geared to one 50 horse-power induction motor; one 30 horse-power electric hoist, geared to one 30 horse-power induction motor; one 15 horse-power duplex electric pump, capacity 100 gallons per minute, geared to one 15 horse-power induction motor.

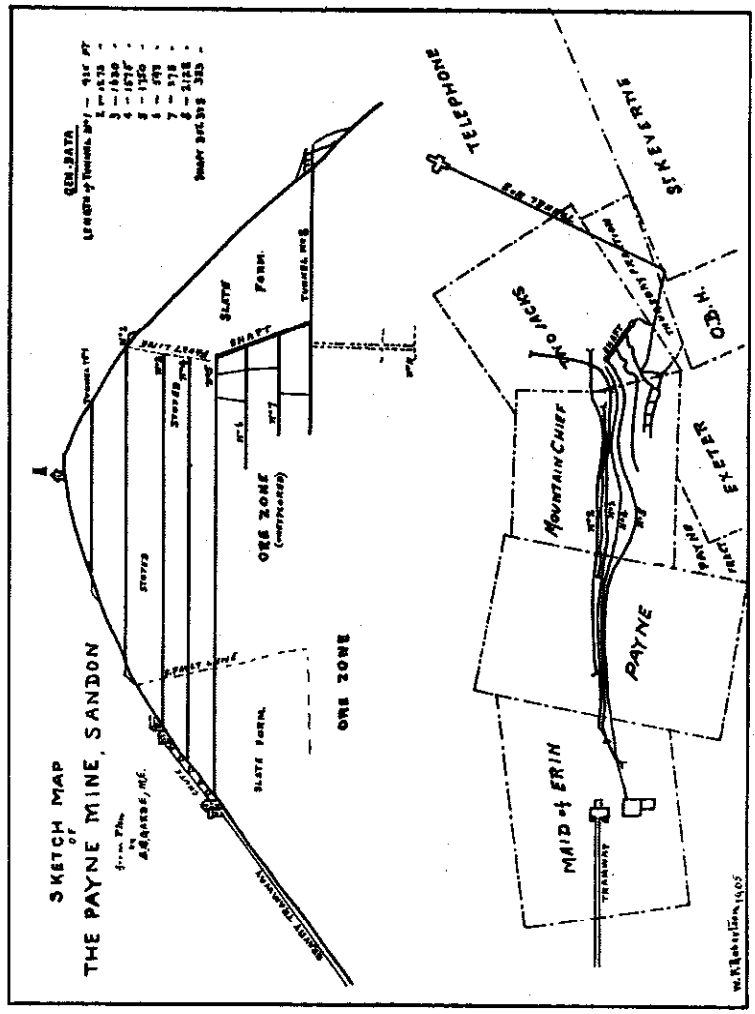
"In addition to the above machinery, we have at the mine:—One Knowles sinking pump of 40 gallons per minute capacity, arranged for steam or air; one 25 horse-power sinking hoist, arranged for steam or air; one 12 horse-power gasoline engine (not in use); two Ingersoll-Sergeant 3¼-inch air drills; one Mac Machine Company 2¼-inch 'baby' air drills; one 20 horse-power boiler, used for heating purposes at mine boarding-house.

Mine.

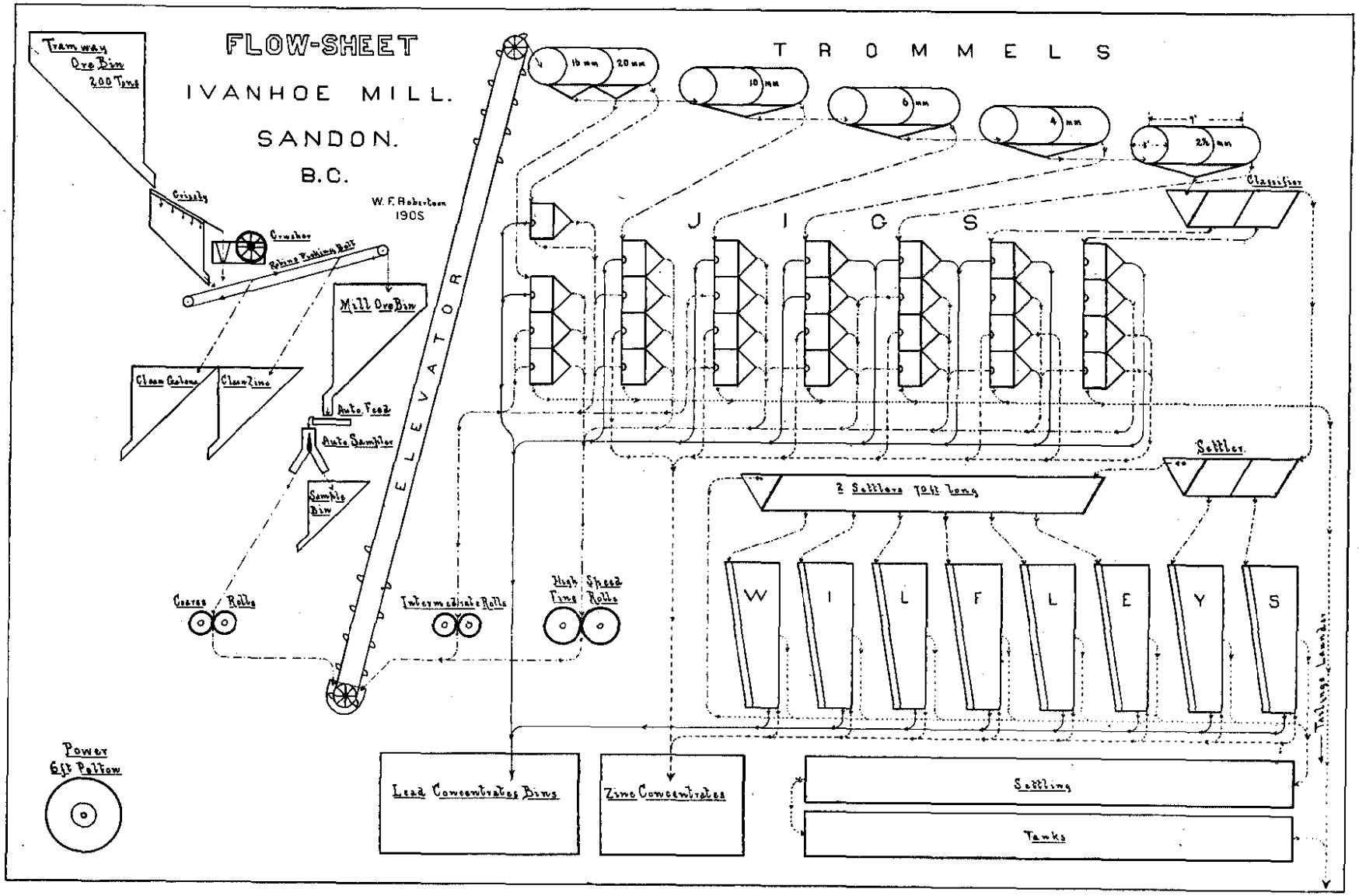
"In regard to the mine, there are altogether eight levels, of which the upper five have been practically stoped out. Some cross-cutting is at the present time being carried on in No. 3 level, to demonstrate whether any other parallel fissures exist in the *Payne* ground. Tunnel No. 5, which is the principal working tunnel and the upper terminal of the tramway, is connected with levels No. 6, No. 7, and No. 8 by means of an incline shaft, 384 feet long. In all of these last-mentioned levels the *Payne* vein has been encountered and developed for some distance. A considerable quantity of concentrating ore has been taken out of these levels, and the company at the present time is engaged in driving the breast of same ahead, and is meeting with considerable prospect of opening still larger ore-chutes in the lower part of the ore-zone. A great deal of work has been

done in level No. 8, where a new ore-chute of considerable value is uncovered for a distance of about 300 feet, showing up very strongly, and with all indications of going down. Recently a station has been cut in the east drift of tunnel No. 8, and arrangements are now being completed for the exploration of this ore-body to a depth of 300 feet, after which, if the results of this work will warrant it, a long tunnel, starting at some point lower down on the *Payne* mountain, will be driven with the view of tapping the vein and handling all ores from here, thus avoiding hoisting, and also allowing for drainage of the property."

The shutting down of this important property must be considered as a most unfortunate occurrence, and a distinct misfortune to the mining industry of the district, and while the preceding statement of the manager, Mr. Garde, written about a month before the shut-down, gives a very correct idea of conditions, a few notes from an independent standpoint may help to a fuller understanding of the situation.




As shown in the sectional plan, the vein cuts from side to side of the hill, while the ore-bearing zone appears to be confined to the central part of the hill, and has a sectional width


FLOW-SHEET
IVANHOE MILL.
SANDON.
B.C.
W. F. Robertson
1905
Tramway Ore Bin 200 Tons
Grizzly
Crusher
Spring Pendulum Belt
Mill Ore Bin
Clean Galena
Clean Zinc
Auto Feed
Auto Sampler
Sample Bin
ELEVATOR
TROMMELS
16 mm
20 mm
10 mm
6 mm
4 mm
2½ mm
Classifier
JIGS
Settler
2 Settlers 70 ft long
WILFLEY S
Coarse Rolls
Intermediate Rolls
High Speed Fine Rolls
Power
6 ft Pelton
Lead Concentrates Bins
Zinc Concentrates
Settling
Tanks
Tailings Launder

of about 1,000 feet, with a barren zone on either side, that is, on either flank of the hill. As M Garde says, the five upper levels have been practically stoped out, and the small patches of ore that remain are being taken out by "tributers." Between the No. 5 and No. 6 levels a dyke, locally known as the "white dyke," comes in, having a strike parallel to that of the vein, but, above its junction with the vein, a flatter dip. After meeting the vein, the dyke and vein follow the same dip and strike, that is, they are together, down to the lowest working level, No. 8, where the dyke cuts into the hanging-wall, while the vein, resuming its old dip, continues in depth into the unexplored portion of the ore-zone.

On levels Nos. 6, 7 and 8, where the dyke is in the vein fissure, the galena is largely replaced by spathic iron, and on these levels the mining has never paid expenses, all profit seeming to have vanished with the appearance of the dyke. On the vein, after the dyke leaves it, there is an exceedingly encouraging showing of ore, on which a winze has been started down, for which a station had been cut, an air hoist installed, and bins constructed. The winze being full of water, this showing was visible only for 15 to 25 feet from the point where the dyke left the vein, but even with what little could be seen of the ore showing, it was decidedly the most promising ore-chute seen below No. 5 level, and it is greatly to be regretted that active operations in the way of development should have ceased when the difficulties brought about by the dyke had been surmounted, and just as a fair promise was obtained of the renewal of the conditions prevailing in the upper levels before the advent of the dyke in question.

The mine, as it stands at present, is another victim of that short-sighted policy of gouging out all available ore, and neglecting the proper development, in advance, of further bodies of ore.

Queen Bess.

The *Queen Bess Group* has been one of the important mines of the district, having, under former owners, shipped ore of which the smelter returns show a value of about $225,000, the ore having had an average value of about $65 a ton, assaying about 100 ounces in silver and 70 % lead. The property is situated on the east slope of Howson creek, opposite the *Idaho* basin, being over the ridge from the *Monitor*. The property was on January 1st, 1904, acquired by the present owners, the Queen-Dominion Mining Co., Ltd., of which Robert Irving, of Kaslo, is secretary-treasurer, and George Potter, superintendent in charge of the mine. The property had been opened up extensively by five levels, exploring the contact vein for 1,000 feet, while from No. 5 an inclined shaft connects with No. 10, some 300 feet lower down.

The formation is slate, in which, along a strong fissure, occurs a crushed zone, several feet wide, carrying quartz, with galena, lead carbonates, and oxide of iron, but with very little zinc. The wall on one side of this fissure is unbroken, while on the other side the slate is "blocky" in character, and from the main fissure are several "spurs" of quartz making off at an acute angle. The mineralisation seems to have been greatest where these "spurs" joined the main lead.

The former owners had left little or no ore developed, so the attention of the present owners has been taken up in prospecting the property practically anew, and this they are doing steadily and systematically.

Ivanhoe.

The *Ivanhoe* mine is owned and operated by the Minnesota Silver Co., Ltd., President, W. H. Yawkey, with Phillip J. Hickey as local manager and superintendent. The *Ivanhoe* and *Elgin* claims are owned by the company, while 11 adjoining and surrounding claims are held in the names of Messrs. Yawkey and Hickey. The management reports that since the present company acquired the property in 1896, about $190,000 worth of ore has been mined and shipped, while previous owners are

credited with shipping from 500 to 800 tons of ore richer than the average. The mine is situated on the south slope of Carpenter creek, about opposite the lower end of the town of Sandon, in a small basin among the peaks of the range, and at an elevation of some 3,000 feet above the creek.

The lead is a fissured zone in slate, having a strike of N. 80° E. (mag.), and a dip of about 50° into the hill, and contains a quartz vein carrying galena and blende. The outcrop cuts diagonally up the basin and into the bluff at its top, but the mining has been done chiefly in the basin. The mine has been opened up by a series of 8 levels, numbered from 1 to 8, starting from the top, of which Nos. 1, 2, 4 and 8 are connected with cross-cut adit tunnels of the following lengths:—No. 1, 75 feet; No. 2, 230 feet; No. 4, 465 feet; and No. 8, 1,310 feet.

No. 1 level is about 150 feet below the surface and is 260 feet long.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| " 2 | " | " | 90 | " | " | No. 1 | " | 220 | " |
| " 3 | " | " | 100 | " | " | " 2 | " | 800 | " |
| " 4 | " | " | 100 | " | " | " 3 | " | 1500 | " |
| " 5 | " | " | 107 | " | " | " 4 | " | 600 | " |

Nos. 6 and 7 levels are only started off from the raise, while No. 8 level, which is 320 feet lower than No. 4, has been driven for 385 feet to the east and west of the cross-cut tunnel.

The general ore-chute is, approximately, 360 feet long in the vein, and extends down to No. 8 level. No stoping or work was going on above No. 2 level, the greater part of the work being done between Nos. 2 and 4, where, also, most of the ore was being produced.

The vein proper follows the crushed zone in the slates, which in places acquires great width, and is filled with crushed slate and clay, between two smooth walls. On No. 3 the ore is found on both sides of the zone, and a level has been driven parallel to the main level, and connected with it by cross-cuts. The ore occurring here all through the zone made irresistible the temptation to extract it, and this was done, with the result that the filling of the fissure was undermined and began to show a tendency to slip down. This has been headed off only by timbering of the most substantial character, placed with great skill and at no little risk.

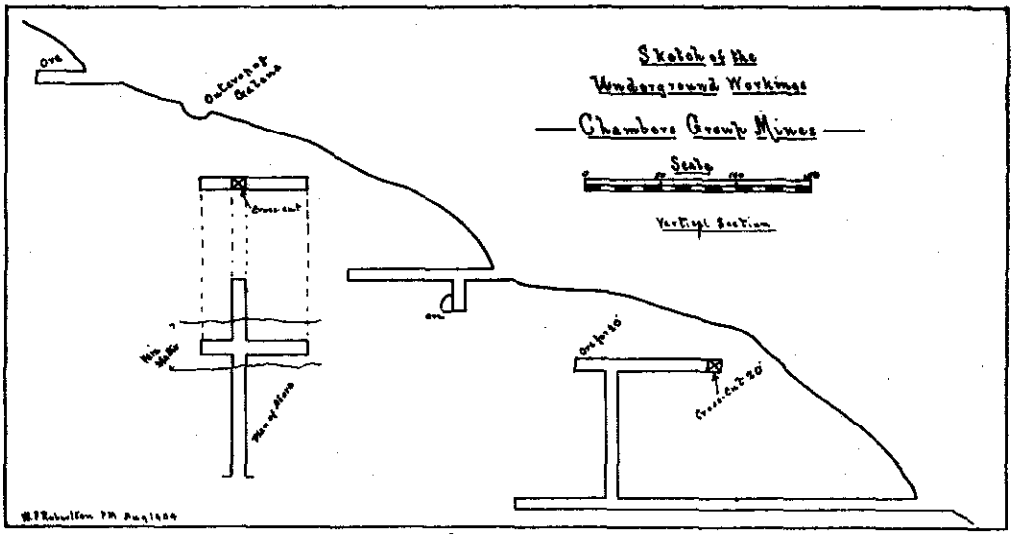
Another large body of ore occurs in a similar way on No. 8 tunnel, but here the danger had been more fully realised from the first, and an adequate amount and proper system of timbering had been used, so that here little danger exists, and everything seems to be held securely. This tendency of the zone to slip on the walls is general throughout the mine, and calls for great watchfulness and skill on the part of the mine foreman, besides adding considerably to the cost of mining.

The ore is argentiferous galena associated with zinc blende, but, as compared with the other mines of the district, there is comparatively little spathic iron, the result of which is that the zinc concentrates produced are higher in zinc and lower in iron, and so command a ready market at a fair price. The ore is essentially a concentrating ore, but contains some clean ore, both zinc and galena, and while all the ore goes to the mill and through the Blake crusher, it is then fed on to a Robins picking belt, where as much as possible of the clean galena and blende is picked out by hand and dropped into separate bins; all of which is shown in the diagram or "flow sheet" of the mill, which accompanies this Report.

A Riblet aerial tramway, 8,500 feet long, and with a fall of 2,300 feet, transports the ore from the mine to the company's mill on Carpenter creek, on the line of the C. P. Ry. The mill was treating from 65 to 70 tons of ore a day of 12 hours, and producing about 7½ tons of galena concentrates, and about 3 tons of zinc concentrates. The lead concentrates are loaded directly from the mill and shipped "in bulk" in box-cars. They assay about 55 to 58 % lead, and from 85 to 90 oz. silver to the ton. The zinc concentrates vary in assay from 42 to 50 % zinc, depending on the class of machine producing them, but will average about 45 % zinc.

The company was employing in August about 62 men at the mine and 4 in the mill.

**Chambers Group.** The *Chambers Group* includes the *Jay Gould, Eureka, Chambers* and *Wellington* mineral claims, situated on the north slope of Carpenter creek, about two miles above the town of Sandon. The property was worked this past year by a local syndicate, and some small quantity of ore was taken out. There is on the property a strongly fissured zone from 5 to 10 feet wide, cutting through a slate formation in a N.E. and S.W. direction, with a dip of about 80° to the N.W. Following in this fissure up the gulch, a series of tunnels has developed a quartz vein, in which occur chutes of argentiferous galena, which, after being hand-sorted, is shipped by pack-train to Sandon, and gives returns of about 70% lead and 125 oz. silver to the ton. The character and extent of the development is shown by the accompanying rough sketch of the workings, made from paced and estimated measurements only.




**Reco Mine.** The *Reco* Mines include the *Ruecau, Texas, New Denver, Ephraim Fraction* and *Clifton* mineral claims, situated on the north slope of the valley of Carpenter creek, near the summit of the range, and about 4 miles from Sandon. The property is held by the Reco Mining and Milling Co., Ltd., of Sandon, capital $1,000,000, of which John M. Harris is the president and manager of the mine. There are three known veins on the property, all more or less parallel, having a strike about N. 55° E. with a dip to the S.E. of about 70°, and cutting the formation nearly at right angles.

The rock formation of the vicinity is a dark slate, with a strike to the bedding of about N.W. and S.E., while, parallel with the bedding, the slate is cut by a large number of porphyry dykes varying greatly in size. Immediately below the mine workings, cutting through the *Texas* and *Deadman* claims, there is one of these dykes, of great width, reported by the management to be, by actual survey, 1,050 feet wide, while in the mine workings some 18 dykes have been cross-cut, having widths varying from 2 inches to 24 feet. That the most of these dykes were "in place" long before the vein fissure was formed, is proved by the fact that in the tunnel the vein cuts them all, and further, that the values in the vein seem to be about the same where it cuts through a dyke as in the adjacent slates.

Of the three veins mentioned, the best known is the most easterly, the No. 3, or, as it has been called, the *Reco* or *Goodenough* vein, which cuts through from the *Goodenough* into the *Reco* ground, and which has been developed by a series of cross-cut tunnels run in on *Goodenough* ground near the dividing line, at the joint expense of the *Reco* and *Goodenough* mines, from which cross-cuts the respective companies have run drifts on their own portions of the vein.

The vein in the *Reco* ground is found between clean, hard walls, from which the ore parts readily, and in width varies from a mere rusty streak up to about 24 inches, having an average width of about 6 inches of quartz, etc., of which an average of about 3 inches is solid ore, which consists of the silver sulphides, argentite, ruby silver, and some galena, with gray copper and zinc. The ore is easily hand-sorted in the workings, no grade being produced other than shipping ore, which, for the first five years that the property was operated, from 1894, averaged, as shipped, 309.6 oz. of silver to the ton and 46% lead. Latterly, however, shipments have been somewhat lower in grade, lower freight and treatment rates not calling for such close sorting, and average about 225 oz. in silver and 55% lead. Zinc is present in the ore, but in unimportant amount, being about 5%.

The mine is opened up by tunnel No. 2, 900 feet long; No. 4, a cross-cut of 57 feet and drift of 1,050 feet; No. 6, a cross-cut of 270 feet, and a drift 1,025 feet long; No. 7, an intermediate "blind" level, is 640 feet long. No 8 has a cross-cut 350 feet, with a drift of 550 feet. Although some ore still exists above levels Nos. 2 and 4, the vein has been pretty well stoped out as far as the levels have been run, and the greater part of the ore known is between Nos. 7 and 4. Comparatively little ore has come out of No. 8 level as yet, but it is possible that the ore-chute on No. 7 will go down and be found on the production of No. 8.

It is of more than passing interest to note the values which have been extracted and realised upon from this small vein. Mr. Harris reports that, as worked up to the present, the vein alone has produced on *Reco* ground about $700,000 from ore shipped, while from the vein in *Goodenough* ground another $100,000 was mined. The original cash outlay for the purchase of the mine and its development was $2,700, while in 10 years there has been paid in dividends, chiefly from this vein, $287,000.

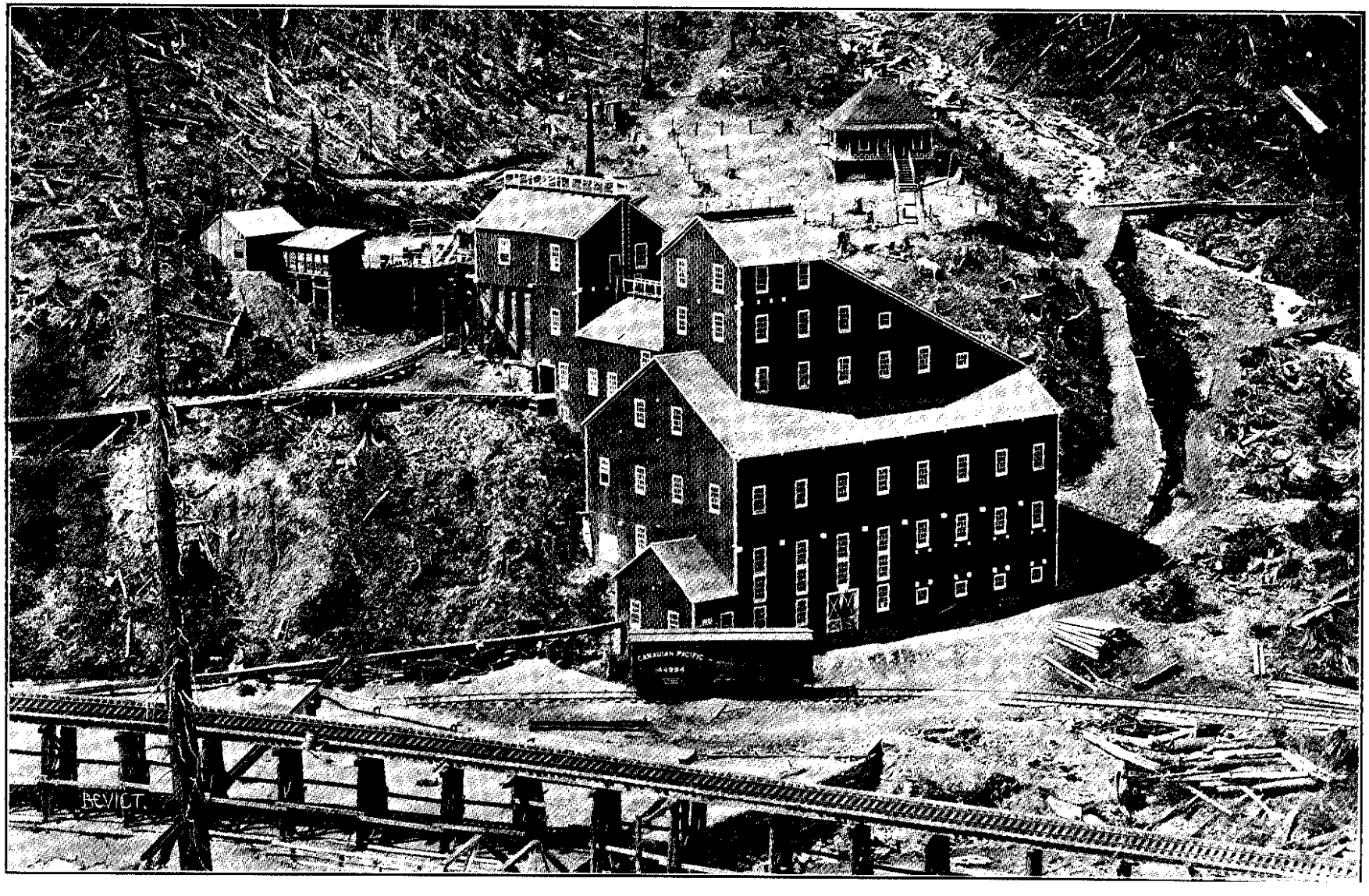
About 750 feet to the west of No. 3 vein and higher up the hill, is the No. 2 or "Big Vein," which is practically parallel with No. 3, and, as far as can be traced, cuts the same dykes. This vein has been opened up by adit tunnels on the vein, of which No. 1 is about 600 feet long, No. 3 is 850 feet, and No. 5 is 275 feet, while between Nos. 3 and 1 an intermediate has been driven for 330 feet.

(NOTE.—The levels on No. 3 vein are designated by the even numbers and those on the "Big Vein" by the odd numbers.)

The stoping that has been done is all above No. 1, except one small stope. No stoping has been done on the intermediate, but in driving this tunnel 60 feet, this past winter, the two contractors sacked up about 40 tons of good ore.

Above No. 1 tunnel, stoping has been done for a length of 350 feet and for a height of from 40 to 50 feet. The height between No. 1 and No. 3 is about 140 feet, which ground has not yet been stoped.

This "Big vein" is considerably larger than No. 3 and the ore is lower in grade, but the lead has as yet only been developed, and proportionately little has been shipped, attention having been centered on the higher grade ore in No. 3. Still, shipments from this vein sum up to the not inconsiderable amount of $90,000.



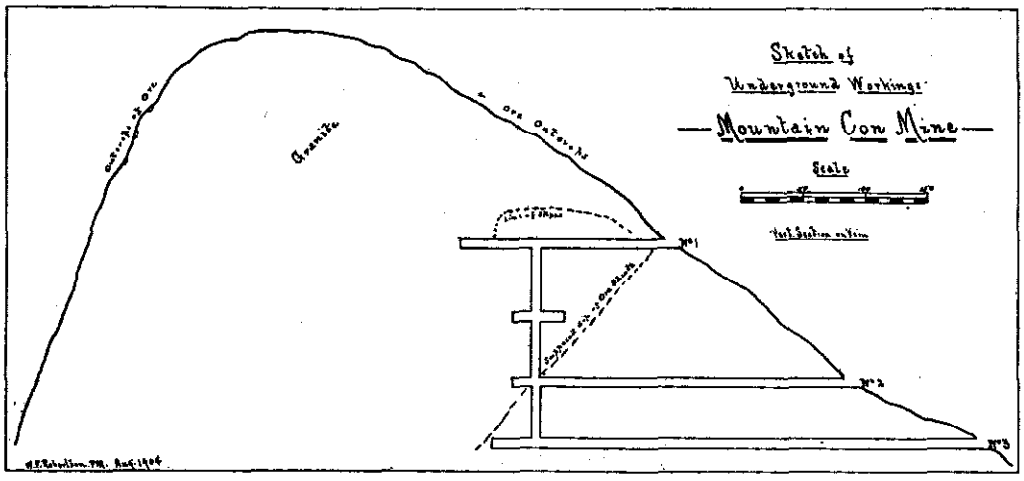

IVANHOE CONCENTRATING MILL, SANDON, B. C.

The mines were worked regularly until 1903, but since that date it has been the practice of the company to mine for four months and develop for four months. The ore is rawhided in winter down a trail to Sandon, from whence it is shipped by rail.

The property was not working when visited in August, but arrangements were then being made for the resumption of work by September.

Mountain Con.

The *Mountain Con* mine is situated in a basin about the head of the south fork of Carpenter creek, at an altitude of about 8,000 to 8,500 feet, and at a distance of seven or eight miles from the town of Sandon, from which point it is reached by a waggon road to Cody, and thence by a trail leading up the north side of Carpenter creek along a hillside on which snowslides are so frequent in spring as to render the trail most hazardous at that season of the year. The trail from Cody to the basin below the mine is on a fairly even and light grade, with a good, solid bottom, and a waggon road could be built along its route, but from the basin up to the mine, the last mile, the trail is very steep, and winds around among great masses of granite rolled down from the peaks above, with no earth covering them, and offering a very precarious footing for animals. Should the development of the mine at any time justify it, an aerial tram could be run from the mine to the basin, thus eliminating the last and worst part of the trail.




At present the cost of packing ore from the mine to the K. & S. railway at Cody is about $12 a ton, and of conveying supplies from Sandon to the mine $20 a ton.

Within this past year this property has been so successful that it has caused more interest than almost any other claim in the Slocan. The property has been well known for several years, and was held by three individuals, who on two or three occasions have given a bond on it to various parties, who, after doing some work on it without finding ore, each in turn threw up the bond.

One of the original owners, C. A. McLeod, a miner, despite the many set-backs the property had had, always maintained a strong faith in it, which was not shared by his partners. McLeod, consequently, took a lease and bond on the property, and operations were begun this last year, under a partnership of McLeod and Thompson. The firm was fortunate enough, after comparatively little work, to strike a chute of very rich ore, from which has been mined and shipped this past summer some 200 tons of ore, of which the average assay, from the smelter

settlements, was 337 ounces silver to the ton and 27 per cent lead, making the value of the ore $200 per ton, and the gross value of the shipments a little more than $40,000, which amount has not only covered the purchase price of the mine, and working expenses, but has left a substantial net profit as well.

The rock formation in the vicinity of the mine is granite, the ore-body occurring in a regular fissure vein of quartz, cutting through an abrupt and bare granite peak. The strike of the vein is N. 40° E., with a dip of 80° to the N. W., and its width is about 18 inches of quartz, with perfectly clear walls of solid granite. Almost exactly parallel to the vein, and about two feet from it, is a slip joint in the granite, which is found to be of great assistance in the working of the vein, since this two feet of granite is easily broken free, and, with the width of the vein, gives sufficient room in the levels and raises, while, in the stopes, only the vein is mined. The fissure is straight and true, giving straight levels with smooth walls, and the only timbering required is in the raises, with a few stulls where stoping has been carried up from the level, enough waste being produced in mining to serve as filling. The conditions for economic mining are ideal, and such as are seldom met with.

The vein quartz is somewhat crushed, and is easily mined, and contains ore consisting of galena, with lead carbonates and iron oxides, carrying average values as already indicated by the shipments, of 337 ounces of silver to the ton, but of which shipments one carload assayed 543 ounces silver to the ton. The gold values are neglectable. The ore occurs in a chute, the width of which has not been determined, and which appears to dip into the hill from the outcropping at an angle of almost 45.°

The previous bonders of the property had run in tunnels on the vein below the surface outcroppings, but as the chute of ore dipped into the hill, the tunnels, not having been driven far enough, failed to strike it, which accounts for the bonds being forfeited. Accompanying is a rough sketch, prepared merely as illustrating these notes, and to give an idea of the various workings and their relations to the ore-chute.

A production of No. 1 tunnel for from 250 to 300 feet, would come out to daylight on the far side of the peak, where, above the tunnel level, on the almost precipitous face of the hill, it is reported that there are outcroppings of the vein carrying some exceedingly high-grade ore. The property has much promise, and is one of the most interesting of the small high-grade properties of the district. It is recently reported that the property has been bonded by McLeod and Thompson to M. S. Logan, of Nelson, and that he has disposed of it to certain Chicago capitalists for $67,000, subject to an inspection in the spring by their engineer.

Rambler-Cariboo.

The *Rambler-Cariboo Group* includes the *Rambler, Caribou, Antelope, Tiger* and *Best Fraction* Crown-granted mineral claims, situated well up in McGuigan basin, at an altitude of about 6,000 feet. This property has, under various ownerships, been one of the large shippers of the district. It is now held by the Rambler-Cariboo Mines, Ltd., a company with a capital of $1,250,000 and head office at Kaslo; president, A. F. McClaine, of Tacoma; general manager, Mr. W. E. Zwicky, of Kaslo.

The rock formation of the district is slate, through which a great boss of granite has been forced up, the whole being much cut by porphyry dykes. A well-defined quartz vein cuts through both the slate and the granite, and across the contact, and has been traced on the surface for a long distance, in a north-east by north direction, with a dip to the south or into the hill.

The mine was originally opened up by three cross-cut tunnels, connecting with levels about 100 feet apart. No. 3 is the main working tunnel, and has a cross-cut 510 feet long to the vein, and drifts to the extent of over 1,200 feet. Above this level all the ore, except a few small bunches, has been extracted some time ago. The lower workings were flooded and

could not be seen. From this No. 3 level a shaft has been sunk for 500 feet, with levels Nos. 4, 5, 6, 7, and 8, at intervals of about 100 feet, and here the recent productive mining has been done. From the shaft, drifts have been driven; at No. 4 level, to the north for 63 feet, and to the south for 350 feet; at No. 5 and No. 6 levels, to the north 280 feet, and to the south 350 feet (most of which ground has been stoped); at No. 7, to the north 231 feet, and to the south 324 feet, of which 250 has been stoped; and at No. 8, to the north 94 feet, and to the south 101 feet. From this shaft and levels some very good ore was obtained, and it is reported by the management that the ore-body is strong in the bottom of the shaft and is continuing with depth. The cost of hoisting from this shaft to a higher level, together with the cost of keeping it unwatered, added so much to the cost of mining that the company decided to abandon the workings temporarily and to run a long cross-cut tunnel in to the vein at the 1,400-foot level, putting up a raise in continuation of the shaft, thus reaching the known ore-body from below.

Mr. Zwicky says he feels sure he has "sufficient ore in sight on levels 7 and 8 to liquidate any loan secured to complete the new work."

**New Cross-cut.** The portal of the new tunnel is located on Dardanelles creek, about half-way between McGuigan station and the mine, and near the waggon road. The tunnel will be 9½ feet high by 7 feet wide (7½ by 7½ in the clear) and about 4,300 feet long, cutting the vein over 1,400 feet deep, or 600 feet deeper than No. 8 tunnel. It will take about two years to complete this tunnel (till July, 1906), and it will cost approximately $60,000, exclusive of cost of plant. This tunnel was started on July 9th, 1904, and by September 1st it had been driven 460 feet, the work being done under contract, and progressing at the rate of about 11 feet a day, the compressed air being supplied by the company from its new plant on Dardanelles creek.

In view of the changes being made, very little work is going on in the upper workings, only 6 men being there employed, while in No. 14 tunnel the contractors were running three shifts with 12 men.

The company's concentrating mill, located just below No. 3 tunnel outlet, was employed running through the second and third class ore-dumps, which would probably be cleaned up in 1904. This old dump is estimated to run about 3 % lead and 20 oz. silver to the ton, and the ratio of concentration is about 12 into 1. The concentrates run about 35 % lead, 112 oz. silver, 11 % zinc and 18.5 % iron. The first-class shipping ore runs about 280 oz. in silver, 50 % lead, and under 10 % zinc. The mill is old, and rather out of date, but as the whole plant will shortly be moved to No. 14 tunnel mouth, any great expenditure on it would not be justified. The tailings run about 2½ % lead and 10 oz. silver and are being impounded, an estimated amount of some 20,000 tons being so stored up.

The air compressor plant has already been moved down the hill to a point below No. 14 tunnel, and is operated by water power, the water being taken out of both McGuigan and Dardanelles creeks, and conveyed from the flume to the plant in a pipe-line 1,600 feet long, tapering from 12 to 8 inches in diameter. The water is used under a head of 750 feet to operate a 36-inch Pelton wheel, which is connected by a belt to a 10-drill Rand air compressor.

The company will, for the next two years, be engaged entirely in development and construction, for which the previous production of the mine and the showing reported in the No. 8 level would seem to give ample justification.

A little higher up the same basin is the *Antoine*, of which George Alexander, of Kaslo, is the manager. This property was closed down in November, 1903, and has not since been worked by the company, but a couple of men working on tribute took out this past year about two carloads of ore.

The *Red Fox*, in the same basin, has not been operated by the owners during the past year, but two men have been working on it as "tributers."

The *Washington* has been under development, but has shipped no ore this past year. This property is reported to have in sight, in the mine, a large tonnage of ore high in zinc, which will soon, it is hoped, be extracted and shipped.

The *R. E. Lee* was under development in a small way, and shipped one car-load of ore.

The *Sunset* and *Trade Dollar*, operated by G. W. Hughes, is on the summit of the divide between McGuigan basin and Carpenter creek. The property has been extensively developed, and a large quantity of ore shipped, but during the past year only a small amount of work, chiefly exploratory, has been carried on; the property is reported, however, to have shipped over 300 tons of ore.

Lucky Jim.

The *Lucky Jim* mine is situated on the slope of the hill south of Bear lake, 600 feet above the line of the K. & S. railway. The property has been opened up for many years, and has had an eventful history, as it contained large masses of galena, but also so much zinc blende as to interfere with the sale of the galena without some means of separation. In places the ore is entirely zinc blende, nearly free from galena—so much so that the mine has been looked upon as more a zinc than a galena mine.

The country rock formation of the vicinity is slate and limestone in beds, and near these contacts a vein cuts both formations in a general N. E. and S. W. direction, with a nearly vertical dip. Where this vein cuts through the slate, it appears to be but a few inches in width, but in the limestone it opens out into large chamber-like deposits, sometimes 30 feet wide, in which the ore, galena and zinc blende is nearly solid. These chambers seem to be "chimneys," with irregular dimensions and dip. The galena carries about 70 per cent lead and 70 ounces silver, while the zinc blende assays about 50 per cent zinc and 5 ounces silver.

The property has been very extensively opened up, but in a very irregular manner, by tunnels into the hillside and by great open pits. The mine was recently purchased by G. W. Hughes, of Sandon, who is opening it up again in a more scientific way, the mine workings being in charge of John Wolverton as manager. The workings from No. 2 cross-cut up to the surface, a height of 200 feet, are being properly equipped with tracks, chutes, etc., and will soon be in shape for a regular output. There is certainly a large quantity of ore in sight, but the workings were not in such a condition as to permit of even an approximate estimate as to the tonnage.

On the face of the hill, near the outcrop of the vein, but apparently not connected with it, there is a big open pit, with a face of 30 feet of pure black zinc blende. Mr. Hughes shipped about 1,000 tons of zinc ore to the Kaslo Smelting Works, where it was weighed and sampled, and bids were asked for on these samples, but as this was done late in the year, results were not obtained by the close of 1904. A number of tons of mixed galena and zinc ore were sent to the *Payne* mine concentrator for separation. There is a gravity surface tramway from the mine workings down to the railway track, where bunkers are provided. The mine is well equipped with all necessary bunk-houses, etc., and a small air compressing plant.

## SLOCAN DISTRICT.

Report of E. E. Chipman, Gold Commissioner.*

While the expected improvement in the condition of the mining industry in the Slocan District in 1904 has not been fully realised, yet sufficient advancement has been made to encourage the belief that there will be a marked progress for the better in the year 1905. The past year may be considered as one of investigation and of change—investigation for the obtainment of the most favourable markets for the disposal of the zinc ores, and change in the methods of treatment to arrive at the most economical methods of saving such ore.

In former years, the silver-lead operators had to contend with a large percentage of zinc in their ores, and to such an extent as to render a large proportion of their output valueless. From the increased price and demand for zinc in the past two years, the mine-owners realised that they had a valuable product in their zinc ore, if it could be prepared to suit the market. For this preparation they found that their silver-lead concentrators were almost entirely useless, unless they were remodelled to meet the new conditions. For this reason, operation, outside of development, was largely discontinued until the mills could be changed so as to permit of the saving of the zinc as well as the lead. Thus far, five of the mills have been remodelled, and are now adapted to the saving of both ores. These changes in the mills during the year will, in a measure, account for the decrease in the silver-lead tonnage. This decrease, however, has been more than made good by the output of over 4,500 tons of zinc ore, a new product in the history of the Slocan.

To facilitate the treatment and handling of these ores, the Kootenay Ore Co., which has successfully operated a custom sampling works, is now engaged in completing the addition of a zinc separating plant at the works at Kaslo, where it will undertake the treatment of zinc ores. This plant is expected to be in operation about the middle of March. Another large plant of the same character is under construction at Rosebery, and will be completed and in operation in the spring.

A new feature in the mining operations in the Slocan is the large and increasing number of mines which are being successfully worked under lease. These leases are not only materially adding to the output of the district, but are bringing a number of the old and practically abandoned mines again into the list of shippers.

The improved facilities for the handling and treating the ores; the advanced prices for both silver and lead; the opening of a market for zinc, a hitherto unsaleable and detrimental product; and the extended development of the past year, make the outlook for 1905 most encouraging.

## AINSWORTH MINING DIVISION.

The progress in this Division during the year has been marked by an increased development, and, as a consequence, some valuable bodies of ore have been uncovered, notably on some of the mines on Woodbury, south fork of Kaslo, Cooper, Lake and Cascade creeks. When the projected trails on some of these creeks are completed, so as to enable the miners to move their output, there will be a very considerable increase in the shipments.

### Duncan River.

The *Irene Group*, located on the upper Duncan river, had two men employed all summer, who did 150 feet of development, drifting on the vein. A continuous chute of ore was encountered 40 feet in length, and from 8 to 15 inches in width. The ore runs from 30 to 60 ounces of silver and 65 per cent. lead. The work is closed down for the winter.

*See also Report of Provincial Mineralogist, page 147 *et seq.*

On the west fork of the Duncan river, the Old Gold Company did a considerable amount of development work, and employed a small force of men during the summer months. They claim to have 50,000 tons of ore in sight and blocked out, and ready for shipment as soon as transportation facilities can be provided. The work is now closed down, and I have been unable to obtain accurate data of the operations of the company.

On Hall creek some valuable bodies of ore have been uncovered, and it is the intention of the owners to work their properties extensively next summer. The *Bannockburn Group* on this creek, which was developed to a considerable extent some years ago, partially changed hands late in the year, and the new management is making preparations to work the property extensively next year.

On Hamill creek, the Argenta Mines Co. has steadily prosecuted development, with a force averaging 8 men for the year. Eight hundred and seventy feet of tunnelling, and an upraise of 156 feet, have been accomplished, and numerous cross-cuts have been made to show the size and extent of the ore-bodies. The management is entirely satisfied with the progress made, and has the utmost confidence in the value of the property.

The *Lavina-Butte Group* of mines remain closed down, pending the completion of the waggon road, which will enable them to ship ore, of which they claim to have large bodies. Other claims on the creek have done little more than assessment work, and no claims are known to have expired.

### SOUTH FORK OF KASLO CREEK.

On this creek the most extensive operations have been carried on by the Silver Star Mining Company, on the *Cork* mine. Two tunnels have been driven on the ledge; the upper one 250 feet in depth, and the lower one, 240 feet deeper, 1,000 feet in depth. A raise has been made, connecting the two tunnels, in ore all the way, and a cross-cut of 70 feet, made in the ore-body, has failed to reach either wall. The ore is silver-lead-zinc in character, and the estimates of amount of ore in sight range from 150,000 to 250,000 tons. A 100-ton concentrator is nearly completed, which the management intends to operate to its fullest capacity. A small force of men has been constantly employed on development work during the year.

The *Province Group*, consisting of six adjoining claims, is on the same vein, and shows the same characteristics, with apparently as large bodies of ore. Two or three men have been engaged in development the greater part of the year, and it is estimated that 10,000 tons of ore are blocked out. The management contemplates the driving of a 1,200-foot tunnel at a lower depth than the present workings, and the erection of a concentrator to handle the output.

The *Bismark Group*, south and east of the *Province* and the *Cork*, is a high-grade silver-lead property. Four men have been steadily employed in taking out ore and in development. One hundred and ten tons of ore have been produced during the year which have netted the owners a handsome profit in their operations. In the course of development, late in the year, a body was uncovered of 8 feet in width of carbonate ore, carrying high values in both silver and zinc, which gives a very bright outlook to this mine.

The *Gibson*, another old-time property, has been worked under lease by two men, who have shipped about 40 tons of ore, which has well paid them for their labour.

A small quantity of ore was shipped from the *Silver Bell*, which carried high values in silver. The *Sturgis Group* was worked the greater part of the summer, and a valuable body of high-grade silver-lead ore has been exposed, which the owners intend working steadily next year.

The *Black Fox* and *Montezuma*, which have been idle for some years, are expected to resume operations next year, in consequence of the increased facilities for handling zinc, of

which the ores in both mines largely consist. The *Bell Group*, on the opposite side of the creek from the *Bismark*, is being worked under lease, and it is reported the lessees have a promising body of ore.

### Kaslo Creek.

At Whitewater, the *Whitewater* mine is being worked by lessees, the output for the year being about 100 tons.

The *Whitewater Deep* shipped a small quantity of ore, and there was 275 feet of development work done.

The *Echo* and *Alameda* did considerable development work during the year and shipped 20 tons of high-grade silver-lead ore.

The *Jackson* mines, consisting of five Crown-granted claims, are situated on Jackson creek, about five miles from Whitewater station, on the K. & S. railway, to which place there is a good waggon road. No ore was shipped during 1904, the company being engaged in remodelling their concentrator to adapt it to the saving of both the lead and zinc, of which the ore largely consists. Considerable development work was done, with gratifying results.

The *Empress* and *Silver Glance* mines are situated near Bear lake. Both have worked steadily during the year with a small force of men at each. The former is credited with shipping 12 tons of ore which netted the owner over $3,000. The latter did 200 feet of development, and shipped 24 tons of ore, which fully remunerated the owners for their outlay. The character of the ore in both mines is dry, carrying very little lead.

On Spring creek, near the head of Jackson creek, are two claims, the *Goat* and the *Cowboy*, both under lease and bond. On the *Goat* a shaft has been sunk to a depth of 15 feet, disclosing a streak of from 3 to 15 inches of high-grade silver-lead ore. A tunnel has been run during the year, a distance of 168 feet, to tap this showing at a lower depth, and is still being pushed. On the *Cowboy* a shaft has been sunk 40 feet, and drifts and upraises have been made to the extent of 40 feet, and nine tons of ore have been extracted and shipped.

### Woodbury Creek.

The *Baltimore* worked two men steadily during the year in development, and made a trial shipment of five tons, which netted the owners $1,300. Work will be prosecuted steadily the coming year, and the ore will be shipped during the rawhiding season this winter.

The *Pontiac Group* has also been worked steadily by a small force of men, and shipped one car of ore during the year. In the course of their operations in driving a cross-cut tunnel a vein was cut, three feet in width, carrying exceptionally high values in silver and copper.

The *Grant*, which made a shipnent of some high-grade ore some years ago, has changed hands and is now being developed by the new owners with a small force of men.

The King Solomon Mines Company has employed a small force of men in developing their numerous properties. They have about 60 Crown-granted claims on the creek, 30 of which were obtained during the year.

### Ainsworth Camp.

The *Highland* mine, near Ainsworth, has worked steadily during the year, and up to August employed about 70 men in the mine and mill. The mine produced over 14,000 tons of crude ore, from which 2,156 tons of concentrates were obtained. In addition to this 156 tons of clean silver-lead ore was marketed. The mine, during the first half of the year, was the largest shipper of lead in the Province. The mill was closed down about the 1st of September, since which time 25 men have been employed in development work. Over 1,200 feet of work was accomplished in the mine, and a large amount of open cut-work was done on the surface.

The *Highlander* mine, owned by the Highlander M. and M. Co., did some development work on their long tunnel, which is now in about 2,500 feet. The mine has a large quantity of silver-lead ore exposed, but no ore was shipped during the year.

Some development work was done on the *Number One* mine during the year. At the present time the upper workings are under lease, and some high-grade silver-ore is being obtained, but no ore has been shipped.

Important discoveries of ore are claimed to have been made on Coffee creek in the past summer, but no data are at hand as to their extent. Little else has been done during the year except assessment work, which has been fairly well kept up.

No important work was done on Crawford creek during the year.

OFFICE STATISTICS—AINSWORTH MINING DIVISION.

| | |
|---|---|
| Free miners' certificates, personal | 495 |
| " " companies | 9 |
| " " special | 3 |
| New claims recorded | 391 |
| Transfers recorded | 113 |
| Certificates of work issued | 609 |
| Payments in lieu of work | 22 |
| Water records issued | 17 |
| Pre-emptions issued | 35 |
| Certificates of improvement issued | 94 |
| " purchase issued | 32 |
| Crown-granted mineral claims on roll | 1269 |

## SLOCAN MINING DIVISION.*

REPORT BY ANGUS MCINNES, MINING RECORDER.

I have the honour to submit herewith my annual report of the progress of the mining industry in the Slocan Mining Division for the year 1904:—

The *Slocan Star* has been worked steadily throughout the year, under the management of O. V. White, with an average force of 35 men. It has produced during the year 2,670 tons of silver-lead ore, besides a very large tonnage of zinc, which is being piled up on the dumps. The management contemplates erecting a large zinc plant this coming year, for the purpose of treating the zinc on the ground. There has been a large amount of development work done during the year, which leaves the mine with a large tonnage of galena and zinc blocked out.

The *Ivanhoe* has also been worked steadily during the year, under the management of Mr. P. J. Hickey. The ore shipments for the year have been 1,380 tons of galena ores, and 1,070 tons of good quality of zinc. The average number of men employed is 75. This mine has also a large amount of ore in sight and blocked out.

The *Payne* mine has been working with a reduced force for the most part of the year. The ore shipments are 1,110 tons of silver-lead ores and 970 tons of zinc, the average number of men employed being 25. Mr. Garde, manager for the last three years, has resigned, and Mr. Ransom is now acting manager. There are certain levels of the mine working under lease, and it is said the lessees are doing well.

The *Reco* has been working with a slight increase of force during the year. Mr. J. M. Harris is manager and part owner and has at present 40 men employed. The shipments for the year were 950 tons of high-grade silver-lead ores.

* See also Report of Provincial Mineralogist, page 171.

The *Ruth*, managed by H. B. Alexander, working a small force, has shipped 450 tons of ore, which was mined in the course of development.

The *Last Chance* mine has shipped 380 tons of ore during the year, with a small force of men, employed under the management of Mr. L. Pratt.

The *Sunset* mine is also worked with a small force, and has shipped 313 tons of very good ore. The principal owner is Mr. G. W. Hughes.

The *Mountain Con* has, within the last year, developed from a prospect into a mine. About a year ago it was taken over from the owners under a lease and bond by Messrs. McLeod and Thompson, for, it is understood, the sum of $25,000, and in that time they have taken out enough ore to pay for the property, besides having a good surplus for development. The amount of ore shipped was 200 tons of high-grade ore.

The *Blue Bird* has been worked on a small scale during the year, and shipped 20 tons of very good ore.

The *Sovereign* has been worked under lease during the first part of the year, and shipped 30 tons.

The *Idaho*, under the management of Mr. P. D. Ahier, has during the year shipped 980 tons of high-grade ore, most of which has been reduced in the company's mill at Alamo. Thirty men are employed on an average.

The principal work done on the *Rambler* during the year was pushing the long tunnel started last year, which will tap the vein at depth. This tunnel will be nearly a mile in length. A portion of the mine has been working under lease, with good results, and ore to the extent of 850 tons has been taken out.

The *Cinderella* is situated near Three Forks, and has been worked during the year under lease to Messrs. Cory and Foster. They have shipped 170 tons of high-grade silver-lead ore.

The *Antoine* is managed by Mr. George Alexander, who is working a small force, the principal work being development, during which 40 tons of ore have been shipped.

The *Monitor* mine is situated near Three Forks, and has not been worked to any great extent during the year. The management is making preparations to treat the ores from the property on the ground, and has erected large reduction works and a zinc plant at a point on the shore of Slocan lake, and on the line of the Nakusp & Slocan Railway, near Rosebery, where there is good water-power and also good shipping facilities. It is understood that the plant, besides treating *Monitor* ore, will do custom work. Mr. Brockman is president of the company, and Mr. Maurice Gintzburger the local manager, while Mr. Fernau is engineer in charge.

The *Comstock* mine has been working a force of 7 men during the first part of the year, but lately, work has been confined to development with only 4 men, under William Hunter, of Silverton, as manager. Several cars of ore have been shipped.

Work on the *Fisher Maiden* also has been confined to development during the last year, though several cars of ore have been shipped. The property is situated on Four-Mile creek, and managed from Spokane, Washington, with George D. Long as local manager.

The *Mollie Hughes* has been worked on a small scale during the year, under lease to T. Avison, who is also one of the owners. The character of the ore is "dry," and very high in silver values. The ore shipped during the year was 50 tons.

The *Bob Fraction* is owned and operated by the owners, Messrs. Barker and Burges, and is situate on Goat Mountain, near New Denver. The ore is "dry" and high grade. Twenty tons were shipped this season.

The *Capella* is also on Goat Mountain, near the *Bob Fraction*, and is owned and operated by W. R. Will and N. F. McNaught. This is a "dry" ore and valued at $6,000 a car, net.

The *Red Fox* has been worked for the last year, under lease to Gething and Henderson. They have shipped 40 tons of silver-lead ore during the year.

The *Majestic* is situated near the Payne mine, and is worked under lease, with good results, having shipped 35 tons of good ore during the year.

The *Joe Joe* is situated on the north fork of Carpenter creek, and has been operated during the last year under lease, with good results, the ore being "dry" and high grade. The amount of ore shipped was 23 tons.

The *American Boy* is situated near Cody, and is owned and worked by an American syndicate from Spokane. The local manager is Mr. Tom McGuigon, who is working a small force of men. This mine has shipped during the year 40 tons of silver-lead ore.

The *Hewitt* is situated near Silverton, on Four-Mile creek, and is worked under lease by Mr. M. S. Davys, of Nelson, who is shipping a good deal of ore.

The *R. E. Lee* is near Sandon, and is operated by Mr. Lorenzo Alexander, of New Denver, who is also a part owner. Mr. Alexander expects to ship ore as soon as rawhiding begins. He has shipped one car during the year.

The *Mercury*, near the *Payne* mine, has been working a small force for a part of the season by the owners, Messrs. Twigg, Cunning and Drewry, who shipped 14 tons of very rich silver-lead ore.

The *Rowse Fraction* is on the north fork of Carpenter creek, and is owned and operated by Messrs. Hunter and Fairbairn, of Silverton. The ore is "dry," and gives high values in silver. The shipments for the year amounted to 12 tons.

The *Lucky Jim*, near Bear lake, was purchased early in the year by Mr. G. W. Hughes, who is now managing the mine himself. He has shipped 200 tons of silver-lead ore, and has thousands of tons of first-class zinc ore stored at Kaslo with excellent prospects of getting a good market for it.

The *L. H.* is situated on Red mountain, between Silverton and Eight-Mile creek. The owners, Messrs. Fingland and Brand, have done a great deal of development work for the last few years. The principal values in this mine are in gold.

The *Silver Bell* has been worked during the year under lease to Mr. Harry Lowe and others, and is showing up well under development.

The *Marion*, situated on Silver mountain adjoining the *California*, is also worked under lease, and Messrs. Brindle and Thompson have already a car of ore on the dump.

Summing up the situation in the Slocan, and more especially in the "lead belt," the season has, on the whole, been fairly prosperous, especially for lessees and owners of small properties, who have been working on a small scale and shipping their own ores, and a feeling of confidence for the future prevails among all classes who are engaged in the mining industry in the district.

OFFICE STATISTICS—SLOCAN MINING DIVISION.

| | |
|---|---|
| Free miners' certificates issued—ordinary | 389 |
| " " —companies | 9 |
| Locations recorded | 105 |
| Assessments recorded | 368 |
| Cash paid in lieu of work | $615 |
| Transfers and other documents recorded | 83 |
| Certificates of improvement recorded | 19 |
| Traders' licences issued | 34 |

## SLOCAN CITY MINING DIVISION.

Report by H. P. Christie, Mining Recorder.*

I have the honour to submit my annual report on the Slocan City Mining Division for the year 1904.

There has been, on the whole, a slight improvement in the mining situation here during the past year, there being an actual improvement in tonnage of ore shipped, of about 80 per cent. over last year, and there are more mines shipping, and more men employed. The general impression, however, seems to be that no great success will attend the mining industry in this division until mills are erected to treat the low-grade ores on the ground. The most notable achievement of the year has been the success of the *Ottawa* mine. Leasing is still popular and has been, in most cases, successful.

### Springer Creek.

The *Arlington* and *Speculator* have practically done nothing, keeping merely a couple of men employed.

*Slocan Prince* (*Black Prince*) has changed hands, as have also the *Two Friends* and *Bank of England*. This group has been acquired by the Pioneer Mining Co., of Nelson, and is now employing about 25 men. The former lessees shipped about 60 tons and the present owners are to make a large shipment immediately.

The *Ottawa* has been worked steadily all the year, and is now employing about 35 men. This mine has proved an unqualified success, having shipped about 1,300 tons of exceptionally rich ore, averaging, approximately, 200 ozs. in silver to the ton. The mine has already paid for itself and all development to date.

The *Myrtle Group* of claims has been worked all the year by from four to six men. They have driven a cross-cut tunnel of 450 feet, with side-drifts and a raise. By these means they have cut the vein at a vertical depth of about 100 feet. This is probably one of the largest veins in the district.

The *Cripple Stick* has been worked under lease with a small force of men, and a shipment of 10 tons was made.

The *Mayeta Group*, consisting of 15 claims, has been purchased by Pittsburg capitalists. A Crown grant is being applied for, and six men are at work developing the property.

The *Young Bear Group* of four claims has been bonded by a Sandon syndicate, and is undergoing development. They have already exposed a fine body of ore.

The *Tamarac* has recently been leased, and five men are employed taking out ore.

The *Combination* is being worked by three men. They have a good showing, and will shortly make a shipment.

The *Club* has undergone some development, with promising results. A good pack-trail was made and 8 tons of ore shipped.

On the *I.X.L.* and *Northern Light* some work has been done, and the latter will make a shipment shortly.

The *Port Hope* and *Republic* were worked under lease, shipping 17 and 22 tons, respectively. The *Graphic*, *Argentite*, and *Calumet and Hecla* were all worked a little, the latter opening up a fine body of ore.

*See also Report of Provincial Mineralogist, page 163.

### 12-Mile Creek.

The *Colorado* and *Hamilton* made a successful shipment which paid all expenses of driving a 50-foot tunnel. More ore is at present being taken out.

The *Sapphire* worked under lease, and the *Black Fel* by owners, both shipped a small quantity of ore.

### Ten-Mile Creek.

The *Enterprise* had 40 to 50 men working all the summer. About 680 tons were shipped, and at present there is a small force of men opening up new ore-bodies. This property is under lease to W. E. Koch, of Nelson.

The *Edison*, leased, worked a small force and shipped 15 tons.

The *Neepawa* worked under lease with a small force, and shipped three car-loads of ore.

The *Westmont* and *Black Cloud* were worked steadily by owners all the year, and look promising.

The *Riverside*, a new property, has improved under development.

The *Mabou* was worked by the owners with a few men, and a fine body of ore has been exposed, on what is supposed to be the *Enterprise* vein.

The *Highland Light* was worked by the owners, who shipped two tons of very rich ore.

The *Bannockburn* is being worked by five men under a lease.

### Lemon Creek.

There has been some activity on this creek during the year, the *Chapleau* having been leased and worked with good results. There are now about 28 men employed on this property, and it is looking most promising. Former lessees shipped three tons of concentrates, and present lessees have one car of gold ore and one car of concentrates ready for shipment.

The *Kilo* has undergone some development, and sent out a car of good ore, which gave returns of $64 a ton in gold. Another car is ready for shipment.

The *Alberta* was worked under lease with three men, and shipped 15 tons.

The *Emmett Group* is leased, and will ship ore during the winter.

On the *Nansen* four men were employed taking out ore. Several car-loads will be shipped during the winter.

The *Blandfield*, worked by owner, made a small shipment and has another going forward.

The *Lady Franklin* is being opened up by owners, and will make a shipment in the spring.

### Office Statistics—Slocan City Mining Division.

| | | |
|---|---|---|
| Free miners' certificates issued | | 188 |
| Certificates of work recorded | | 317 |
| New locations | " | 107 |
| Conveyances | " | 77 |
| Crown grants issued | | 15 |

# ROSSLAND DISTRICT.

## TRAIL CREEK MINING DIVISION.

Report of J. Kirkup, Gold Commissioner.

I have the honour to submit my report of mining operations in the Trail Creek Mining Division during the year 1904.

Although the shipments of ore from this Division for the past year are somewhat short of those of the previous year, the mineral industry has witnessed a general and satisfactory progress, as the future of the camp depends to a large extent on the successful concentration of the ores, and the year 1904 has witnessed a marked advancement in the way of solving this problem, four concentration plants having been in operation during the latter part of the year.

The *Le Roi No. 2* concentrator, which was the first to be erected in the camp, has been in operation during the whole of the year, with but little interruption, although during the past few months the mill has been operated by the water process of concentration only, and fairly good results have been obtained.

During the year the Consolidated White Bear Mining Company, Ltd., constructed an Elmore plant of much larger dimensions than that of the *Le Roi No. 2*, including many labour-saving devices; and although this plant has been in operation but a few weeks, the results are quite satisfactory.

The Velvet-Portland Mining Company also constructed a small plant on their property on Sophia mountain, in which straight water concentration is used, and, so far as known, with satisfactory results.

The mill of the Rossland Power Company, recently completed, after a trial run of several weeks, closed down early in December, for the purpose of adding some necessary machinery.

The statistics of ore production for the year show that about 312,205 gross tons of ore have been shipped from the mines within this Division, the gross value of which is approximately $3,860,354. The ore shipments from the different mines for the year 1904 are, approximately, as follows:—

| | | |
|---|---|---|
| Le Roi | 132,496 | dry tons. |
| Centre Star | 76,191 | " |
| War Eagle | 56,760 | " |
| Le Roi No. 2 | 22,947 | " |
| * " " | 661 | |
| Jumbo | 13,298 | " |
| Rossland-Kootenay | 5,068 | " |
| †White Bear | 1,344 | |
| Spitzee | 1,000 | " |
| *Velvet-Portland | 180 | |
| Cliff | 1,517 | " |
| ‡I.X.L. | 600 | |
| View | 68 | " |
| Miscellaneous | 75 | " |
| | 312,205 | " |

*Concentrates. †Including concentrates. ‡Milled.

NOTE.—The foregoing shipments from the *Centre Star* and *War Eagle* mines do not include some 10,000 tons of second-class ore shipped to the Rossland Power Company's concentrator, and from which no returns have been received.

DETAILED STATEMENT.

*Le Roi Mining Company, Limited.—Le Roi Mine.*

| | |
|---|---|
| Tons of ore shipped (dry) | 132,496 |
| Average number of men employed | 243 |
| Development: | |
| Drives | 3,078.5 feet. |
| Raises | 240.5 " |
| Cross-cuts | 2,030 " |
| Winzes | 122 " |
| Diamond drilling | 3,938 " |

Additions to plant during the year, stating approximate value of same, $7,000.

*The Centre Star Mining Company, Limited.—Centre Star Mine.*

| | |
|---|---|
| Tons of ore shipped (dry) | 76,191 |
| Average number of men employed | 160 |
| Development: | |
| Drifting / Cross-cutting / Tunnels | 2,412 feet. |
| Raises | 201 " |

No additions to plant during year.

*The War Eagle Consolidated Mining and Development Company, Limited.—War Eagle Mine.*

| | |
|---|---|
| Tons of ore shipped (dry) | 56,760 |
| Average number of men employed | 125 |
| Development: | |
| Drifting / Cross-cutting / Tunnels | 1,938 feet. |
| Raises | 106 " |
| Winzes | 175.5 " |

No additions to plant during year.

*Le Roi No. 2, Limited.—Josie, etc., Mines.*

| | |
|---|---|
| Tons of ore shipped (dry) | 22,947 |
| Tons of concentrates shipped | 661 |
| Average number of men employed | 120 |
| Development: | |
| Drives | 1,423 feet. |
| Raises | 92 " |
| Cross-cuts | 157 " |
| Diamond drilling | 3,376 " |
| Winzes | 105 " |

No additions to plant during year.

*Jumbo Gold Mining Company, Limited.—Jumbo Mine.*

| | |
|---|---|
| Tons of ore shipped (dry) | 13,298 |
| Average number of men employed | 20 |
| Development: | |
| Raises | 60 feet. |
| Tunnels | 407 " |

Additions to plant during year consisted of one 8-drill compressor and motor, of the value of $5,000.

*Consolidated White Bear Mining Company, Limited.—White Bear Mine.*

| | |
|---|---|
| Tons of ore shipped (including concentrates) | 1,344 |
| Average number of men employed | 40 |
| Development: | |
| Drives | 250 feet. |

Addition to plant during the year consisted of the construction of an Elmore Process concentrator, of the approximate value of $80,000.

*Spitzee Mines, Limited.—Spitzee Mine.*

| | |
|---|---|
| Tons of ore shipped (dry) | 1,000 |
| Average number of men employed | 16 |
| Development: | |
| Drives | 500 feet. |
| Raises | 400 " |
| Cross-cuts | 100 " |
| Winzes | 30 " |

Additions to plant during year consisted of one electric pump and motor of the approximate value of $1,500.

*Velvet-Portland Mines, Limited.—Velvet, etc., Mines.*

| | |
|---|---|
| Tons of concentrates shipped | 180 |
| Average number of men employed | 15 |
| Development: | |
| Drives | 694 feet. |
| Raises | 60 " |
| Cross-cuts | 8 " |

Addition to plant during year consisted of the construction of a concentrator, of the approximate value of $25,000.

*Columbia-Kootenay.*

This property was operated by the Rossland-Kootenay Mining Company, the owners thereof, from January 1st to July 31st, the work consisting of stoping some 5,068 tons of ore, 32 men being employed.

*Cliff.*

This property was worked for a short time during the past season, during which time 1,517 tons of ore were shipped.

*I.X.L.*

This property was operated under a lease for some time during the past season, during which time some 600 tons of ore were put through the *O. K.* mill, at a loss to the lessee.

*View.*

This property was also operated under a lease for a short time during the past season, during which time some 68 tons of ore were shipped.

In addition to the foregoing, some miscellaneous shipments amounting to possibly 75 tons were made, of which no accurate returns have been received.

Outside of the companies whose work is here set forth in detail, little has been done in the camp beyond the ordinary assessment work, and that has fallen off to a large degree in comparison with former years.

OFFICE STATISTICS—TRAIL CREEK MINING DIVISION.

| | |
|---|---|
| Mineral claims recorded | 50 |
| Placer " " | 6 |
| Certificates of work | 75 |
| Payments in lieu of work | 2 |
| Certificates of improvement | 4 |
| Bills of sale, etc., recorded | 24 |
| Water grants issued | 1 |
| Free miners' certificates: | |
| Companies | 9 |
| Personal | 357 |
| Special | 3 |

# BOUNDARY DISTRICT.

## GREENWOOD MINING DIVISION.

REPORT OF W. G. McMYNN, GOLD COMMISSIONER.

I have the honour to submit my annual report of operations in the Greenwood Mining Division during the year 1904.

It is by no means complete, as it has been found very difficult to obtain from some of the companies and individuals operating the working properties any idea at all of what has been done during the year, but where figures are used they may be taken to be those furnished by the owners or others in authority. The principal features of the year have been the steady increase in the number of high-grade gold and silver-bearing properties in the immediate vicinity of Greenwood, all of which, so far, have proved to be successful, and the resumption of work by the reconstructed Montreal & Boston Consolidated Mining & Smelting Company. This company, besides taking over the property of the Montreal & Boston Copper Company, has acquired the interests of the Dominion Copper Company, and a number of claims, belonging to individuals, which were in an advanced state of development. There are now in this Mining Division 13 properties at work and two smelters, employing in the neighbourhood of 1,000 men continuously. As usual, there has been a small amount of placer mining both by whites and Chinese, but no returns are available of the amount of gold produced, but it must be small.

It is confidently expected that the output for 1905 will reach 1,000,000 tons of ore. Last year the output for the district reached nearly 820,000 tons.

As in former years, by far the larger part of the ore produced came from the *Granby* mines, with the *Mother Lode* next, these two being together credited with about 708,000 tons. The details of production have not been supplied, notwithstanding the efforts made to secure the tonnage direct from the companies shipping. Most of the figures that follow, have, therefore, been approximated or taken from published tables. Where there are discrepancies they are caused by different tonnage having been supplied by the mines concerned, but in the main they are substantially correct. The following is the approximate tonnage of the various shipping mines:—

| | Tons. |
|---|---|
| Granby | 549,703 |
| Mother Lode | 175,800 |
| Emma | 38,000 |
| Brooklyn and Stemwinder | 24,000 |
| Oro Denoro | 15,000 |
| Athelstan-Jackpot | 4,600 |
| Senator | 3,500 |
| Sunset | 2,800 |
| Mountain Rose | 1,800 |
| Sundry small shippers | 2,500 |
| Total | 817,703 |

GREENWOOD CAMP.

Granby.

The report of development for the year is that 2,327 feet of sinking and raising, and 3,456 feet of cross-cutting, were done; total 5,783 feet. The total footage to date is 21,061 lin. feet, about five miles of underground workings, to say nothing of stopes of immense size and enormous excavations in the quarries of these mines. With a record output of about 1,549,594 tons to date, extensive workings at these mines may well be looked for. The information supplied from the mine does not give particulars of new plant and machinery installed, but it is known that new ore-bins were built, to meet requirements of the Great Northern Railway company's connection of its system with No. 3 tunnel, and that this tunnel is being equipped in readiness to send out a large tonnage of ore to the smelter over the new railway. Hauling from the tunnel will be by an electric locomotive, which should by now be at the mine. No. 4 tunnel will be similarly prepared for delivering ore to the same railway. A second big crusher has been obtained for use here. Like the other installed some time ago, it was supplied by the Jenckes Machine Co., of Sherbrooke, Quebec. Its nominal capacity is 150 tons per hour, the size of its jaw-opening, 42 by 30 inches, and its total weight, 113,000 lbs. Its frame is of semi-steel, having a tensile strength of 32,000 lbs. to the square inch. About 350 men are employed at these mines, which are steadily enlarging their producing capacity, already considerably beyond the present requirements of the company's smelting works.

New machinery installed during two years includes two Canadian Rand, class D, cross-compound, duplex air compressors, electrically driven and connected to motors by rope drives; high-pressure cylinders 16 by 36 inches, low-pressure cylinders 28 by 36 inches, rated capacity together, 8,228 cubic feet of free air per minute, or 60 3½-inch machine drills; two 700 horse-power, type C, Westinghouse induction motors, to operate compressors; one type No. 1 Thew automatic, single-truck, steam shovel, rated capacity 500 to 750 cubic yards in 10 hours, built by the Thew Automatic Shovel Co., of Lorain, Ohio; one type No. 3 automatic, single-truck steam shovel, capacity 1,000 to 1,500 cubic yards in 10 hours, and two 9 by 14 saddle tank locomotives, built by the Davenport Machine Works, Davenport, Iowa, for hauling the mine ore-cars from the workings to the ore bins.

This machinery has cost the company something like $150,000 alone, and is constantly being added to. It is all of the most modern and approved manufacture, and calculated to materially assist in the reduction of costs in the production of ore.

In addition to the above, last fall new ore bunkers were constructed for the No. 3 tunnel, capacity 2,500 tons, and electrical equipment for hauling ore, including the first electric locomotive in the Boundary, has been ordered and is now being installed. All of this electrical machinery was supplied by the Canadian Westinghouse Co., of Hamilton, Ont., and is of the latest and most improved type. A huge style B Blake-Farrell ore-crusher is also being installed for the No. 3 ore bins, similar to that in use for some time at the No. 1 ore-bins, having jaws opening 42 by 32 inches, and a capacity for crushing rock to the size of 7 or 8 inches at the rate of 150 tons per hour. A crusher-house and ore-bins of 2,000 tons capacity have been built, and a tramway 800 feet long between crusher-house and ore-bins.

In regard to the tonnage of ore treated at the Granby smelter since the first furnace was started, August 21, 1900, the following figures tell the story, the ore all coming from the company's Phoenix mines, with the exception of occasional small shipments from other Boundary, Kootenay and Republic camp mines:—

| | Tons. |
|---|---|
| 1900 | 62,387 |
| 1901 | 230,828 |
| 1902 | 312,340 |
| 1903 | 401,921 |
| 1904 (estimated) | 578,000 |
| Grand total | 1,585,476 |

For the fiscal year ending June 30, 1904, the production of gold, silver and copper at the Granby smelter was as follows, the figures given being official :—

| | | |
|---|---|---|
| Copper | 16,024,415 | lbs. |
| Silver | 275,960 | oz. |
| Gold | 54,231 | oz. |
| Mine development | 5,783 | lineal feet. |
| Granby ore shipped to smelter | 549,703 | dry tons. |
| Granby ore smelted | 516,059 | " |
| Foreign ore smelted | 36,182 | " |
| Foreign matte treated | 4,290 | " |

**Montreal and Boston Mines.**

This company last summer arranged to consolidate the Dominion Copper Co.'s *Brooklyn-Stemwinder* and *Rawhide* mines, *Athelstan-Jackpot* mine, *Sunset Group* and *Morrison* mine. With the exception of the last mentioned all these several properties are now on the list of shippers, sending their ores to the company's smelter at Boundary Falls. The *Brooklyn-Stemwinder* has been equipped with new machinery and plant equal to handling 600 tons of ore a day, and they are now producing about 400 tons. Ore-bins, tramways, and other surface works have been constructed, and altogether these properties are in condition to regularly maintain the output required from them to keep the smelter supplied. The *Rawhide* lately commenced shipping and will soon be producing about 300 tons daily. The company has expended many thousands of dollars on this property during the last six months, providing it with machinery, building gravity trams capable of handling up to 600 tons a day, and generally putting the mine into shape for dealing with the large tonnage of ore it has in sight.

For nearly three years, however, the properties have been idle up to last summer, when they were taken over by the Montreal & Boston Consolidated. Since that time they have been most vigourously operated, and in the short time that shipping operations were conducted, to January, 1905, the group had sent to the company's Boundary Falls smelter between 25,000 and 30,000 tons of ore. In addition to this, the Dominion Copper Co., which did not sell the dumps of the *Brooklyn* and *Stemwinder* mines, have shipped approximately 5,000 tons of ore.

Development on the *Brooklyn* has attained a depth of 350 feet in the incline shaft. On the 250-foot level there is a drift about 1,800 feet in length, all of which is said to be in ore of a good grade. At the 150-foot level, a considerable amount of drifting has also been done on the ore-body.

When the Montreal & Boston Consolidated took hold of the *Brooklyn*, in July, 1904, they found it necessary to straighten out and re-timber the shaft, in order to admit the skips. This was done, ore-pockets and runways put in, and since then the mine has maintained, and is still maintaining, a steady output of about 300 tons of ore daily. Some of the stopes in the *Brooklyn* are 50 feet across.

Within the last month or two a new air compressor has been installed at the *Brooklyn*, being one half of a 20-drill machine, of the latest type. This, however, has not proved sufficient to furnish power for pumping, hoisting and operating drills for the *Brooklyn* and *Stemwinder* together, and the other half of the compressor, it is said, will soon be ordered. An 80 horse-power hoisting engine is in use at the shaft of the *Brooklyn*.

The *Stemwinder* mine, almost adjoining the *Brooklyn*, has an incline shaft down nearly 400 feet. The only drifting that has been done in this mine is at the 114-foot level, but the ore taken out is some of the best from any mine in the Boundary. In fact, in the early days of the Boundary, before the *Granby* mines, the *Mother Lode* and the *Brooklyn* had had as much development and shipping as they have now, the *Stemwinder* was commonly reputed to be the best mine in this district.

Across the valley from the *Brooklyn* is the *Idaho* claim, which has a tremendous surface showing, and has had some development done. The *Brooklyn* workings extend into the *Idaho*, and in the course of time the *Idaho* will doubtless be one of the big shippers of the group.

The *Sunset* mine, in Deadwood camp, is owned by the Montreal & Boston Consolidated, and has only been operated since that company resumed operations in the Boundary. The mine is well equipped with machinery, and this year has shipped appoximately 5,000 tons.

### SKYLARK CAMP.

The *Skylark Group*, consisting of the *Skylark* and *Denver* mineral claims, is situated about half way between Phoenix and Greenwood, B. C. These claims were discovered in 1892 and were worked for some time with very good results. Later, however, owing to the drop in the price of silver and to the excessive cost of transportation, it was found necessary to discontinue work on this group, as well as on all other high-grade properties in this part of the Boundary.

The underground work consists of the following:—A shaft, dipping to the east at about 55° from the horizontal, follows the vein to a depth of 80 feet. At this point the vein faults to the east about 30 feet. It was easily picked up again by a cross-cut, and a winze has been sunk on it for another 20 feet. This winze will be sunk 50 feet more as soon as possible. On the 80-foot level a drift has been run on the ledge for a distance of over 250 feet. This drift will be carried north and south as fast as possible.

The ledge itself runs nearly north and south and dips to the east. It is very regular and varies in width from a few inches to over a foot. It carries a great deal of antimonial silver and native silver. The ore is easily mined, as the walls are exceptionally good and the ore is not frozen to them in the least.

During October, 1904, the number of men working on the *Skylark*, under Foreman Rowe, was six. On November 1st the force was increased to eleven, which force is still working. As stated before, it took over a month to get ready to mine, so that no ore was shipped until November 25th, 1904. From that time to the present (January 1st, 1905) three cars have gone out, one of first-class ore, one of second-class ore, and one of third-class ore, making a total of 52 tons shipped. These three cars brought in $4,970. The total expenses during the three months for wages, machinery, buildings, etc., was $3,900. At the present time there is ready to ship a car of second-class ore and about ten tons of first-class ore. This will easily net $2,000.

**Barbara.**

The *Barbara*, separated from the *Helen* by one claim, was acquired last summer by Chicago parties and is now being developed. It lies directly east of Greenwood, its west line abutting on Copper street. A vein from 17 to 26 inches in width, constituting one of the biggest quartz leads in the camp, crosses this property in a northerly and southerly direction and traverses other adjacent claims. Its trend is north and south. The lode had thus the same characteristic strike and dip of all the parallel veins so far discovered and opened up in the south belt. The mineralisation closely resembles that of the *Helen*, from which it is separated by one claim; and also that of the *E. P. U.*

An incline shaft on the lead extends 40 feet to the first level, where the vein was found to have broken over, but the vein has been exposed and stripped clean for a distance of 200 feet on each side of the shaft. Ore taken from the galena outcrop gave an average assay of $78.60 per ton in gold, silver and lead. The *Barbara* vein is a parallel lead to the veins on the *E. P. U.* and *Goldfinch* mines. The *Barbara* claim adjoins the *Goldfinch* mine on the west.

**Helen.**

The *Helen* is situated on the east side of Boundary creek, adjoining Greenwood on the south and Anaconda on the east. In an air-line, the Greenwood smelter is 1,500 feet distant from the mine workings. The property was bonded last March by local parties and the work has proceeded under the direction of W. H. Jeffery, M.E. At various periods in the past different individuals had thrown up bonds on the *Helen*, owing to their failure to obtain uniform values and the discouraging difficulties presented at the bottom of a 40-foot shaft, where the lead virtually pinched out. The best assays which have been obtained from the pay streaks varied from $2 to $20 and $30 per ton in gold and silver. The parties now holding the bond, however, have had exceptional success. By cross-cutting and following a horizontal seam an inch wide from the fault at the bottom of the shaft to a point 40 feet east, the lead was again recovered at its natural size on its original dip, at an angle of 50° to the east, the strike being northerly and southerly. Concurrently, a drift was run south 29 feet on the vein above the fault on the same level.

At a point 19 feet south of the shaft a series of samples gave average values of $115 per ton in gold and silver, the former predominating. Ten feet farther south, on the same lead, just above the fault, another series of samples gave average values of $225 per ton in gold and silver in the same order. One sample ran $525 per ton. The drift has been extended farther south and raises have been made in the same direction at the same time, in order to extract this high-grade ore.

From the point in the 40-foot cross-cut where the ledge was re-discovered this incline shaft was sunk 50 feet on the ore. This working will be extended to a depth of 200 feet, with drifts north and south on the vein at intervals of 50 feet. Now that the difficulties presented by the fault have been overcome, the ledge has been found in place stronger than ever.

The silver-gold mines about Greenwood attracted attention throughout the year. Beyond stating that the *Providence*, *Elkhorn* and *E. P. U.* continue to ship ore, and by development work made it evident that their rich quartz veins go down, there is not much to state. The output of these three mines was about 1,400 tons. The ore runs from $50 to $100 per ton, in carload lots. A discovery was made a few weeks ago on the *Providence* of ore close to the surface, and this lead was stripped along a distance of about 215 feet. It is thought by some to be an extension of the vein that has been worked during two years past.

The banner property in this class is the *Providence*, the history of which is well known, having been a profitable undertaking for three years, and now looking as well as ever. Some $22,000 in dividends has been paid to the shareholders in this property, with the almost certainty of their getting many more dividends.

The *Elkhorn*, adjoining the *Providence*, owned by Phil McDonald and James Sutherland, has paid from the grass-roots, and is paying handsomely now. In the same locality are the *Gold Bug*, *Strathmore*, *Combination* and others, that so far are coming up to expectations These claims are all located north of Greenwood within a mile or two.

### Smith's Camp.

**Republic Group.**

The development work carried on at the *Republic Group*, in Smith's camp, since last September, in order to secure a series of shipping tests, has resulted very satisfactorily. The quantity of ore exposed on three of the

properties, the permanence and continuity of the leads, coupled with the smelter returns, all combine to demonstrate that the Boundary is about to add another producer to its growing list of high-grade propositions.

The *Republic Group* comprises the *Last Chance, Republic, None Such* and *Hidden Treasure* mineral claims, situate in Smith's camp, one mile west of the Montreal & Boston Copper Co.'s smelter at Boundary Falls. It is owned by the Republic Gold Mines, Ltd., of which W. T. Smith, a pioneer of the district, is the general manager. Mr. Smith has just received the smelter returns of a recent carload shipment of 20 tons of ore from the *Last Chance* claim. The ore was treated at the Hall Mines smelter, Nelson, B.C. The carload, according to the official certificate, averaged 18⅜ per cent. lead, $3 gold, and 22 ozs. silver, equivalent to $23.40 per ton, including the lead bounty.

The *None Such* claim also made a similar carload shipment, which averaged $10 gold and 2 oz. silver per ton. The vein occurs in the same formation and averages from three to five feet in width. It is the same lead as the one on the *Last Chance*, the adjoining claim.

The carload shipment from the *Republic* claim proved even higher, the ore averaging $17 gold and 7½ ozs. silver per ton. The vein runs at right angles to the other lead and is from 12 to 18 inches in width. It occurs in identical formation.

### DEADWOOD CAMP.

**Mother Lode.**

At the B. C. Copper Company's *Mother Lode* mine, substantial progress was made last year. The open workings were considerably enlarged—in fact they are now one big quarry, the dividing masses of ore having been broken down and sent to the smelter. There is here a long, double-tracked adit, known as the mule tunnel, from which half a dozen raises have been made to the quarries above. Near the end of this tunnel, a big stope was opened a few months ago in a large body of ore of a good grade. This ore may prove to be the same body as that in No. 5 quarry, but this cannot be determined until the raise, now being made, shall break through. When the mine was visited, about the middle of November, this raise was up about 150 feet, in ore most of the way, but there remained about 50 feet more to be passed through before the connection would be made. The consolidation of the crushing plants having been decided upon, a new tunnel was driven, to intersect the main shaft, from which the 200-foot and 300-foot levels were opened, on the same level as the quarry tunnel. At the shaft a large pocket has been excavated, and this will discharge the 4 to 5-ton skips, obtained to replace the cages previously used. The skips will empty into a bin at the head of the shaft, the ore passing thence to either one of a pair of Jenckes-Farrell crushers, each having a jaw-opening of 24 by 36 inches. These crushers will be worked by two engines, driven by compressed air, so arranged that either engine can drive either crusher, thus reducing chances of stoppages by break-downs in either engines or crushers. A belt conveyor will take the crushed ore to the main ore-bins for shipment by rail, thence to the company's smelter at Greenwood. All the plant for this improved arrangement for crushing the ore has been purchased and some of it has already been installed. Where the excavation was made for the crushers a body of good ore was opened up and from this 6,000 to 7,000 tons were taken out. This body of ore has since been proved to be of considerable size, recent reports placing its dimensions, so far as yet explored, at 200 feet by 130 feet. The diamond drill has been used underground during recent months, with satisfactory results, one hole proving the occurrence of very good magnetic oxide ore down to 345 feet below the collar of the shaft, at which depth the drill was withdrawn.

In some respects the *Mother Lode* is fairly representative of the larger copper-gold ore deposits occurring in the Boundary district. The croppings are in places soft oxides of iron from decomposition of ore-bearing rock, and in others unaltered magnetic iron oxides, very

solid and compact, carrying copper pyrites and gold. In still other places they are calcite with copper pyrites, iron pyrites, more or less quartzose material, and carrying some gold. These croppings differ from those on the Granby Co.'s *Knob Hill* mine, in which specular iron occurs, a fine-grained magnetite being more generally characteristic of the *Mother Lode* outcrops, the chief of which was a big copper-stained blow-out, standing out prominently and distinctly noticeable from all of the surrounding thinly-timbered hills.

The footwall, as disclosed by development work, is for the most part limestone, and the hanging-wall a diabase. On the footwall side there is not, as a rule, a marked transition from ore-bearing or barren rock, but the ore often grades into the country rock outside of what is more or less defined as the ore-body, so that it is difficult to tell within a few feet where the pay ore will run out. On the other hand, the ore gives place to the barren country rock on the hanging-wall side with comparative abruptness, fading away completely within a foot or two. The chemical composition of the hanging-wall and of the ore lying against it—leaving out the pyrites—is substantially the same. According to the best geological authorities who have examined the district, the ore-bodies are altered limestone. Here, as at the *Old Ironsides, Knob Hill* and *B. C.*, porphyry dykes intrude, and it is considered quite probable that these intrusions afforded means of ingress for the ore-carrying solutions from beneath; consequently, the presence of a porphyry dyke is usually regarded in this district as a favourable indication when prospecting for ore.

Although the croppings on the *Mother Lode* appear in somewhat of a crescent shape, the general trend of the lead or ore deposit is north and south. The ore-bodies pitch to the east at an angle of 55 to 65°. The ores themselves may be classed in three general groups:—1. A calcite carrying copper pyrites and iron pyrites, these sulphides sometimes being massive and sometimes scattered in small crystals throughout the rock. Some quartzite is also often present. 2. A silicate of lime, iron magnesia and alumina, carrying both copper and iron pyrites, massive or scattered, and frequently also quartz, garnets or serpentine; often all three together. Occasionally, too, a small quantity of zinc blende occurs in this class of ore. 3. An excessively hard magnetic oxide of iron, with silica and copper pyrites; not often much iron pyrites.

For several years development work was done underground, and much cross-cutting and drifting at the 200 and 300-foot levels has proved that here, too, a large body of ore of shipping grade is available.

A main tunnel has been driven nearly a thousand feet into the hill, on a level with a bench on which have been erected ore-bins and other facilities for ore shipping. From this tunnel several exploratory cross-cuts have been run to determine the width of the ore, and big raises have been made to the quarries above. The main quarry was opened at a level about 110 feet above that of the tunnel, and other quarries below and above. From the highest point at which the ore outcrops on the hill, down to the level of the main tunnel, the depth is about 260 feet, and down to the bottom of the main shaft, which is also in ore, about 350 feet. Half a dozen quarries have been opened at different places, those on the top of the hill giving a larger percentage of sulphur, which facilitates matte-making in the smelter furnaces. The raises from the tunnels to the quarries are funnel-shaped at the top, so that when blasted down from the faces of the quarries, the ore may fall into them without handling. Rocks too large to pass through the bin gates of the hoppers at the bottom of the chutes are "bulldozed." The ore is drawn from the chutes into 3-ton cars, which are hauled by horses to ore-crushers having each a capacity of 65 to 80 tons of rock an hour, crushing to a size not exceeding five inches. From the crusher an elevating machine raises the ore to shipping bins above the railway track.

The *Mother Lode* is opened up sufficiently to enable it to maintain an output up to 1,000 tons per diem, whenever the company shall increase the treatment capacity of its smelter to require that quantity in addition to the custom ores which it also treats.

### WEST FORK OF KETTLE RIVER.

Development in this district is slow, owing to the absence of transportation. In 1904, however, there was more work done than for several previous years.

On Wallace mountain, the *Sally* claim last winter and spring shipped three carloads of ore to Midway by sleighs. The ore was galena and gray copper, and contained much silver, which occurred in the native form. The values averaged considerably more than $100 a ton, one car running over $125 a ton. A lot of second-class ore was also got out, but this cannot be shipped under the existing conditions, freight and treatment costs amounting to nearly $30 per ton. Five men are at present engaged in development, and more will be put on as soon as sufficient snow falls to admit of shipment of ore.

The *Wellington*, also on Wallace mountain, has lately been leased, and three men are now at work on it. The ledge is an extension of that on which the work has been done at the *Sally*. There is a good showing of ore in the face of a drift at the 40-foot level. On an adjoining fraction about 100 feet of tunnelling has been run to cross-cut a strong ledge of high-grade ore showing on the surface.

On the *Bounty*, a tunnel driven 100 feet taps the ledge. This property will also ship this winter, the ore being of an exceptionally high grade.

On the *Gold Drop Fraction* a tunnel is in about 20 feet. The ore on this claim carries good values in gold. A good deal of work has also been done on the *Gold Drop*, on which there is a high-grade silver ledge.

On the *Napanee Group*, situated about two miles from Wallace mountain, several men were at work all last summer. Two ledges have been opened up, and the ore assays up to $40 to the ton in gold, which is associated with arsenical iron.

On the *Curry Group*, on Curry creek, more than 100 feet of work was done in 1904, and several ledges were worked on. On Beaver creek, considerable development work was done on some claims in St. John camp. This is a copper-gold camp, with large bodies of low-grade ore. The results of the work have been very promising.

There has also been a great deal of assessment work done throughout the district.

A small test mill, with two Tremaine stamps and an Overstrom table, was installed at the *Carmi* mine last year. The mine had not been worked for some time, but it was known to have a good grade of ore, for between 800 and 900 tons were shipped to a Boundary smelter, and its value in bulk ascertained. The experiments now being made to concentrate the ore are for the purpose of lessening the heavy cost of the 50-mile haul to the railway at Midway. The extraction obtained is 87 per cent., of which 30 per cent. is by amalgamation. The concentration is 6 into 1. Water will be brought in next spring for power purposes, and additional plant installed.

The *Butcher Boy* is the extension of the *Carmi* on the west. A shaft has been sunk 75 feet with drifts at 45 and 70-foot levels. The ore is free-milling and concentrating. About 50 tons were taken out lately, and of this quantity some 20 tons will be shipped. Values range from $50 to $10. A small mill may be put in next spring.

There is a small high-grade silver ledge on the *Observatory Group*, from which two or three cars will probably be shipped this winter. Numbers of other claims in the *Carmi* camp have promising showings and some of these are being prospected.

## THE BOUNDARY SMELTERS.

### SMELTER OF THE B. C. COPPER CO., AT GREENWOOD.

The British Columbia Copper Co.'s smelting works, at Greenwood, Boundary District, were designed and constructed in 1899-1900 by Mr. Paul Johnson, E.M. They were planned with a view to eventual enlargement to a maximum treatment capacity of about 1,800 tons per diem. Their present capacity, with two furnaces running, is between 700 and 800 tons of ore a day. The first furnace was blown in on February 17th, 1901; the second was completed in the earlier half of 1902. Recently a Bessemerizing plant was added, this having been designed and installed by the present smelter superintendent, Mr. J. E. McAllister.

The smelter site adjoins the town of Greenwood. The Canadian Pacific Company's Columbia and Western Railway to Midway, giving rail connection with Rossland, Trail and Nelson, runs just below the works, while the Deadwood branch of the same system passes immediately above. Connecting tracks have been constructed at three levels—a double track over the upper ore bins, for the delivery of ore to be passed through the sample mill; a triple track over the smelter mixture bins and above the fuel yard, and a single track below the converter building, this last for the delivery of stores and shipment of the copper product.

The works may be briefly described as follows:—Starting from the top, the upper ore bins come first. There are six of these, each of 500 tons capacity, built in two parallel rows. An elevated tramway connects these with the sample mill building, which is a three-story frame structure 79 by 65 and 58 feet high to the eaves. Its full capacity when it shall be supplied with the requisite ore bins, etc., will be about 3,000 tons, but present arrangements only include provision for a smaller quantity. The building is large enough for three sets of sampling and crushing plant, but as yet only one set has been put in. This comprises three Gates rock crushers of different sizes, one pair Cornish rolls, one sample grinder, and three automatic samplers. The sample mill has been constructed on the automatic principle with samplers designed to avoid elevating the material before crushing. Under these arrangements only two or four per cent., as desired, has to be elevated, the great bulk going to the discard bins. The lowest floor of the sample mill building is two feet higher than the top of the lower or smelter mixture ore-bins. There are two sets of these bins, each twelve in number in four parallel rows, the whole giving a storage capacity of about 10,000 tons. They are crossed by three parallel railway tracks over which the bulk of the ore from the company's *Mother Lode* mine, already crushed at the mine and consequently not having to be passed through the smelter sample mill, comes to be dumped direct into the lower bins.

The flue dust-chamber is 12 feet wide by 14 feet high, and its length is about 620 feet. It has thick masonry walls, brick-lined in part and arched over with brick. It rises 76 feet 6 inches to the base of a circular brick stack, 121 feet high, the inside diameter of the shaft being 12 feet. This, together with the height gained by running the flue up the hillside, gives an effective draught height of 197 feet 6 inches from the level of the blast furnace charging floor to top of stack. This brick stack was erected last year, replacing the sheet steel stack that previously carried off the fumes from the blast furnaces.

The lower part of the blast furnace house is constructed entirely of stone work and steel, and the charging floor is of cast iron plates. The building is 58 feet wide by 45 feet long, and room has been left for extending it sufficiently to accommodate three more furnaces. The furnaces are water-jacketed stack furnaces 42 inches wide by 150 inches long, inside dimensions at tuyeres, of which there are ten on each side of 3½ in. diameter.

Owing to the filling of the dumping ground suitable for that purpose it became necessary to abandon the practice of granulating the slag from the furnaces, so last autumn a movable slag railway was constructed. The slag is now taken from the blast furnaces in a molten state in large, side-dumping pots, tilted by a worm and worm-wheel, each pot having a holding capacity of five tons. They are hauled by a steam locomotive with 10 by 14 cylinders, and four drivers of 31 inches diameter.

The engine and blower-house, 60 feet by 45 feet, contains two No. 7½ Connersville blowers, the high-pressure cylinder of a compound condensing Reynolds-Corliss engine 16 by 35 inches, rated at 150 h. p. with 100 lbs. steam pressure, and an electric light dynamo with direct-connected engine. In the adjoining 45 ft. by 40 ft. boiler room there are three horizontal return tubular boilers 66 inches by 16 feet, each of 100 h. p. and equal to a steam pressure of 130 lbs. Space was left for housing more boilers, but as electric power has been substituted for steam power throughout the works, the earlier intention to double the steam power will not now be carried out.

A Bessemerizing plant has been installed and the product now turned out is 99 per cent. blister copper instead of 45 per cent. copper matte as formerly. This plant consists of two converting stands, equipped with five shells of the trough type, 84 inches in diameter and 126 inches long. The converters are tilted by power supplied by a hydraulic accumulator.

For the purpose of conveying the molten matte from the blast furnaces to the converters, and for moving the shells from their stands to the re-lining platform, an electric travelling crane is used. Four motors operate this crane, which is equipped with a main hoist of 40 tons capacity and an auxiliary hoist of 10 tons.

The fumes from the converters are taken off by an independent stack, having first passed through steel boxes at the back of the stands, a suitably-shaped steel flue of 20 square feet cross-section, and finally a brick chamber of 285 square feet cross-section, in order to collect the flue dust, before being conducted into the stack.

The converting plant is housed in a steel building, 46 feet by 90 feet with a lean-to of 60 feet by 30 feet. At one end of this building is located the re-lining machinery. The silicious ore used for the linings passes directly from the sampling mill through a 7 by 10 inch Blake crusher, and a set of 24-inch rolls, into a bin, from which chutes lead to a 6-foot Carlin mixing pan. The clay used as a bond for the silicious ore of the lining is delivered by similar means into the pan which automatically discharges the mixed product, ready for tamping, in front of the converter shell.

The blast for the converters is furnished by a Nordberg blowing engine, with cylinder 40 in. diameter and 42 in. stroke, having a capacity of 5,000 cubic feet of air per minute, at 12 lbs. pressure. This compressor is operated by a rope drive, the fly-wheel being 18 feet in diameter and power furnished by a 300 h. p. variables peed motor, operating at 2,000 volts.

For the transmission of electricity the B. C. Copper Company has built a pole line, with two independent three-phase circuits, to connect with the sub-station of the Cascade Water Power & Light Co., at Phœnix, a distance of $4\frac{8}{10}$ miles. This line terminates in a brick sub-station containing step-down transformers from 20,000 to 2,000 volts of 1,000 h. p. capacity. From this sub-station the alternating current is transmitted at 2,000 volts to the power house, in which are located transformers with a further step-down to 550 volts.

A 75-k.w motor generator furnishes the direct current required for travelling crane and the necessary power for trolley locomotives to be used in the immediate future; a 300 h. p. motor, previously referred to, drives the Nordberg compressor; there are two 100 h. p. motors for the two blast furnace rotary blowers and one for the sample mill; a 40 h. p. motor drives the converter lining machinery; a 20 h. p. motor operates the hydraulic accumulator for

tilting the converters; a 15 h. p. motor runs elevators connecting the blast furnace tapping and charging floors, and a 5 h. p. motor the sample grinding machinery. The lighting on the plant and premises is provided for by a series of transformers, each having a capacity of 150 lamps.

A briquetting plant, of a capacity of 100 tons a day, is to be at once installed to handle the flue dust and concentrates. This will consist of a mould briquetting press with lime slackers, mixers and conveyor belt, the flue dust being automatically fed from a bucket elevator. This plant will be operated by a 40 h. p. induction motor.

Prior to the installation of the above described Bessemerizing plant the copper matte produced at this smelter had to be sent elsewhere to be converted into blister copper. Now this work is done on the spot, and in making provision for it the B. C. Copper Company has advanced another stage in the progressive policy it is steadily pursuing. The total tonnage of ore treated at this smelter during the three years and a half it has been in operation is in excess of 500,000 tons. Mr. McAllister has been in charge since the early part of last year, after having been for some time assistant superintendent at the Tennessee Copper Company's smelter at Copperhill, Tennessee, U. S. A., and his modern and economical metallurgical practice has been the chief factor in making the smelting works a commercial success.

The British Columbia Copper Company, Ltd., is a New York organisation. It was incorporated in 1898 to acquire the *Mother Lode* mine, situated in Deadwood camp, which property the organisers of the company purchased in 1896 and developed from a mere prospect. Mr. Frederic Keffer, of Greenwood, the company's general manager, has been in charge of the company's interests ever since its inception.

The following is a statement of the ore smelted during 1904:—

| | Tons. | | Tons. |
|---|---|---|---|
| January | 18,159 | July | 16,303 |
| February | 17,263 | August | 17,901 |
| March | 19,412 | September | 18,254 |
| April | 14,475 | October | 19,851 |
| May | 18,480 | November | 16,624 |
| June | 17,107 | December | 16,655 |
| | | Total | 210,484 |

From which was produced:—

| | |
|---|---|
| Total pounds matte | 4,978,750 |
| " blister copper | 2,934,115 |

The matte and blister contained:—

| | | | |
|---|---|---|---|
| Fine copper | 5,081,743 pounds, | @ 12.823c., | $651,631 90 |
| " gold | 36,403.84 ounces, | @ $20 | 728,076 80 |
| " silver | 118,418.93 " | @ 57.221c., | 67,760 50 |
| Total value | | | $1,447,469 20 |

Source of ore smelted:—

| | Tons. | | Tons. |
|---|---|---|---|
| Mother Lode | 172,753 | Hunter V | 144 |
| Primrose | .... | Le Roi No. 2 | 22,262 |
| E. P. U. | .... | Lead King | 336 |
| Providence | 240 | Mountain Rose | 1,562 |
| Elkhorn | 100 | Mountain Lion | 578 |
| Emma | 9,869 | Roderick Dhu | 47 |
| Oro Denoro | .... | Rathmullen | 36 |
| Athelstan | 1,538 | Senator | 59 |
| Jackpot | .... | Winnipeg | 69 |
| Barbara | .... | Bay, Ben Hur, Butcher Boy, Carmi, Eureka, Evening Star, Gem, Gold Finch, Gold Bug, Nonsuch, etc., in small lots | 371 |
| Helen | .... | | |
| Copper King, etc | 246 | | |
| Cliff | 82 | | |
| Columbia-Kootenay | 135 | | |
| First Thought | 57 | | |
| | | Total | 210,484 |

There has been installed at *Mother Lode* a new crushing plant and hoisting arrangement. When completed the plant will consist of two (2) 24 by 36-in opening Jenckes-Farrell crushers, driven by a pair of 100 horse-power engines. Ore will be taken to bins by 36-inch Robins conveying belt. The shaft is being equipped with a pair of skips, of 5-ton capacity each. No other equipment of importance was added during the year.

### MONTREAL & BOSTON COPPER COMPANY'S SMELTER AT BOUNDARY FALLS.

At the present time the smelting plant of the Montreal & Boston Copper Co., Ltd, is capable of treating about 650 tons of ore per day, but has sufficient equipment on hand, which could be installed within 30 days, to take care of 1,000 tons a day.

It is the intention of the new company to add a converting plant and increase the smelting capacity to from 1,250 to 1,500 tons per day. At the commencement of the year only one furnace was in blast at these works. In the spring a second was blown in, and later a third was obtained, but this last was not then erected. The furnaces here are 40 by 176 inches, inside tuyere line, and each has a nominal capacity of 300 tons every 24 hours, being somewhat larger than those in use at the other two district smelters.

Three Connersville blowers have been installed at this smelter, two of them in 1903. One No. 7 and one No. 7½ have their own direct-connected 75 horse-power Erie steam engines, while the third, a No. 8, is direct-connected to a 125 horse-power Erie engine, this last mentioned being large enough to provide blast for two furnaces. A Canadian Rand Drill Company's 7 by 12 locomotive, and seven 5-ton Union Iron Works slag-cars were also purchased, and rails were laid to provide for dumping the slag hot instead of granulating, this change having been found necessary here as well as at other district smelters. Additions to plant and machinery, and to buildings, etc., involved a total outlay of about $70,000.

The tonnage of ore treated at this smelter during 1903, was 132,570 tons, of which only 317 tons were dry ores. The 132,253 tons of wet ores produced 3,041,104 lbs. of copper, 52,278.74 oz. silver, and 7,850.005 oz. gold. The dry ores yielded 20,474.57 oz. silver and 150.906 oz. gold. There were 1,061 tons of United States (Republic camp) ores treated, these producing 4,592.69 oz. silver and 615.122 oz. gold.

### OFFICE STATISTICS—GREENWOOD MINING DIVISION.

| | |
|---|---|
| Free miners' certificates issued | 633 |
| Locations recorded | 267 |
| " " (placer) | 9 |
| Certificates of work issued | 553 |
| Conveyances recorded | 149 |
| Certificates of improvement recorded | 57 |

## GRAND FORKS MINING DIVISION.

### Report of S. R. Almond, Gold Commissioner.

I have the honour to submit my report of the mining industry in the Grand Forks Mining Division for the year 1904 :—

I am sorry to record that some of the superintendents and managers of mines seem very loth to furnish suitable information on which to base a fair report.

**The Granby Smelter.**

The directorate of this company appears to have undergone a complete change, and it is reported that the company intends, in the near future, to extend the plant to twelve furnaces, with a capacity of about 5,000 tons of ore daily. During the year 1904 the smelter treated over 597,000 tons of Boundary ore, resulting in 50,694 oz. of gold, 217,472 oz. silver, and 17,843,399 pounds of copper, valued at about $3,000,000 ; showing an average value of over $5 per ton.

### Brown's Camp.

None of the mines in this camp have been worked during the past year. The *Golden Eagle* is under consideration of purchase by a Spokane company, and, if the deal goes through, will possibly, before long, be shipping ore. This mine was worked some years ago and shipped steadily for some time. The ore is said to carry high values.

### July Creek.

On the *Hesperus* and *Betts* 200 feet of surface prospecting has been done, consisting of open cuts and shafts, and 1½ miles of waggon road have also been constructed. This property is, at the present time, being equipped with a five-drill air compressor, and one 60 horse-power boiler ; and the necessary buildings, such as compressor building, blacksmith's shop, bunk and boarding-houses, are under construction.

### Summit Camp.

In this camp several of the mines are being worked. On the *Oro Denoro* development work has been carried on very actively during the past twelve months, and large bodies of ore have been uncovered, at the same time over 15,000 tons have been shipped to the local smelter. The mine is the property of the Denoro Mines, Limited, with head office at Rossland.

The *Emma*, in the hands of the Hall Mines Co., has shipped over 37,000 tons of ore during the past year.

The *B. C.* was not working during 1904, but it is rumoured that work may be resumed ere long.

The *Brey Fogle* shipped between 200 and 300 tons of ore.

The *Mountain Rose* shipped close on 2,000 tons of ore during the past season.

Considerable development work has been done on the *Lancashire Lass* by the Montreal & Boston Consolidated M. & S. Co. and several buildings put up, but so far the company has not shipped any ore.

**Senator.**

The *Senator*, owned by C. M. Tobiassen and Henry Hoffman, and at present under bond to the Granby Consolidated Mining & Smelting Co., has been working about seven months, and during that time there have been shipped over 3,000 tons of iron ore for fluxing. The property is worked on the "glory hole" system. The equipment of the mine consists of a 30 horse-power boiler, a 15 horse-power hoist, with derrick of 57-foot mast and 50-foot boom. The buildings put up during the year consist of one box-frame cook-house, 16 by 28 feet, 1½ stories high ; one box-frame bunk-

house and two log bunk-houses; a barn, 18 by 30 feet; an engine-house, 18 by 28 feet, and a root-house. The company has also built three-quarters of a mile of waggon road from the mine to the Canadian Pacific Railway. The average number of men worked on the mine was 10, with an output of about 450 tons per month.

**No. 37.** The *No. 37*, lying west of and adjoining the *Senator*, and owned by J. B. Henderson, was worked by the Granby Co. during the months of May and June, and is at present under bond to that company. This mine was worked in the same manner as the *Senator*, about 360 tons of ore being taken out and shipped to the smelter. Most of the work done consisted in removing about 1,000 yards of wash before the ore-body was reached. The ore is of the same character as on the *Senator*. During the two months the mine was worked the average number of men employed was 12.

### WELLINGTON AND GREENWOOD CAMPS.

On the *Rawhide* the Montreal & Boston Consolidated Mining & Smelting Company has installed a gravity tram, capable of handling 600 tons of ore a day, and has built ore-bunkers, blacksmith's shop, bunk-house and dining-room. The management started to ship ore in the latter part of December, at the rate of about 300 tons a day, and expects shortly to increase that amount to 500 tons a day.

**The Snowshoe.** This mine has not been operated to any extent during the year just closed, possibly on account of the policy adopted by the company, which is reported to be anxious to amalgamate its property with others, with a view to having its own smelting works. I understand that the mine was unwatered and fully inspected by competent engineers, and that when the inspection was over, everything was put in order for any immediate action. About 100,000 tons of ore have already been shipped from this mine, and I am given to understand that the condition and equipment of the mine are such that it could at any time, if necessary, turn out 500 or 600 tons of ore a day.

**The Athelstan.** This property has, generally speaking, carried its values in gold, but report has it that a new discovery, in the shape of native copper, has been made, and, in fact, I was shown a small piece of ore rich in that metal. Between 4,000 and 5,000 tons of ore were shipped during the year.

### CHRISTINA LAKE AND BURNT BASIN CAMPS.

During the last year work, except assessment and prospecting work on the various properties held by companies, has been very limited. The reason for the apathy of the claim-owners in these camps is rather an enigma.

### CENTRAL OR WHITE'S CAMP.

This camp, although including some very good properties, from which ore was shipped by waggon three years ago, is still at a standstill for want of railway transportation. Possibly, in the near future, this camp may be enabled to demonstrate its capabilities.

### FRANKLIN CAMP.

For the following account of this camp I am indebted to Mr. George McLeod, one of the most energetic workers in it:—

The *Monterey* and *Manhattan* are situated on the western extension of the McKinley ledge. There are numerous cuts and trenches exposing copper-gold ore, the average of an 11-foot cut being $17.50, consisting of 7½ % copper, balance gold and silver.

On the *Gloster* a tunnel 200 feet long is being run this fall and winter. The object is to tap the ledge underneath the present shaft, at an estimated depth of 150 feet. The shaft is down 55 feet, in ore all the way, and the bottom is in ore of an average assay value of 13 % copper, and $3.50 in gold and silver.

McKinley Mountain.

On the *Jumbo* an immense iron cap was prospected by open cuts, and large, loose blocks of copper sulphide ore were encountered. The work accomplished was not sufficient to locate the solid formation.

On the *McKinley*, at an elevation of 3,758 feet, an ore-body, estimated at 400 feet wide, occurs at a contact of lime and birds-eye porphyry. The property was heavily covered by fallen timber, but the forest fires this summer got rid of this completely. In the spring a space 40 feet long by 20 feet wide was sluiced off by utilising McKinley creek, and considerable iron and copper sulphide ore exposed. On this exposure an open cut was run across the ore-body, the size of the cut now being 80 feet in length, 40 feet wide, and 30 feet deep; all in ore of an average assay value of 3½ % copper and $2.50 in gold and silver.

About 200 feet easterly along the ledge and about 150 feet higher another large cut 30 feet long, 20 feet wide, and with a breast of 25 feet was made, the ore averaging 4½ % copper and $2 gold and silver. A shaft was sunk 10 feet from the bottom of this cut to determine the dip of the ore-body, and afterwards a tunnel, which is now in 55 feet, was started to cross-cut the ledge at a depth of 125 feet.

Numerous bodies of chalcopyrite, from 4 to 6 feet wide, traverse the main ore-body.

In addition, about 50 trenches were made over the hillside, and almost invariably the characteristic iron capping was encountered. Another 8-foot ledge, parallel, and lower down the hill, was exposed for 600 feet, but no attempt was made to open it up. It contains copper sulphides and lead carbonates in a lime gangue.

A number of substantial buildings have been erected, good trails constructed, and preparations made to ground-sluice a large part of the ore-body this coming spring by damming and fluming the water of McKinley creek.

Eight men are at work under the direction of A. D. McPhee. Machinery will be installed in the spring, should the Government assist in completing the waggon road the remaining 7 miles to the camp.

Assessment work was done on a number of very promising outcrops, and this coming summer considerable development is looked for.

Office Statistics—Grand Forks Mining Division.

| | |
|---|---|
| Certificates of work issued | 366 |
| Locations | 190 |
| Conveyances, etc | 105 |
| Certificates of improvement | 26 |
| Permission to re-locate | 2 |
| Filings | 38 |
| Water rights | 2 |
| Free miners' certificates | 315 |
| Companies' " | 2 |
| Special " | 1 |

Note by Provincial Mineralogist.—The Lightning Peak camp is distant about 70 miles from the recording office at Grand Forks, being situated at the extreme head of the west branch of the north fork of Kettle river. Owing to its inaccessibility, the camp has not been otherwise reported on, and the Provincial Mineralogist is indebted to Mr. Wm. Thomlinson, of New Denver, manager of the *Lightning Peak Group*, for the following particulars of claims in this section.

### LIGHTNING PEAK CAMP.

In the Grand Forks Mining Division, but over 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 from the general public. The mineral section referred to 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 at present are the *Lightning Peak*, *Rampolla* and *Waterloo Groups*, but there are also a number of likely undeveloped properties in the district.

The *Lightning Peak Group*, consisting of seven claims, four of which are being Crown-granted, is owned by capitalists of St. Paul, Minn., U. S. A., represented by their agent and manager, W. Thomlinson, of New Denver, B. C. During the past season the following preliminary work was done to open up the property. About 16 miles of pack-trail was built from Fire Valley to the property, and camp equipment, provisions, mining tools and supplies were packed in, sufficient to carry on development work, with a small force of men, till the end of the year.

Four of the claims were surveyed for Crown grants, and considerable surface work and about 80 feet lineal of underground development was done on the group. A five-ton general sample of ore was sacked and brought out to the smelter at Nelson, B. C., as a test of values, and gave satisfactory results, the smelter returns showing 164 ozs. silver to the ton, and 26 per cent. lead.

The present route from Fire Valley landing to the property is about 26 miles in length, of which about four miles is waggon road and the remainder fairly good pack trail. Transportation charges are at present very heavy, but as the several properties get opened up, and ore tonnage increases, these may be gradually reduced.

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 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 returns of 669 ozs. silver, $10.30 gold to the ton, and 45 per cent. lead.

The Scaia Brothers have done considerable development work on an extension of the *Waterloo Group*, and have several promising showings of ore.

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

In a different section of country, situate north of Wauchope, near the head of Fire Valley river and tributary to Fire Valley landing, there are also a number of likely mineral properties, notably the *Paladora* or *Olds Group*, on Eureka mountain. This property has been favourably known for some years, but its sale and development have 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 or 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 about 16 miles. This road, if built, will serve all the properties tributary to Fire Valley landing or Edgewood, as well as the properties included in the *Lightning Peak*, *Rampolla* and *Waterloo Groups* on the north branch of Kettle river.

## OSOYOOS MINING DIVISION.

Report of C. A. R. Lambly, Gold Commissioner, Fairview, B. C.

I have the honour to submit my report of the mining operations in this division for 1904.

### Camp Fairview.

In this camp but little work has been done during this year. On the *Morning Star* a drift was run at the 100-foot level for 50 feet on the vein, and cross-cut 35 feet, showing the vein that width in good ore.

On the *Stemwinder*, owned by the New Fairview Corporation, the following is a short summary of work done. During the early part of the year a fault was encountered, which rendered further extraction of ore for milling purposes inadvisable until the main vein was re-located under the break, which cut off the ore-body previously worked, from the east second level to the west fourth level of the mine. This, after much trouble and expense, was accomplished. The new ore-body was discovered below the fault and opened up north of the previously worked ledge. A mill test of 60 tons, taken out during a cross-cut at the point of contact with the new ore, gave satisfactory results. The whole work during the year consisted of development and exploration.

### Lower Similkameen.

On the *Manery Group* of claims, owned by the Eclipse Mining and Milling Company, of Oskaloosa, Ohio, U. S. A., the following work was done:—A winze was sunk on the *Buller* claim about 80 feet, showing a good grade of ore almost the entire length. A tunnel was run on the *I. X. L.* claim about 90 feet, about 25 feet of which was in ore, but then encountered a fault. This tunnel will be extended next year to strike the ore-body at greater depth. Good gold values were found on this claim. A tunnel about 25 feet was run in on the *Apex* claim, which shows a solid body of mineralised quartz, from 4 to 6 feet wide, with good gold values.

### Olalla and Keremeos Valley.

In this part of the district very little development has been done this year. On the principal claims the work has reached the state when further work would be useless, without having milling or smelting conveniences, and in most cases the owners are waiting for railway transportation before installing machinery for working the mines.

The following information regarding the principal properties in the Olalla and Keremeos Valley districts, is supplied by Mr. C. W. McDougall, who is interested in these sections:—

### Olalla Camp.

**Bullion Group.** During the past season the work accomplished on this group consisted of extended open cross-cutting and tunnelling. The strike of the ore-bodies occurring within the extended ore zone on this property was defined as north-easterly and south-westerly. The full extent of the available surface ore supply has not yet been fully determined, and more work will be undertaken shortly for this purpose. The underground work consists of about 75 feet of tunnelling, much high-grade ore being exposed as a result. The values obtained from this property run from $1 to $40 in gold; silver, a few ounces; copper, 1 to 20 %. The gangue consists of lime, garnetite, and from 12 to 40 % silica. The position of the property is excellent, the ore-showing extensive, and only railway facilities are lacking to enable it to be operated on a profitable basis. This property was surveyed during 1904, and is now being Crown-granted.

**Flagstaff Group.** The tunnel on the *Searchlight* claim of this group was extended about 100 feet during the past year. Other work consisted of open cuts, for the purpose of defining, as nearly as possible, the boundaries of the large deposits of magnetite, carrying small gold and copper values, which occur on this group. Ore values run from $2 to $25. The gangue consists of lime, garnetite, and a small per centage of silica. This group is capable of supplying large quantities of self-fluxing ore, that will render it a source of profit to its owners as soon as the needed railway facilities are available. The *Flagstaff Group* was surveyed last fall, and Crown grants are now being acquired by its owners.

**Opulence.** This is a high-grade copper property. No gold or silver values are obtained. The copper occurs as native in an altered rock, which in appearance is not unlike a hard black coal. Copper values run from 2 to 30 %. A shaft 50 feet deep, with a cross-cut of about 35 feet at the bottom, is sunk in the lead, which, however, has not yet been fully cross-cut or its extent determined.

**Elkhorn Group.** Considerable high-grade ore has been opened on this property. The values are mostly in copper, but from $1 to $5 in gold is often obtained in addition to the copper values. Like other properties in this camp, further development is conditional on railway facilities becoming available. The entire group is Crown-granted.

**Copper King.** This property possesses a very fine showing of copper ore in a lime and garnetite gangue. A large amount of surface work has been done, as well as shaft sinking and tunnelling, much of which was carried out during the past season. This property, like all others here, is idle, awaiting better methods of transportation.

**Dolphin Group.** Development work during the past year, on this property, consisted of open cut and tunnel work, immense quantities of heavy iron capping being cut through. The ore opened is principally copper, with small gold and silver values. This group should be amongst the first heavy producers in this camp.

**Mount Zion.** This property has been idle during the latter part of last season. The development consists of a long cross-cut tunnel, open cuts and sinking, much of which was carried out during 1904. The values are in copper, gold and silver, the latter running up to 20 oz. occasionally. This property is admirably situated for economical operation, and will doubtless become an important producer.

**Golconda Group.** This property has been idle during the past season. It is opened by some 250 feet of tunnel. It is expected that this, like all other important properties here, will remain idle until adequate transportation facilities are accorded the camp.

The *Homestead-Silent Friend Group* has lately been surveyed, preparatory to Crown-granting. The copper and gold-bearing strata require more extended development.

The *Star of Hope Group* is situated between the head of Cedar and Sixteen-mile creeks. The work last year consisted of shafts, tunnelling and open-cut, exposing three different ledges. The ore is lead, galena and arsenical iron, carrying gold values. The values run from $15 to $95 per ton. This property has every chance of making a profitable mine when developed.

### UPPER KEREMEOS CREEK CAMP.

**Le Roi and Scotia Group.** During last season a tunnel and cross-cut therefrom were run on this property. This work disclosed an extensive body of high-grade copper-gold ore, running about 5 % copper and several dollars in gold. The property is well situated for operation through tunnels.

Apex Group. This property was extensively opened up last season by the owners, and large bodies of copper-gold ore exposed. The values from the *Apex Group* are above the average, and there is little doubt but what it will become a valuable property.

Green Mountain Group. This group was Crown-granted some time ago, and has since been allowed to remain idle by its owners. It possesses an immense pyrrhotite capping, throughout which extensive open-cuts and short tunnels have been run. Values up to $8 have been obtained.

Keremeos-Pontiac Co. Properties. This group has been extensively developed by tunnels, shafts and cross-cuts, high-grade copper-gold ore being met with. During 1904 a large amount of work was done and results of a gratifying character met with. This property is situated in the copper-gold belt of the Upper Keremeos Creek Valley.

Riordan Mountain Group. This property is remarkable for the immense surface showing of ore which occurs within its boundaries, and which caps the entire summit of Riordan mountain. During last season considerable open-cut work was done, and a tunnel extended into the ore for the purpose of rendering it available for stoping. The values are in gold and copper, the gangue being principally lime and garnetite, with a proportion of silica. This property was surveyed last year and Crown grants are now being acquired.

Penticton Group. This group, situated on Stevenson mountain, about 1½ miles north of Riordan mountain, at the headwaters of Keremeos creek, possesses an immense pyrrhotite capping. Work last season consisted of open-cuts throughout the capping.

### Camp Hedley.

In this camp the chief work has been done by Mr. M. K. Rodgers, on the properties managed by him and owned by the Yale Mining Company and the Daly Reduction Company. Work by the Yale Mining Company was confined principally to the *Nickel Plate*, *Sunnyside* and *Bulldog* mineral claims. On the *Nickel Plate*, about 500 feet of drifts, tunnels and raises were made during the year. Stoping of ore began about the middle of the year, and about 10,000 tons were shipped from the mine during the year. On the *Sunnyside*, about 200 feet of tunnel was run and about 200 tons of ore were shipped. About 30 to 50 men were employed by the Yale Mining Company during the year.

The Daly Reduction Company has a 40 stamp-mill completed, and about 9,000 tons of ore were treated. The 20-Mile creek flume, 4 feet by 4 feet, was finished. The electric tramway and gravity incline have been in operation since the month of June of this year. About 50 to 60 men have been employed during the year.

### Office Statistics—Osoyoos Mining Division.

| | |
|---|---|
| Free miners' certificates issued | 248 |
| Records of location issued | 195 |
| Certificates of work issued | 439 |
| Records of conveyances | 69 |
| Certificates of improvements issued | 13 |

# VERNON DISTRICT.

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## VERNON MINING DIVISION.

REPORT OF L. NORRIS, GOLD COMMISSIONER.

I beg to say that during the past year but little development work has been done on the mines in this division, other than the necessary annual assessment work, except on Monashee mountain, where the Cherry Creek Mining Co. drove a tunnel for 35 feet on the *Morgan* claim, and a tunnel of 100 feet with upraises, aggregating 175 feet, on the *McPhail Group*.

There has been considerable work done on the *Gale Group* of claims, on the west side of Okanagan lake. This group lies between Siwash creek and Six-Mile creek, and consists of the *Rossland*, *Violet*, *Gale* and *Garnvillo* claims, located some three years ago and now owned by Jas. Hamilton and A. W. Birnie, of Vernon. The work on the group consists of, on the *Violet*, a cross-cut of 35 feet and an inclined shaft of 19 feet, all in ore, and one shaft of 20 feet; on the *Rossland*, one shaft of 20 feet and one of 9 feet; on the *Gale*, one shaft of 35 feet and one of 12 feet, the latter entirely in ore; and on the *Garnvillo*, one shaft of 25 feet and one of 15 feet and a crosscut of 20 feet. The chief values are in gold and copper. The three claims, the *Violet*, *Rossland* and *Garnvillo*, are all located in line along the one contact lead, lying between limestone and porphyry. The ledge in places is not very clearly defined, and is rather of the nature of a "blow-out." The assay values run from $5 to $55 per ton. On the *Gale* claim, which lies off and alongside the main lead, the pay chute is 16 inches wide and dips towards the main ledge on the other claims. At least $4,000 has been expended on this most promising property, which has a good waggon road running up to it from the lake shore.

Last year, S. Hill and A. McKay, of Revelstoke, located the *Stult*, *Joe Chamberlin* and *Silver Bell* claims, on the north fork of Cherry creek, nearly north of and distant about 6 miles from the old *Monashee* mine. They stripped the ledge for about 400 feet, exposing ore carrying good values in free gold and native silver, and drifted for 150 feet, tapping the ledge at about 80 feet from the surface. The ledge at this depth is well mineralised and is similar to the ore on the surface. This strike is the most important one made last year, and I regret that I was unable to visit the locality and report more fully on it.

Last year I reported that the mill test of the ore from the *Morgan* mine, on Cherry creek (running from the 15th to the 30th December last), was satisfactory. It has since transpired that the test gave $25 per ton of free gold on the plates and concentrates worth $200 per ton. There were no mills running this past year.

Below is appended the office mining statistics furnished by Mr. F. H. Wilmot, Mining Recorder:—

OFFICE STATISTICS—VERNON MINING DIVISION.

| | |
|---|---|
| Individual miners' certificates issued | 99 |
| Companies " | 1 |
| Certificates of work recorded | 42 |
| Conveyances | 7 |
| Mineral claims recorded | 31 |
| Placer claims " | 1 |
| Certificates of improvements | 2 |
| Crown grants of Mineral claims issued | 2 |

# YALE DISTRICT.

REPORT OF G. C. TUNSTALL, GOLD COMMISSIONER.

I have the honour to enclose the annual mining reports for the Kamloops, Ashcroft, Yale and Similkameen Mining Divisions for the year 1904. The lack of capital in this district still acts as a formidable obstacle to the opening up of the mineral locations, which, in many instances, exhibit large bodies of ore. In the Jacko lake section, about six miles south of Kamloops, there are deposits of chalcopyrite on the *Kimberly*, *Monte Carlo*, *Wheal Tamar* and other claims, exposed by shafts and open cuts. On other portions of Coal hill similar results are visible, and claim-owners have firm confidence in their holdings.

The Glen Iron Mining Co.'s property has lain idle for some time. Its output was formerly used for fluxing purposes by the Nelson Smelter until a new and more convenient source of supply was discovered. The Cinnabar mines, north of Kamloops lake, have not been worked recently.

The operations of the Kamloops Coal Development Company are looked upon with deep interest, as the discovery of a suitable seam would have an important bearing on the mining interests of the district, and would enable the working of low-grade ores which cannot bear the expense of transportation to distant points for treatment. The same remarks apply to the discovery of coal at Enderby, where a large seam of coal is believed to exist, about five miles north of that town, at an elevation of about 1,100 feet above the railway track. This may lead to the resumption of navigation between Enderby and Kamloops. The distance from Enderby to Kamloops is 110 miles, and transportation can be effected by water at a comparatively small cost, but has been discontinued since railway construction.

## KAMLOOPS MINING DIVISION.

### COAL HILL.

**Iron Mask Group.**

The *Iron Mask Group* consists of seven claims, of which the *Iron Mask* is the principal location. Development on this property has been systematically prosecuted by Capt. Argall, and the shipping stage was reached last autumn, after the completion of the 100-ton concentrator. Several experiments were made before the results were considered satisfactory, and the changes effected have rendered it thoroughly efficient. Preparations are now being made to enlarge its capacity to 200 tons a day, to accommodate a larger output next season as the different levels show up large bodies of shipping ore. The average gross value of the shipping ore is from $30 to $35 per ton, which includes from $2.40 to $4 in gold. Transportation to the railway track is effected by a 100 horse-power traction engine, capable of drawing 30 tons. An excellent waggon road, four miles long, with comparatively easy grades, was completed last summer and macadamised to meet the requirements of heavy traffic. Very favourable arrangements have been made with the Trail smelter in regard to freight and treatment, in consequence of the ore, in common with the mineral deposits of Coal hill, being of a fluxing character, and, therefore, in demand for smelting purposes. The average number of men employed last summer was 65, although a much larger number was occasionally engaged. Every facility is supplied for their comfort in a large boarding-house, capable of accommodating 100 persons. The ore shipments amounted to 975 tons.

Dewey Group.

The *Dewey Group*, consisting of the *Dewey*, *Black Beauty* and *Cyclone*, is situated on Jones mountain, about six miles south of Kamloops. The ore is chalcopyrite, running from 7 to 22 per cent. in copper and from $1 to $3 in gold to the ton. The work accomplished on the *Cyclone* consists of a tunnel 85 feet long, cross-cuts 150 feet long, and one deep cut running on the vein, with an 18-ft. face at its extremity, exposing a vein of ore from 3 to 4 feet wide. Work will be prosecuted under the superintendence of C. W. Nesbitt during the winter. This property belongs to a Seattle company.

Monte Carlo and Ajax Groups.

These properties embrace some of the most promising locations on Coal Hill. The *Monte Carlo Group* consists of the following claims:—*Monte Carlo*, *Sultan*, *Anaconda*, *Vulcan* and *Whitecap Fraction*, situated six miles south of Kamloops. The principal showing is found on the *Monte Carlo*, where by means of extensive cross-cutting, a vein fully 20 feet wide has been exposed. The ore is chalcopyrite, which is found four feet below the surface. On the footwall of the lead is a band of high-grade copper, 16 inches in width, said to carry 17 per cent. copper, and $4.40 in gold per ton. There is a similar band six inches wide on the hanging-wall, of equal value, and several stringers three inches wide between the two bands mentioned. The rest of the vein rock is also impregnated with copper. The strike of the vein is nearly due north and south, with a slight dip to the west. Running parallel to this, and just within the side-line of the *Sultan* claim, which lies to the east of the *Monte Carlo*, is another vein, on which a shaft has been sunk some 18 feet, and ore of a similar character to that on the *Monte Carlo* been found. There are also many surface cuts exposing the lode in various places. The *Anaconda* lies to the south of the *Monte Carlo*, and is supposed to be intersected by the vein of the latter. There are also copper showings of lesser importance exposed on this claim, on which no prospecting has been done. The *Whitecap Fraction* and *Vulcan* lie to the east of the *Monte Carlo*, and each of them has fair showings. The *Vulcan* has an excellent site for a concentrator and necessary buildings. A creek runs through the group, from which a plentiful supply of water can always be obtained.

Adjoining the *Monte Carlo Group* is the *Ajax Group* of claims, respectively named the *Ajax*, *Hercules*, *Jupiter*, *Neptune* and *Mars*. The principal vein is on the *Ajax*, where, by extensive cross-cutting and a shaft, a large lead has been found. At the point where the most work has been done the rock is greatly decomposed, showing a quantity of copper carbonates. In another locality, where no oxidation has taken place, solid copper pyrites is found. The strike of this vein is nearly east and west, with a moderate dip to the north. East of the *Ajax* is the *Mars*, where a deposit of a similar character is found, the ore being identical with that of the *Ajax*. On this claim a shaft has been sunk 25 feet and cross-cuts run, showing good results. The *Jupiter* possesses a wide vein, on the hanging-wall of which is a band of copper ore eight to ten inches wide, carrying copper and gold values. The *Hercules* has a vein 8 feet wide, which has been cross-cut in several places on the surface. A shaft has also been sunk, in which is found a paystreak of about 18 inches, assaying 9 per cent. in copper and $3 in gold. The *Neptune* has three shallow shafts, and surface work.

Hecla Group.

The *Hecla Group* is situated about one mile north of the *Monte Carlo*, and consists of three claims. On the principal location a shaft has been sunk on the lode to a depth of 60 feet. Several cross-cuts intersect the vein, which is of considerable width, and has been traced for a distance of 1,000 feet on the surface. The assays average 5 per cent. copper and $4.50 in gold to the ton. This property adjoins the *Kimberly* and *Python Group*.

The *Number Seven* lies a short distance from the *Hecla*. It has an enormous body of low-grade copper-gold ore over 40 feet wide, exposed by cross-cuts for a distance of 500 feet.

**Wheal Tamar Group.**

The *Wheal Tamar Group* lies about half a mile south of the *Monte Carlo*, near Jacko lake, and is owned by Mr. Boillot, of Oakland, Cal.; G. D. Hamson, of Vancouver; and O. S. Batchelor, of Kamloops. It embraces the *Wheal Tamar*, *Tamar Fraction* and *Blizzard Fraction*. A new shaft is at present being sunk on the ledge in an oxidized zone, which shows rich oxides and carbonates. The vein has a width of about 150 feet of low-grade gold-copper ore. A shaft has been sunk 40 feet, from the bottom of which returns have been obtained amounting to seven per cent. of copper. Some of the smaller bands of ore have assayed 28 per cent. copper. The deposit has been traced the full length of the claim. The property has been opened up by three shafts to a depth respectively of 50, 40 and 15 feet, and by open cuts. The ore carries gold and silver values as well as copper. This and the foregoing claims can be worked on a large scale.

**Evening Star.**

The *Evening Star* is situated about six miles south-west of Kamloops, and adjoins the *Iron Mask*. It is owned by John Morrison, of Kamloops. The vein is 42 feet wide, composed of chalcopyrite lying in a diorite formation. The work on the property consists of a timbered shaft 30 feet deep, and an open cut at the eastern extremity 100 feet long, averaging 5 feet deep, at the termination of which is a shaft 17 feet deep.

**Orphan Boy Group.**

The *Orphan Boy Group* consists of three full-sized claims, viz.: the *Orphan Boy*, *Last Chance* and *Manitou*. Most of the development work has been done on the *Orphan Boy*, and consists of a shaft 35 feet deep, besides cross-cuts showing the trend and breadth of the vein, which is about 40 feet wide. At the foot of the shaft a drift has been run to the hanging-wall, exposing a body of pyritic ore 8 feet wide. The ledge has been traced 1,500 feet across the adjoining claim, the *Last Chance*.

**Delaney Group.**

The *Delaney Group* adjoins the *Orphan Boy*. It consists of two fractional claims, the *Delaney* and *Queen of May*. All work of any importance has been done on the *Delaney Fraction*, which has a shaft 64 feet deep. At the 60-foot level cross-drifts, 22 and 23 feet long, respectively, north and south of the shaft, intersect a body of low-grade copper ore.

**Grass Roots.**

This claim is situated south of Kamloops, near Jacko lake, and is easily reached by a good waggon road. A good deal of development work has been done during the past eight years, nearly all, however, in the form of open cuts and shafts on the surface. These have exposed five separate and distinct veins of ore, varying in thickness from 3 to 16 inches. The ore is a mixture of magnetite, copper pyrites, calcspar and silica. One vein of decomposed pyrites contains free gold, which may be separated by panning. The several veins vary in the proportions of iron and copper, one sample showing little copper and assaying $7.80 in gold to the ton. A second sample gave 11.36 per cent. copper. The claim is traversed by a dyke of porphyry impregnated with finely disseminated iron pyrites, carrying from a trace to $1 in gold. Fifteen hundred dollars has been spent in development work on this property. In a report on the *Grass Roots*, W. T. Newman, M. E., of Vancouver, says as follows:—"The conditions so far merit and warrant the expenditure of a reasonable amount of capital in further development work, etc., etc."

**Truth Group.**

The *Truth Group* lies 5½ miles in a south-westerly direction from Kamloops. It includes the *Truth*, *Hope*, *Pearl*, *Jeannie* and *Dakota*, covering a total area of 247.63 acres, owned by Messrs. A. G. McDonald and Joseph McGee. The country rock is diorite, which is identical with that which exists in the Rossland, Phœnix and other mining camps in the Boundary district. The vein is a felsite

matrix of great width, bounded on two sides by trap and iron dykes. A shaft, 80 feet deep, has been sunk on the *Truth*, from which a drift has been run 100 feet on the ore-body, which was ascertained to carry values ranging from $1.28 to $66.64 to the ton. Cross-cuts on the *Pearl* and *Dakota* have proved the existence of the same character of ore a length of 1,800 feet. A tunnel has also been run on a lode 12 feet wide, first encountered in the shaft. This body has been traced on the surface a distance of 1,500 feet by open cuts, whilst working on this chute a large cross-vein 42 feet wide was exposed, running east and west over the entire length of the property on the north side of the main body. This ledge is strong and well defined by foot and hanging-walls. A shaft 30 feet deep was sunk on this vein, which shows some clean copper pyrites. Numerous cuts on the surface expose the various veins and ore-zones to advantage.

Dakota.

The *Dakota* has a strong vein of magnetite about 40 feet wide. The ore carries small veins, containing gold, silver and copper, and about 75 per cent. in iron. There are also two other leads of the same kind of ore, on one of which a shaft 20 feet deep has been sunk, showing good ore.

O. K. Group.

On the *O. K. Group*, which is situated midway between the *Iron Mask* and *Python*, and at the centre of Coal Hill, the development work done during the year consists of a tunnel run to cross-cut the upper lead. The ore-body was encountered at some 35 feet down, and was intersected 15 feet. The face of the drift is still in ore, so that the extent of the body is undetermined. The ore is a chalcopyrite, containing gold values. High grade chutes and lenses of varying size scattered through the vein give assay values of 22 per cent. copper, and as high as $42 in gold. Although the work done on this group is not extensive, it is sufficient to indicate the existence of two distinct veins of large size, carrying good values. The lower lead, which is believed to be an extension of that being worked at the *Iron Mask*, is opened up by a shaft 85 feet deep, with cross-drifts at the 50-foot level, aggregating 65 feet, besides a considerable amount of surface work. The other lode is opened up by the tunnel run this year, and by a shaft 20 feet deep, and cross-cuts along the surface.

### JAMIESON CREEK.

Homestake.

The *Homestake* claim is situated on Jamieson creek, about 17½ miles north of Kamloops. It was located in 1897. The formation, according to Dr. Dawson, is an intrusive granite and argillite. It occurs in large-sized areas as well as dykes, cutting through the hard slates, and contains more or less quartz-veins along its entire course to the head of the creek. There are several veins on the *Homestake*, varying in width from 2 to over 40 feet, which contain a large amount of mineralised quartz, carrying iron pyrites and galena. Development consists of several shafts from 8 to 20 feet in depth, and numerous open cuts on the different veins, which run north-west by west, and dip slightly to the south-west. The values range from $3.60 to over $20, with probably an average of $12.50 in gold and silver. About 60 per cent. of value is in gold. The ore is capable of being worked by the cyanide process. The location can be developed by tunnel to a depth of 1,000 feet, and it has been bonded by parties who are actively engaged in developing the property.

The *Molly Gibson* lies south of the *Homestake* and shows a vein 5 feet wide, with ore similar to that found in the latter claim.

### SALMON ARM.

Mount Ida.

The *Mount Ida* mineral claim is situated four miles south of Salmon arm, on the north-west slope of Mount Ida. The present location was staked by Mr. F. A. McLeod about a year ago. Some rich silver float had

been previously found in the vicinity, and was the cause of considerable excitement. Efforts were made by several parties to find the lode, but without success, owing to dense timber and depth of alluvial deposit.

It has apparently been discovered by the present locator in the bed of a small stream which crosses the vein at right angles. Several cross-cuts have uncovered the lode for 38 feet without attaining the opposite wall. The vein-matter consists of a quartz gangue impregnated with mineral. The country rock is porphyry. Work is at present being actively prosecuted.

**Coal at Kamloops.** A local company, known as the Kamloops Coal Development Company, started to work late last fall, and sank a shaft through sandstone a depth of 380 feet, at a point several hundred yards east of the old Guerin tunnel on the creek running through what was formerly called the Hudson's Bay Company's farm. Several seams, differing in thickness from a few inches to one of over two feet, separated by layers of sandstone, were encountered. A drift was run from the bottom of the shaft a certain distance, from which some six or seven tons of first-class coal were obtained. A great improvement was noticed in the distribution and increased number of seams exposed, on those found in the Guerin tunnel. These favourable changes have led to the belief that further east a body will be found that will prove sufficiently valuable to work. The drift looks so promising that the property has been bonded by Mr. Morrish, of London, England, one of the directors of the company which owns the *Iron Mask* mine, who intends to sink another shaft over a quarter of a mile east of the present site.

**Coal at Enderby.** About two months ago a great deal of excitement was caused by the discovery of a seam of coal near the summit of a mountain, about five miles north of Enderby. The coal is said to be of excellent quality and is stated to be four feet thick, so far as could be observed, but may prove to be of greater extent, as it is partly covered by slides from the mountain. Parties interested, I am told, have applied for the purchase of 3,000 acres of land in the vicinity. A tunnel will be run to ascertain the extent of the deposit. Should expectations be realised a strong company will be formed to operate the mine on a large scale.

**Placer Mining.** The dredge on Tranquille creek started to work last June. Operations ceased during a period of two months, owing to the scarcity of water, caused by an unprecedentedly dry season. The gravel worked measured 150 yards long, 200 feet wide and 15 feet deep. Frequent breakages, and time and expense incurred in making repairs, are great obstacles to this branch of mining. The cost of fuel also is great, and the returns are not deemed satisfactory, a condition for which the auriferous character of the gravel cannot be held responsible.

The yield of gold for the past year is $6,066.

OFFICE STATISTICS—KAMLOOPS MINING DIVISION.

| | |
|---|---|
| Claims recorded | 112 |
| Certificates of work | 181 |
| Bills of sale | 36 |
| Mining leases issued | 19 |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $2,159 50 |
| Mining receipts general | 1,424 15 |
| Tax on Crown-granted mineral claims | 393 95 |
| | $3,977 60 |

The following additional notes as to claims in the Kamloops Division, in the vicinity of Nicola, are supplied by Mr. George Murray, Deputy Mining Recorder at Nicola:—

On Ten-Mile creek, the Broomhead Syndicate, owning a group of eight claims, ran a cross-cut tunnel 75 feet, to cover required assessments. The intention is to prosecute work until the strong copper lead which shows on the surface is reached.

The *Great Western Group*, in the same vicinity, gives good promise and has been carefully prospected. A 60-foot tunnel and considerable surface prospecting have been returned as work done on the claims forming this group.

On the *Interior* mineral claim a double-compartment shaft is being sunk, from which a cross-cut to the vein will be made. If indications already obtained are sustained at the depth reached by the shaft, the owners of the *Interior* will be well repaid for their toil.

The work on the *Saucy Sally* and *Saucy Lass* consists of shaft extension. The lead on those claims is about 50 feet wide, the greater portion of which is well mineralised, and when cut from the bottom of the shaft, it is fully expected that a body of high-grade ore will be encountered.

Recent work on the *Golconda* has exposed a 5-foot vein, which yields fair assays.

An assessment each has been done on the *H. L.*, *Mary Maud*, *Alice* and *Champion*, designated the *Pan American Group*.

Work during the past year on the Ten-Mile creek mineral claims strengthens the conviction that there will be a prosperous camp in that locality when ample capital is enlisted.

## ASHCROFT MINING DIVISION.

### REPORT OF J. W. BURR, MINING RECORDER.

SIR,—I have the honour to submit herewith my annual report on mining operations in the Ashcroft Mining Division for the year ending 31st December, 1904.

**Placer Mining.** Placer mining on the Fraser and Thompson rivers has not been carried on as extensively this year as formerly, and, in consequence, the amount of gold mined in this way is not near the mark of previous years.

Dredging operations on the Fraser river, above Lytton, have not proved as remunerative as was expected. The Fraser River Gold Dredging Co. built a new dredge, which was completed this spring, and from which great results were expected, but, unfortunately, after work was commenced the machinery could not stand the heavy and constant strain and kept breaking. This involved a great loss of time and money and a very short season.

The old dredge worked till the 1st of December and took out a lot of gold. It was moved up the river several miles, with the intention of putting it on another of the company's leases, but the water being so low it could not be got over some of the bad places in the river, and work was abandoned until spring. In the meantime, the intention is to take it down to Kanaka Bar, where the company has a lease which is believed to have a very rich pay streak.

The amount of gold taken out for the year by placer mining is about $24,000 for this District.

**Mineral Claims.** In Highland valley, some ledges of copper-gold ore have been discovered this year, and the coming year will see development work carried on there.

The mine-owners are very anxious to see the waggon road into the valley completed as early as possible in the spring, so as to enable them to get in machinery and

provisions and bring out the ore which is accumulating on the dumps. The ore is distributed all through the mountains on each side of the valley. Assessment work on all the claims has been done for the year.

OFFICE STATISTICS—ASHCROFT MINING DIVISION.

| | |
|---|---|
| Free miners' certificates issued | 78 |
| Mining receipts, general | 77 |
| Certificates of work | 36 |
| Mineral claims recorded | 52 |
| Placer " | 4 |
| Certificates of improvement | 6 |
| Bills of sale, &c | 7 |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $ 653 75 |
| Mining receipts, general | 1,020 30 |
| Tax on placer gold | 389 00 |
| Total | $2,063 05 |

## YALE MINING DIVISION.

REPORT OF WILLIAM DODD, MINING RECORDER.

I have the honour to submit herewith my annual mining report and office statistics for the Yale Mining Division for the year ending December 31st, 1904.

**Placer Mining.** There is practically nothing of note to report under this heading since my last return. The output of the Chinese miners constitutes the sum total of the recovery, and even that has become unimportant.

Although material was on the bank ready for building the proposed wingdam, the late winter level of the Fraser river, which is the extreme low water period, was rather higher than usual, and did not permit of the resumption of work on the "Saw-mill riffle," above Hill's Bar, owned by the local Castle-Revesbeck syndicate, which promised so well during the very brief working season in the abnormally low water of 1903.

The Yale Hydraulic Mining Co. completed its pipe-line of about a mile, and was enabled to hydraulic for a month.

**Mineral Claims.** If it were not for the two new concerns on Siwash creek, there would be little or nothing doing in connection with lode mining. In the absence of recent authoritative information from the management of those companies, as also in view of the fact that they have, since my last report, been inspected by a member of the staff of the Bureau of Mines, I may confine myself to stating that during the past twelve months the Mount Baker and Yale Mining Co. has completed its ten-stamp mill and the International Gold Mining Co. its three-stamp, triple discharge battery. The former company has at present some eight men employed, and the latter about twenty. Both concerns are still engaged in completing their surface plant, equipment and buildings, and in getting out timbers for the saw-mills attached to the respective properties. The stamps have been in operation for the past three months.

Regarding other mineral locations mentioned in former reports, such as the silver-lead camp of Summit City, the *Murphy* mine, *King Group*, etc., there is no news. The auriferous arsenical iron pyrites on the *Wardle-Burton Group* at Hope, which carries small percentages of nickel, has not been developed, and on the *Mountain Spring* claim at Yale, Ed. Stout and partners have sunk prospecting shafts and stripped the ledge in places.

OFFICE STATISTICS—YALE MINING DIVISION.

| | |
|---|---|
| Free miners' certificates issued | 104 |
| Mineral and placer claims recorded | 56 |
| Leases recorded | 14 |
| Certificates of work | 43 |
| Bills of sale and permits | 10 |
| Leases in force—dredging and hydraulic | 32 |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $ 521 75 |
| Mining receipts | 3,159 30 |
| Miscellaneous | 575 50 |
| | $4,256 55 |

NOTE.—Owing to the abnormally dry season, which prevented the working of the creeks and benches, the yield of gold has been limited to $3,000, the smallest return that has yet been made. Individual placer mining on the bars of the Fraser in this Division is a thing of the past.

## NOTES ON SIWASH CREEK CLAIMS.

BY H. CARMICHAEL, PROVINCIAL ASSAYER.

### SIWASH CREEK.

Siwash creek flows into the Fraser river from the south, about two miles above the old town of Yale, and is reached by walking up the C. P. Railway track for two miles, and crossing the Fraser in a cage on a cable ferry suspended some 50 feet above the river. At the mouth of Siwash creek several placer leases have been taken up, and pipes are now being laid to work the ground by the hydraulic system. The mineral claims on the creek have all been located at the junction of the north, south and middle forks, about four miles from the Fraser river, and about 1,200 feet above the level of the C. P. R. track, and a waggon road has been built from the river to the claims. Two companies are operating here, and between them own all the claims, the Mount Baker and Yale Mining Co., Ltd., owning the *Old Puss, British Queen Captain Jack* and *Louisabelle*, while the *Ward, Ruby* and *Independent* are operated by the International Gold Mining Co., Ltd. The first-named company has worked chiefly on the *Old Puss*. On a spur of the mountain, between the middle and south forks, a tunnel has been run in over 20 feet on a porphyry *dyke, slightly mineralised with iron pyrites, with slate as the general country rock; and some 50 feet higher up a drift has been run for 10 feet into a

*Samples of these dykes were sent to Prof. J. A. Dresser, at Montreal, for microscopic examination, and the following is his report thereon :—

I.

DYKE IN "OLD PUSS" CLAIM, SIWASH CREEK.

In the hand specimen this is a finely crystalline rock, showing no structure to the unaided eye. It is grey in colour, but with numerous flesh-coloured spots, apparently due to some decomposition product. In the thin section it is found to be a rock, which is wholly, but finely, crystallized. The greater portion consists of a fine ground-mass of quartz and feldspar, with a few larger crystals or phenocrysts of feldspar. The

dyke with similar characteristics. This dyke appears to follow the trend of the mountain spur, and to cross the north fork of the creek in a north-westerly direction, as on the far side of the creek there is an outcrop of rock, similar although more decomposed, which has been prospected by several short tunnels. Sufficient development work has not been done to show the size of this dyke, and although surface indications promise a large tonnage, the values are admittedly so low that the property will be worked at a profit only by working on a large scale and by careful management.

A ten-stamp mill, supplemented by two Wilfley tables, is being erected on the middle fork, from lumber cut by a small sawmill on the ground, and the stamps should soon be dropping, the power being obtained by means of a Pelton wheel, driven by water from the middle creek under 300 feet head. This is purely a sampling plant, built for the purpose of testing rock encountered in prospecting the property, and does not assume to be in any way a working mill.

The *Ward* is the principal claim in the International Gold Mining Co.'s group, and adjoins the property of the Mount Baker and Yale Company. This claim is situated on the spur between the middle and south forks of Siwash creek, on a sharp ridge about 500 feet above the creek. Here on the surface is a crumbling mass of quartz and rock matter, with rusty quartz predominating, but no extensive body of quartz in place could be seen.

Immediately below this float quartz, a tunnel has been driven into the hillside, running in entirely on the dyke* matter noted on the Mount Baker and Yale Co.'s property lower down. This tunnel appears to be the only development work undertaken by the International Gold Mining Co., which is, however, erecting a stamp-mill, to be driven by a Pelton wheel, for the purpose of testing its ground as prospecting proceeds.

A considerable amount of placer gold has been taken from Siwash creek, but it was derived probably from the degradation of quartz veins in the slate formation, rather than from the larger igneous dykes.

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latter are so turbid in appearance from the alteration which the rock has undergone that it is impossible to say whether they are orthoclase or plagioclase. There are more numerous patches of chlorite and epidote, with grains of iron ore, in this slide, probably representing a primary bisilicate mineral. Spots of some carbonate, apparently dolomite, are also present.

The rock is an altered porphyry or porphyrite, probably the former. The distinction between these two classes depends on the character of the feldspar, which, as pointed out above, could not be definitely determined.

II.

DYKE ACROSS THE NORTH FORK OF SIWASH CREEK.

In the hand specimen this rock differs from the last only in having a reddish colour and showing specks of pyrite.

In the thin section also this rock is found to be similar to the last. It, however, contains many rusty spots, due to the oxidation of pyrites, and has also a more pronounced porphyritic structure, showing numerous well-defined phenocrysts of orthoclase, but none of quartz. There is, however, less basic material present than in the last. It has been crushed and sheared by subjection to pressure after its solidification.

It is a quartz-porphyry.

The above rocks strikingly resemble many of the copper-gold bearing volcanics of the eastern townships of Quebec. They are but slightly differentiated phases of a common magma, such a degree of differentiation in these rocks frequently taking place within a distance of a few feet.

## SIMILKAMEEN MINING DIVISION.

### REPORT OF HUGH HUNTER, MINING RECORDER.

I have the honour to forward the annual mining report on the Similkameen Mining Division for the year 1904.

The past year has been most favourable for placer mining, but little was done, as the Chinese population has dwindled down to a very few of the old hands.

At the mouth of Bear creek three Chinamen took out some gold and platinum, and it is reported that they got a nugget valued at $120. In that vicinity some valuable nuggets have been found at different times in past years.

A few Chinese were mining on Granite creek, but they did not reap the golden harvest they expected.

I have not much development to report on mineral claims, the owners satisfying themselves with doing the necessary assessment work.

The Boulder Mining Company, Limited, extended its working tunnel 100 feet, and is now applying for Crown grants for all of its holdings.

On Bear creek, Charles F. Law and partner have done considerable work on the *St. George* and *St. Lawrence* mineral claims, and have exposed a vein 5 feet wide, carrying high-grade gold ore. This vein has been traced for several claims. The *Liverpool*, *London*, *Chicago* and *Morning Glory* are adjoining claims on the same lead.

On Roche river and Summit camp assessment work only has been done.

It is reported that the *Sunset* mineral claim, and ten adjoining claims, situated on Copper mountain, have been bonded through the agency of the Bank of Montreal, Nelson, and that 5 per cent. of the purchase price has been paid to the owners.

On Copper and Kennedy mountains assessment work has been done on the claims not Crown-granted.

On Granite creek a free-milling ledge was found some two years ago, the owner of which has done considerable work stripping the ledge, and has started a tunnel.

#### OFFICE STATISTICS—SIMILKAMEEN MINING DIVISION.

| | |
|---|---|
| Free miners' certificates | 137 |
| Location records | 262 |
| Certificates of work | 373 |
| Conveyances | 69 |
| Certificates of improvement | 38 |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $ 838 75 |
| Mining receipts, general | 2,384 20 |
| Mineral tax, etc | 1,698 25 |
| | $4,921 20 |

The following additional notes, relating to claims in the Aspen Grove Camp, and in the Similkameen Mining Division, have been submitted by Mr. George Murray, Deputy Mining Recorder at Nicola :—

ASPEN GROVE CAMP.

In the Aspen Grove Camp work has been confined chiefly to requisite assessments, and scarcely a claim has been allowed to lapse; while several new locations have been made, and the claim-holders have every confidence in the future of the camp.

Several groups of claims have been Crown-granted, and others are in course of development, so that the actual amount of work may not exceed that of former years.

On the *Boomerang* group of six claims, prospecting was carried on in the form of cross-cutting and sinking small trial shafts, the aim being to disclose the probable extent of the ore body, which is large.

On the *Sovereign Group*, consisting of seven claims, sufficient work has been done to allow application for Crown grants. Mineral showings on this group disclose high-grade ore, such as native copper, gray copper and copper glance. The largest continuous piece of work is a tunnel 50 feet long, which will be extended until the larger ore-body is reached. Cross-cutting and sinking have been carried on extensively on this group of claims. The same company owns the *Bighorn* and *Liverpool Groups*, on which assessment work has been done, with gratifying results.

An assessment was performed on the *Golden Gate* by A. Carrington, and on two adjoining claims by their owners, J. E. Bate and W. A. Dodds. Application has been made to Crown-grant the *Golden Gate*. This claim shows good mineral in large quantity, and offers a splendid site for tunnelling. Messrs. Roberts, Budd and Aldous have a group of six claims, on which a considerable amount of prospecting has been done in the way of tunnelling, cross-cutting and trial shafts, with the result of good exposures in native and gray copper.

Mr. Allan, a veteran prospector, who is upwards of 70 years old, and Augstadt, his partner, have worked the greater portion of the summer on their groups of claims with excellent results. On their *Pearl Group* there is an incline shaft 30 feet long, from which a tunnel of 40 feet has been run into a deposit of chalcopyrite, which promises to be of great extent.

Work has been done on the *Mountain View* and adjoining claims by Messrs. Assar and Rogers. The *Hattie* and *Copper Jack* have been Crown-granted by Messrs. Wells and Poulinier. Messrs. Lowe and Brown, who have clung tenaciously to the camp, have Crown-granted the *Happy Jack*, *Lottie* and *Lottie Fraction*. The work done warrants the belief that there is a large area of copper producing rock.

Assessments on the *Copper Bell* and *Bluebird* mineral claims show an extensive ledge of mineralised matter, Timbering, which counts for an assessment, has been done on the *Big Sioux*, noted for its fine showing of high-grade copper ore. Work on the *Giant* consists of tunnel extension, on the *Maggie*, of shaft continuation. The *Giant* is said to afford every facility for a quarrying proposition. On the *Fish Lake Group* of four claims, owned by Larsen and Murray, tunnel extension sufficient for four assessments was executed. Two assessments were done by the same parties on their *Wayside Group*. Messrs. Starmalt, Murray and others, owners of the *Bare Mountain Group*, did their annual assessments on the several claims. The *Copper Standard Group* of four claims, owned by Eastwood & Co., is considered the most valuable in the camp. The remaining work done has been chiefly upon individual claims, some of which, if surface indications persist to a material depth, will prove rich in copper.

# LILLOOET DISTRICT.

## LILLOOET MINING DIVISION.

REPORT OF C. PHAIR, GOLD COMMISSIONER.

I have the honour to submit my annual report on the progress of mining in Lillooet Mining Division during the year 1904.

This year has been somewhat of an improvement on the previous, as some properties that were idle for years are being developed. By an Order in Council, the southern boundary of this division was extended to a line crossing the Fraser river four miles below Foster's bar.

### CADWALLADER CREEK.

**Mineral Claims.** Very little work has been done on the Crown-granted mineral claims on this creek, and the arrastras, which were operated during the past years on the *Lorne* and *Woodchuck Groups*, have been suspended. The annual assessment work only has been done on the other claims in this camp.

### MCGILLIVRAY CREEK.

No development, except assessment work, has been done on the different claims on this creek. The Anderson Lake Mining and Milling Company's claims have been bonded to Mr. J. Burley Smith, Mining Engineer, of Montreal, who has also purchased interests in the *White Rose* and *Rosemont* claims and acquired other properties on the creek, so it is expected he will commence development work in the spring.

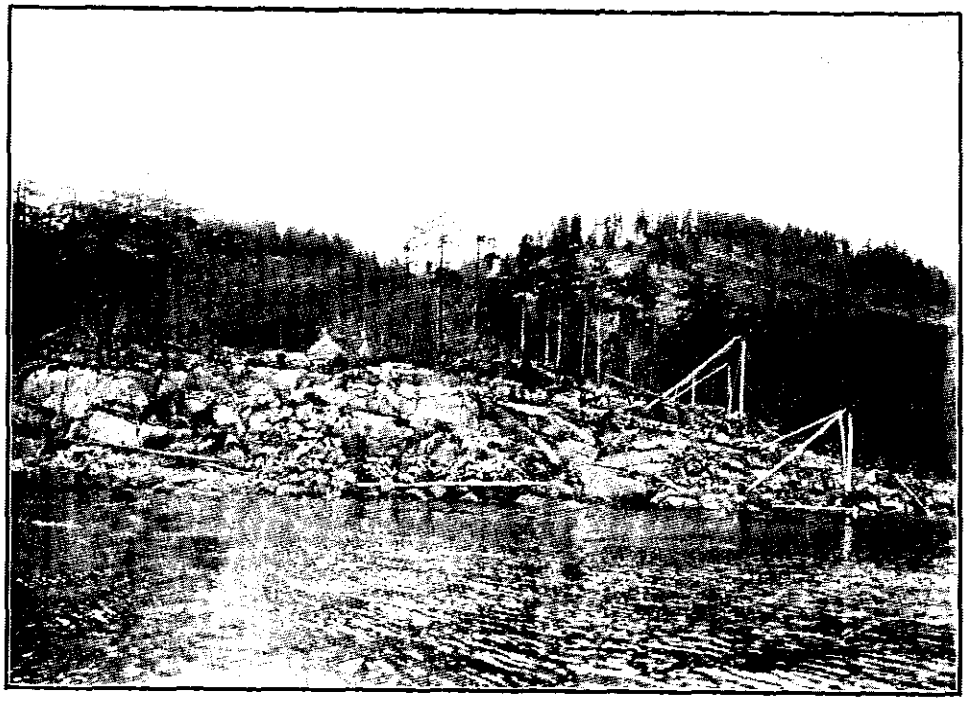
### CAYOOSH CREEK.

A syndicate, represented by Mr. Fred. A. Fenton, in January, 1904, purchased the assets and properties of the Golden Cache and the Toronto-Lillooet Gold Reefs Companies, on Cayoosh creek. Until October 22nd, seven men were employed in prospecting the claims, the main work being done on the Crown-granted *Ample* claim. There, a tunnel was run in 253 feet for the purpose of determining whether or not the deposit of arsenical iron sulphide, that had been opened by the former owners, was continuous with depth. I am informed that the tunnel driven by Mr. Fenton, when driven about 170 feet, intersected one ledge about 7 feet wide, and that the ledge at the end of the tunnel is 32 feet wide between walls. Work on the property has been stopped for the winter months.

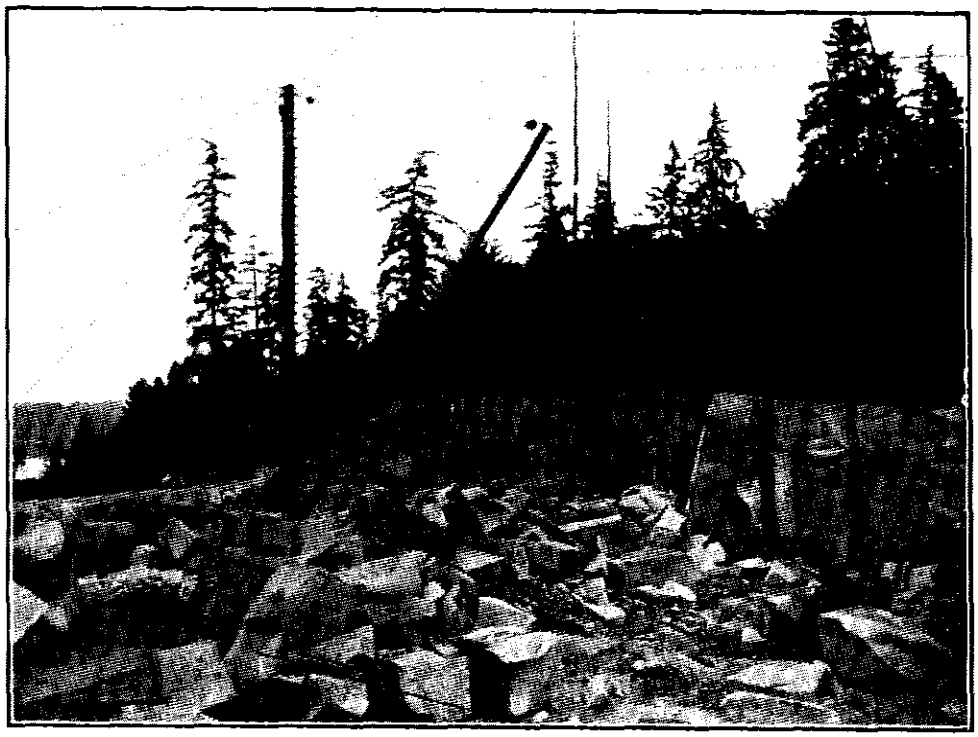
The same syndicate has acquired a working bond upon the properties of the Bonanza Mining Company on Cayoosh creek and now has 14 men employed there in development work.

### BRIDGE RIVER.

The *Royal Group* of claims, situate near the north fork, which were bonded by Mr. W. W. Brown last year, were developed in a small way, by continuing the tunnel, but, at the time work ceased, the ledge had not been struck.



TAYLOR'S SANDSTONE QUARRY--SATURNA ISLAND.



NEWCASTLE ISLAND SANDSTONE QUARRY--NANAIMO M. D.

### Gold Dredging Leases.

Placer Claims.

The Iowa-Lillooet Gold Mining Company, Limited, commenced dredging on its lease on the Fraser river on the 21st March, and continued running until 21st December, with a force of 10 men. Soon after the dredge was put in operation, some of the parts continued breaking, resulting in great loss of time in procuring duplicates from the East. Not a month passed without work being suspended for repairs, sometimes a couple of weeks being lost waiting for renewal parts, so the output of gold, although considerable, was not as large as expected. The dredge, when working, paid very well, proving that the bed of the river contains sufficient gold to pay for dredging, and that it can be saved by the appliances used on this dredge. No doubt, with the experience now gained, the wearing parts of the dredges next built here will be stronger.

No other dredging leases have been worked.

### Hydraulic Leases.

No work has been done on the 14 leases at Bridge river, belonging to the Bridge River and Lillooet Gold Mining Company, Limited. These leases were bonded to the Bridge River Developing Company, but the bond has terminated. I am informed that it is the intention of the owners to resume work on them early in the spring.

The Manager of the Pacific Development and Improvement Company, Mr. W. W. Brown, early in the season discontinued mining on the company's property located on the left bank of Bridge river. He then built a cable bridge across Bridge river, over which he conveyed water to a lease on the right bank, which he mined until near the end of the season. He left the district without informing me of the result.

The *Lillooet* Hydraulic Lease on the Fraser river was worked by six Chinese, as in the past years.

The four creek leases belonging to Messrs. Babb, Walker, Ferguson and Swanson, on Alexander creek, Bridge river, were worked by them in partnership. They diverted the creek and laid 600 feet of flume, 2½ by 3 feet; also built about 1,000 feet of ditch and flume, delivering water under a head of 50 feet. They reached bedrock at the end of the season, and intend putting in a saw-mill and having everything ready to commence taking out gold when the season opens.

At Cayoosh creek, 8 men are engaged blasting a channel through the Falls, and cleaning out an old tunnel, for the purpose of lowering the creek to enable them to mine Mr. J. Jesperson's two leases to bedrock. A great deal of gold, during the years 1887 to 1901, was obtained from this ground by Chinese, but, on account of water, they were unable to mine deeper than about 15 feet from the surface, which did not nearly reach to bedrock. The gold in this creek is very coarse.

The old channel of the south fork of Bridge river, which was struck last year, was mined again this year and about $1,500 in gold obtained.

Last spring was not a profitable one for the Indians and Chinese mining the bars of the Fraser river, on account of the water rising early and covering the pay-gravel, otherwise much more gold would have been added to the output.

The ascertained value of placer gold produced for the year is $23,057, but undoubtedly the itinerant Chinese, mining at the upper and lower boundaries of this Division, sell a good deal of their gold at Ashcroft and Lytton, an estimate of which I have not included in the above amount.

OFFICE STATISTICS—LILLOOET MINING DIVISION.

| | |
|---|---|
| Mineral claims recorded | 45 |
| Certificates of work recorded | 56 |
| Conveyances recorded | 47 |
| Placer claims recorded | 7 |
| " re-recorded | 3 |
| Water grants issued | 3 |
| Water grants in force | 24 |
| Mining leases in force | 39 |
| Dredging leases in force | 7 |
| Free miners' certificates, personal | 114 |
| " " companies | 6 |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $ 995 42 |
| Mining receipts general | 5,032 52 |
| Mineral tax | 133 25 |
| Tax on unworked Crown-granted mineral claims | 322 75 |
| Total | $6,483 94 |

## CLINTON MINING DIVISION.

REPORT BY F. SOUES, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on mining in the Clinton Mining Division of Lillooet District, for the year ended December 31st, 1904.

Mining in all its branches has been at a standstill, and I have to report no improvement on last year.

The hydraulic leases at Big Bar, referred to in former reports, are worked out and abandoned. Two placer discovery claims were located in that neighbourhood late in the fall, and will be worked next season. The *Rivers Group* of mineral claims in the valley of the Bonaparte, for which Crown grants were issued in 1897, have, I am informed, been placed under a working bond, and this has caused a certain amount of activity in recording claims in the immediate neighbourhood.

OFFICE STATISTICS—CLINTON MINING DIVISION.

| | |
|---|---|
| Mineral claims recorded | 34 |
| Placer claims recorded | 3 |
| Certificates of work | 14 |
| Mining leases in force | 4 |
| Dredging leases in force | 11 |
| Conveyances recorded | 8 |
| Water grants | 4 |

*Revenue Collected.*

| | |
|---|---|
| Free miners' certificates | $ 92 50 |
| Mining receipts, general | 389 00 |

# VANCOUVER ISLAND AND COAST.

## ALBERNI DISTRICT.

### ALBERNI MINING DIVISION.

Report of A. L. Smith, Gold Commissioner.

I have the honour to submit my annual report on the progress of mining in the Alberni Mining Division during the year ending December 31st, 1904.

Development has progressed favourably at Uchucklesit harbour and on the Alberni canal. I have to mention the following camps visited by me during the past year. On the *Cascade* mineral claim, at Uchucklesit harbour, owned by the Cascade Copper Mining Co., development work has been carried out this summer, and the showing so far made is very satisfactory. The work done consists principally of a shaft which was sunk 27 feet, connected with an adit level 50 feet long, driven for drainage purposes, giving a total depth of 40 feet. A trial shipment of 93½ tons of mixed ore, sent to the Tacoma Smelting Company, yielded a net smelting return of $1,992.34. The manager reports that, when writing, there was 8 feet of chalcopyrite in the shaft. The shaft is situated at an elevation of 325 feet above deep tidal water. A gravity, three-rail tramway, some 600 feet in length, brings the ore to the bunker, at the wharf.

The *Southern Cross* and *Ballarat* mineral claims, situated at Uchucklesit harbour, are owned by T. D. Conway and others. The work done consists of an open cut 30 feet into the hillside, and a tunnel at the end of the cut 30 feet in length. The open cut was all in ore, showing high-grade chalcopyrite, carrying silver. A shipment of the ore, consisting of 329 tons, was made to the Ladysmith smelter.

Another tunnel was run lower down, the mouth of which is close to the bunker. At 206 feet in, a spur of good ore was struck, and at 220 feet the main ledge was tapped, at a depth of 173 feet.

The *Happy John Group* of mineral claims is situated on the north side of the Alberni canal. The group has been surveyed and two of the claims were Crown-granted. Work has been in progress on this property since May 1st, 1904, with very satisfactory results. About 175 feet of tunnelling was done, and good ore was met with in two of the tunnels at considerable depth. Assays made of ore from both tunnels yielded from 9.4 to 24.7 % copper with small values in gold and silver.

Some important discoveries have recently been made on the *Monitor* property. A well-defined lead of copper ore has been found at the water's edge on the *Monitor No. 1 Fraction*. This is one of the best showings yet found in the district, and of the greatest importance, for it has the appearance of a strong lead of good ore. The same lead, it is thought, has been found on the opposite side of the canal on the *Gladys* mineral claim. A very strong band of limestone lies to the south of the lead.

On various claims in the division the annual assessment work has been done. The indications are that the Great Central lake country, in the interior of the island, will receive considerable attention from prospectors during the coming year.

OFFICE STATISTICS.—ALBERNI MINING DIVISION.

| | |
|---|---|
| Free miners' certificates issued | 60 |
| Mining claims recorded | 27 |
| Certificates of work recorded | 90 |
| Bills of sale recorded | 20 |
| Certificates of improvements issued | 2 |
| Rentals for mining leases | 7 |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $ 379 00 |
| Mining receipts (general) | 1,689 85 |
| | $ 2,068 85 |

## CLAYOQUOT MINING DIVISION.

REPORT OF W. T. DAWLEY, MINING RECORDER.

I have the honour to submit my annual report of mining operations in the Clayoquot Mining Division during the year 1904.

I had expected quite an improvement would take place this year, but regret to say my office receipts and the general work are a long way below the average.

Most of the mineral claims have had the annual assessment work done on them.

The *Indian Chief Group* at Sidney inlet, owned by Messrs. Dewdney and Springett, of Victoria, are the only claims in the district that had any actual development work performed. Men were at work on this group for several months, and 100 tons of ore was shipped to the Ladysmith smelter, returns from which were highly satisfactory. The ore being packed down to salt water by horses, the bad weather starting in closed these claims up for a while. The owners of the property intend to construct an aerial tramway in the spring.

The Elk River District during the year has received considerable attention from mining men, and some options, with the object of purchase, are now pending. Work on some of the claims will start early in January.

As such a small amount of work has been done during the past year it is hardly worth while enumerating the various claims.

I trust that the coming year will do much to open up and determine the value of the many prospects in the Clayoquot Mining Division.

OFFICE STATISTICS—CLAYOQUOT MINING DIVISION.

| | |
|---|---|
| Free miners' certificates issued | 33 |
| Mineral claims recorded | 19 |
| Certificates of work recorded | 73 |
| Bills of sale, bonds, etc., recorded | 20 |
| Certificates of improvements issued | *Nil.* |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $153 00 |
| Mining receipts general | 282 60 |
| | $435 60 |

## QUATSINO MINING DIVISION.

REPORT OF B. W. LEESON, MINING RECORDER.

I have the honour to submit herewith my annual report on the mining industry in the Quatsino Mining Division for the year ending December 31st, 1904.

The cessation of work at the *Yreka* mine, in the early part of the year, has caused some depression in the district, and little prospecting has been done during the season.

The owners of all the mineral claims, with a few exceptions, have done their assessment work, and in some instances have developed some promising property, particularly that of the *Red Rock* and *Edison* mineral claims. During the season the division has been visited by a number of experienced mining men, who all comment on the large surface showings on the different claims, and regret the lack of work on the showings of ore to prove their depth.

The sixteen claims of the Yreka Copper Co. have been Crown-granted during the year, as has also the *June Group*, controlled by the Copper Mountain Mining and Development Co.

**Quatsino King and White Quartz.**

This property, owned by Messrs. Nordstrom and Sorenson, is situated about one mile up the Teta river, and has received considerable development since the visit of the Provincial Assayer last season, a tunnel having been run in for about 50 feet, showing a continuation of the lead downwards as was expected.

On the *Red Rock* claim, one of the *Paystreak Group*, owned by Messrs. Cramer and Pollock, a well-defined lead has been shown by an incline run down on the ore for 20 feet. This incline was abandoned and a shaft sunk 40 feet further on which found the ore. The ore gives fair assay values in gold and copper, some zinc being also present.

**Edison.**

On this property a tunnel has been run in for 80 feet under the showing of ore above. At 50 feet in the ore was struck and cross-cut for 30 feet, a clear hanging and foot-wall being found. The average ore is low in value, but the sorted ore will pay to ship. Drifting and sinking on the lead will now be done to see if a better grade of ore cannot be found.

**June Group.**

There has been no additional work done on this property since last year. According to Prospectus No. 3, just issued by the company, an agreement has been signed by Messrs. Grant and Lippy to do 1,800 feet of underground work on the group as soon as a certain mortgage on the property is paid.

The limonite and bog iron claims on the West arm, owned by Messrs. Hick and Frank, have received their assessment work, but no extensive development has been done.

**Coal.**

It is reported that a Mr. Pearson, of Vancouver, with three others, arrived by a recent steamer at the West arm to bore for coal, but the extent of their intended operations has not been ascertained.

**Zinc.**

It is also reported that the *Peerless* and adjoining claims have been secured by a Kansas zinc company for development.

OFFICE STATISTICS—QUATSINO MINING DIVISION.

| | |
|---|---|
| Mineral claims recorded | 26 |
| Certificates of work recorded | 65 |
| Free miners' certificates (individual) | 29 |
| Free miners' certificates (company) | 1 |
| Conveyances and other documents of title recorded | 19 |
| Certificates of improvement recorded | 21 |

*Revenue.*

| | |
|---|---|
| Free miners' certificates | $241 25 |
| Mining receipts general | 342 55 |
| Fees for Crown grants passing through office | 400 00 |
| | $983 80 |

# NANAIMO DISTRICT.

## NANAIMO MINING DIVISION.

REPORT OF MARSHAL BRAY, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on the mining operations in the Nanaimo Mining Division for the year ending the 31st of December, 1904.

There were 472 mineral claims in good standing at the end of the year, and while less locations were recorded during 1904 than in previous years, more development work has been done and recorded, giving in many instances very satisfactory results. The great difficulty is that many of the properties are handicapped by the fact that the owners have not the means to do the development work which the showings really deserve.

The mines of Vancouver Island and the Coast have made a very good showing during the past year, as the returns from the Tyee smelter at Ladysmith show. The following is the record of the work done, viz.:—

Furnace record from 1st January, 1904, to 31st December, 1904:

Furnace in blast 267 days of 24 hours each.

| | | |
|---|---|---|
| Smelted—Tyee ore, | 57,450 | tons. |
| " Custom ore, | 7,953 | " |
| Total smelted, | 65,403 | tons. |

The custom ore takes in the ore from the *Van Anda* mine, on Texada island. The *Marble Bay* mines shipped part of their ore to Tacoma for treatment.

Total value of the above ore smelted, less refining charges only, was $831,902.41.

All the ore smelted by the Tyee smelter was from Vancouver Island and Coast mines, with the exception of 1,274 tons of foreign ore, and this marks another step in the progress of mining enterprise on Vancouver Island. Already, ores from many properties are brought to the Tyee smelter for treatment, and will be handled during the coming year in increasing quantity, as the development work on the mines of Vancouver Island and the Coast has established their permanence.

### TEXADA ISLAND.

The *Marble Bay* mines, belonging to the Tacoma Steel Co., under the management of A. Grant, have produced and shipped during the year 13,249 tons dry weight. The development work done for the year consists of sinking the main shaft 100 feet, and drivings on 360, 460, and 560-foot levels, 450 feet (lineal). The 560-foot level is 515 feet below high-water mark. The new plant installed comprises one 100 horse-power boiler (new), one new station pump, capacity 16,000 imperial gallons per hour, one electric light plant, costing, including buildings and connections, over $6,000. The average number of men employed for the year was 52 white men and 12 Chinese ore sorters. The gold and silver values have been maintained with depth, and the copper values have improved.

The *Van Anda* properties, held by the Van Anda Copper & Gold Co., Limited, under the management of G. L. Mackenzie, have shipped during the year ending the 31st of December, 1904, 3,539 tons. The development work done was: 480 feet of drifts, 60 feet of winzes, 35 feet of raises, and 44 feet of cross-cutting. Plant installed: a gravity tram connecting the *Copper Queen* with the main line from the *Cornell* mine, and a link-motion hoist installed at the *Copper Queen* mine. The average number of men employed during the year was 30 white men and 12 Chinese.

The Puget Sound Iron Company's mines did not ship any ore during the year 1904; but they have done development work in driving an open cut into the hill 113 feet, to open a large deposit of iron ore. The number of men employed for the year was five.

The Cordillero Mining Company has been steadily developing its properties, having run a tunnel upwards of 200 feet, and also done some cross-cutting. An automatic ventilating plant for their tunnel has been installed.

The *Loyal Group* is being developed by a Seattle syndicate, under a bond from Mr. Treat, and the showings are very favourable. Many other claims have had considerable development work done on them during the past year, and the coming year promises to be a prosperous one for Texada Island. During the past year, only assessment work was done on the mineral claims situate on Phillips and Frederick arms, Thurlow, Valdes and other islands.

### Oyster District.

The Vancouver Island Exploration and Development Company, Ltd., has been steadily developing its group of claims in Oyster district, under the management of Mr. H. Cecil, and has shipped 40 tons of ore to the smelter at Ladysmith, and built 2 miles of waggon road to connect the mine with the E. & N. Railway at Brenton's crossing. The development work at the mines consists of the upper tunnel (cross-cut) being driven 64 feet, and drifted west on the ledge 64 feet; lower cross-cut tunnel 120 feet; drifted west on ledge 72 feet, and driven east on ledge 40 feet. The ledge shows a bornite about 2 feet in width, and the property promises well. The average number of men employed for the year was 7.

Considerable work has been done on several other claims in this district, with favourable results.

### Dunsmuir District.

The Nanaimo Jubilee Mining and Development Co., Ltd., has been developing its *Delphi Group* of claims in Dunsmuir district during the past year, having sunk the shaft 70 feet and opened up a fine body of copper ore. These claims and the *Jubilee Group* of claims owned by this company could ship ore steadily if they had a branch line of railway to the E. & N. Railway, and it would require a branch only of about 16 miles to tap these mines and the mines on Mount Mystery.

Considerable work has been done on other claims in this district, revealing some very good showings.

The owners of claims have done development work in Bright and the northern part of Cowichan lake districts during the past year, and they are very well satisfied with the results.

The mineral claims recorded during the year ending the 31st December, 1904, are situate in the following places throughout the Nanaimo Mining Division, viz.:—

| | | |
|---|---|---|
| Texada island | 83 | claims recorded. |
| Valdes island | 7 | " |
| Thurlow and Hansen islands | 2 | " |
| Pearse island | 4 | " |
| Cracroft, Deer and Savary islands | 3 | " |
| Fort Rupert | 3 | " |
| Theodosia arm | 1 | " |
| Phillips arm | 5 | " |
| Knights inlet | 2 | " |
| Beaver harbour | 6 | " |
| Menzies bay | 1 | " |
| Powell and Horn lakes | 2 | " |
| Oyster district | 12 | " |
| Dunsmuir district | 6 | " |
| Bright district | 3 | " |
| Cowichan lake district | 3 | " |
| Total | 143 | |

OFFICE STATISTICS—NANAIMO MINING DIVISION.

| | |
|---|---|
| Free miners' certificates issued, individual | 233 |
| " " companies | 6 |
| Mineral claims recorded | 143 |
| Certificates of work recorded | 260 |
| Certificates of improvements recorded | 25 |
| Crown grants applied for and issued | 25 |
| Bills of sale recorded | 31 |
| Permissions given to re-locate | 4 |
| Rental mining lease | 1 |

The revenue collected for the above free miners' certificates and mining receipts generally, for the year ending the 31st of December, 1904, was $2,875.25, being considerably less than has been collected in previous years.

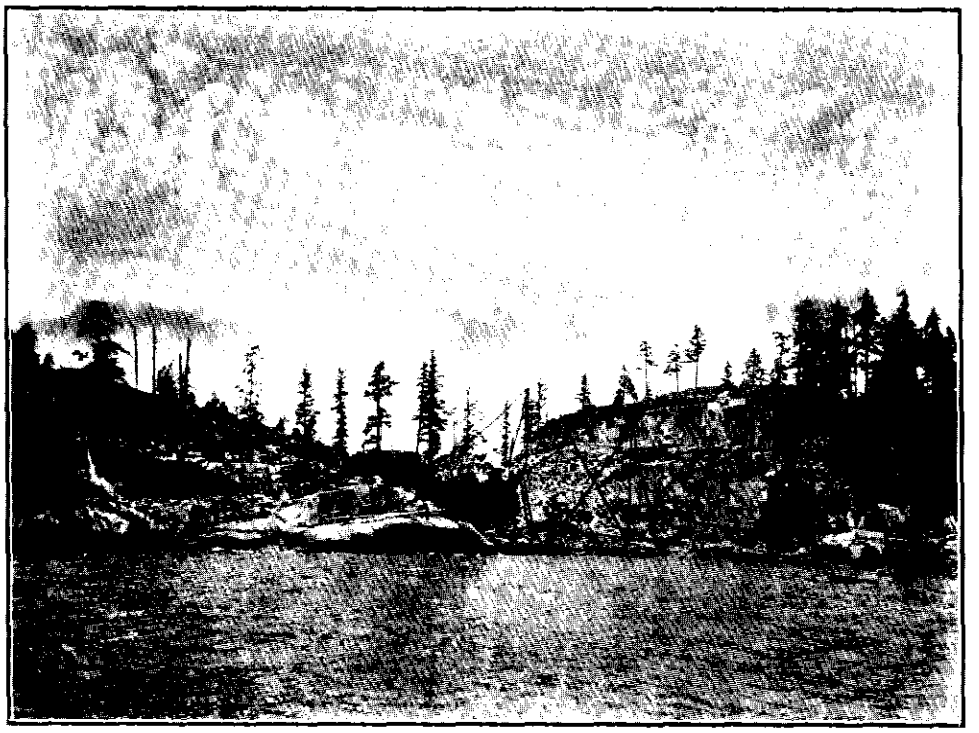
## STONE QUARRIES OF THE COAST.

REPORT BY H. CARMICHAEL, PROVINCIAL ASSAYER.

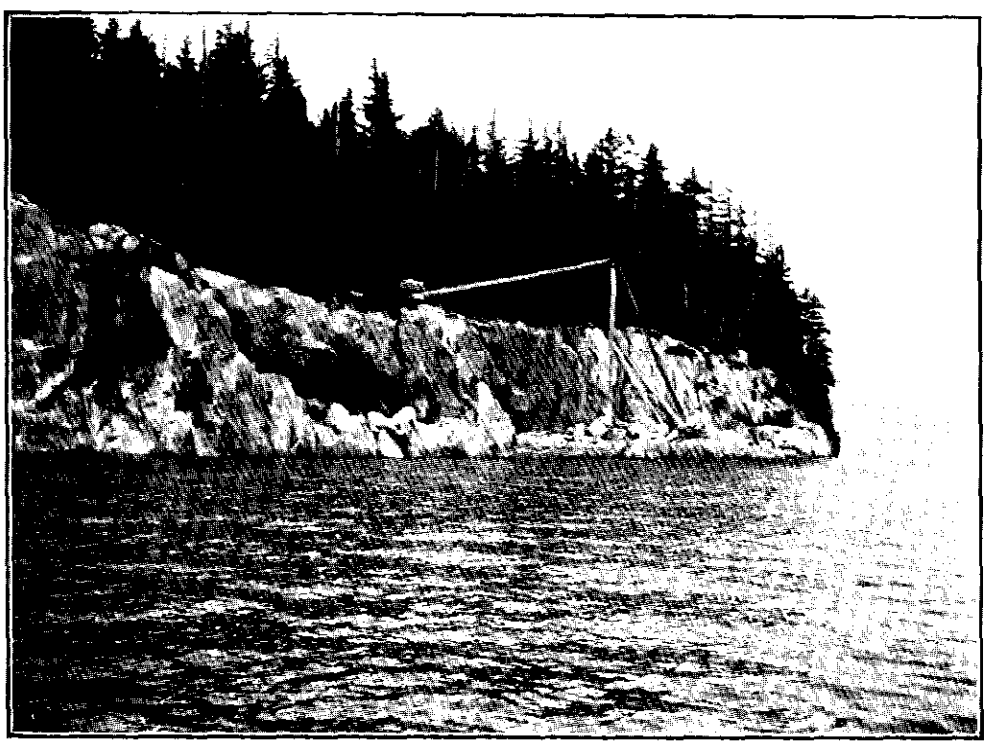
Along the Coast and the islands of British Columbia there is an immense quantity of good building stone, but none of the quarries have been worked to any great extent and all are in an undeveloped condition. This is, of course, due to the fact that a demand for their output in the erection of stone buildings has only recently sprung up. In such quarries as have been opened up, operations have been carried on in a more or less primitive manner, and the work has been done for the most part by hand, the "Knock system" of blasting being employed. This system consists of boring a series of deep holes into which a V-shaped rimmer is driven, the V's all having the same general direction. The holes are loaded with a light charge of powder and fired simultaneously by electricity, thus effecting an even fracture of the rock. With an increased demand for building stone, these methods will, no doubt, be replaced by others, less crude and more ecomomical.

### HADDINGTON ISLAND STONE QUARRY.

Haddington Island is situated near the north-eastern coast of Vancouver Island, in Broughton strait, and about four miles east of Alert Bay. The island, which is about half a mile long and about the same width, is in the route of the regular coastwise steamers.



GRANITE QUARRY, GRANITE ISLAND, NEW WESTMINSTER M. D.



ANDESITE QUARRY, EAST WORKINGS, HADDINGTON ISLAND, NANAIMO, M. D.

Its geological formation is entirely composed of igneous rock, being an andesite. The highest point of the island is about 300 feet above sea level. On the north and west sides the slope to the water is gradual, but on the south and east is a little more abrupt, being at an angle of about 30°.

The stone is rent almost vertically by cooling fractures, which appear in the main to radiate from a common centre, while here and there the rock is again fissured by cross fractures.

At the south-eastern end of the island two quarries have been opened up, only a short distance apart. Work has been commenced at the water's edge, the quarry face being gradually pushed back. In the eastern quarry, from which the larger quantity of stone has been taken, the face is 32 feet high and 180 feet long, and is 41 feet back from the water's edge. The main cooling fractures have a dip of 80°, and a strike of N. 60° W., into the hill, and although there are other irregular cooling fractures throughout the rock, large blocks of good building stone are to be obtained. From the smaller or southern quarry, which was first opened up, a considerable quantity of stone has been taken, and the face is now 25 feet high, with a length of 230 feet, and is 40 feet back from the water. The "Knock" system of blasting has been used here. The stone from both quarries is a light gray andesite, almost white in colour, and contains very little iron. It is of fine grain and compact texture, and being highly silicious, should stand the weather well.

This Haddington island stone was exclusively used in the superstructure and carvings of the Provincial Government Buildings at Victoria.

Although this stone requires a little more care in dressing than does sandstone, its fine appearance and durability, taken in conjunction with the shipping facilities of a quarry where the rock can be loaded directly into scows, ensures a large market for the product of the Haddington island quarries.

Following is an analysis of stone from the Haddington island quarries:—

| | |
|---|---|
| Silica | 70.5% |
| Alumina (with a little iron) | 18.7% |
| Lime | 2.7% |
| Magnesia | trace. |
| Alkalies | not determined. |
| Loss on ignition | .8 |
| | 92.7 |

### Beaver Cove Marble.

Beaver cove is situated on Broughton strait, on the north-eastern coast of Vancouver Island, some five miles south-east of Alert Bay. Here, on the north side of Beaver creek and about a mile from salt water, there is a bluff of marble rock, 200 feet in height, extending for about half a mile up the creek, and from this point some twenty years ago shipments of marble were made, but no regular quarrying has ever been done. Samples of this marble are of a bluish colour, and although the stone is somewhat granulated on the surface, it would possibly assume a more compact texture if quarried below the range of surface influences. This marble bluff is on land owned by Eustace Smith, of Beaver cove.

### Saturna Island Stone Quarry.

This quarry is situated on the southern extremity of Saturna island, in the Gulf of Georgia, and is owned by Mr. George Taylor, who resides on the property. The southern end of Saturna island rises abruptly from the sea, and is composed entirely of sandstone, inter-

bedded with conglomerate, the strata dipping northerly into the island at an angle of 29°, with a slight tilt to the east. The quarry is on the water's edge, and there is no regular working face, the stone being taken out along the bedding planes at different levels wherever rock occurs of the particular size and colour desired. The stone is of two colours, buff and blue-gray, the former being uppermost, is of fine grain, and free from "shakes," or any considerable quantity of iron, and should make good durable building material. The quarrying is done by the "Knock" system of blasting. In calm weather the stone can be loaded directly into scows. Some 30,000 cubic feet of building stone has up to the present been taken from the quarry, the latest building constructed from Saturna island stone being the Carnegie Public Library at Victoria.

### GABRIOLA ISLAND STONE QUARRY.

Building stone has for a number of years been quarried from the north end of Gabriola island. The quarry now being worked is easily accessible from Nanaimo, from which it is distant three miles by water, and is operated by Messrs. Kelly and Murray, of Vancouver. The shipping facilities are excellent, the quarry being on the edge of deep water. The quarry has at different times been worked for a distance of 400 feet along the water front, the present working face being 75 feet long, 28 feet high, and 27 feet back from the water's edge. An upper layer of sandstone from 30 to 40 feet thick extends the whole length of the quarry, dipping, at the north-eastern end of the workings, 14° to the north-east. This layer of sandstone is underlain by a small stratum of argillite, and this again by smaller seams of sandstone. In the middle and on the western end of the thick sandstone seam, quarrying has been suspended, partly on account of hard lumps or nodules which are encountered, and also because of the height of the face above the water. The latter difficulty is overcome at the north-eastern end of the quarry, where the present workings are, by the dip of the sandstone stratum, and although twistings and hard nodules occur there in places, very massive blocks of stone are to be obtained from this part of the quarry. Some two years ago a quantity of stone was taken from a point 200 yards east of this, where there is a face 180 feet long, by 40 feet high, and 40 feet back from the water, but these workings have been abandoned. The stone which is at present shipped is of a blue-gray colour, rather coarse, and contains grains of mica and hornblende.

The Gabriola island quarries have furnished stone for the construction of the Post Office, Victoria, and the McKinnon and Flack blocks, Vancouver. The quarry equipment consists of three large derricks, a hoisting engine, and a short piece of track by which the stone is conveyed to salt water.

### BRIGGS PORTAGE QUARRY.

This quarry is situated at Jack's Point, in Nanaimo harbour, about two miles from the town of Nanaimo. The work of opening up had been in progress only two months when the quarry was visited, but a face 50 feet high had been exposed, and a considerable quantity of stone was ready for shipment. The stone is a sandstone, similar to that quarried at Gabriola island, and is dark blue-gray in colour, weathering to a slightly lighter shade, rather coarse-grained, and containing specks of mica and hornblende. Large blocks of stone are obtainable, for the handling of which an excellent derrick is in position. The quarry is on deep water and the loading is done directly on to scows.

### NEWCASTLE ISLAND QUARRY.

This quarry is situated on salt water on the western side of Newcastle island, in the north end of Nanaimo harbour, and is owned by the North-western Construction Company of San Francisco, of which the representative in British Columbia is John G. Davis, who resides

at the quarry. The stone is a light gray sandstone, and lies in nearly flat strata, with a small dark streak running through it, and is apparently composed of a granitic sand. There is a solid stratum some 16 feet thick, from which very large blocks can be quarried. The Mint in San Francisco, built in 1870, was constructed from Newcastle island stone, and about 1,000 tons were shipped this year by schooner to that city. This quarry also furnished stone for the construction of the Bank of British North America and the Bank of Montreal, in Vancouver.

There are a number of places in the neighbourhood of Nanaimo from which stone has been quarried in small quantities, but no regular quarries have been opened up.

### Granite Island Quarry.

Granite island lies off the mainland shore of British Columbia, at the mouth of Jervis inlet, 60 miles north of Vancouver. The island is about half a mile long and a quarter of a mile wide, and is composed entirely of massive gray granite. The quarry is at the south end of the island, on deep water, the stone being loaded on to vessels from an inclined tramway by which it is brought down from the face. The main working face is from 80 to 100 feet above the sea, and is 168 feet long, showing at one point a depth of 26 feet of solid granite. It has been worked back 47 feet from the water's edge. Although at this point the cooling fractures are somewhat irregular, they are generally vertical, and very massive blocks can be got out. To the west of the quarry the cooling planes are more regular, and have a general dip of 12° westerly (*see* accompanying cut). The quarrying is done entirely by hand.

Nelson island, which adjoins Granite island, formerly supplied the demand for granite, but was abandoned a year ago in favour of the latter island, where the quarries are more easily worked. With the exception of the small amount obtained from boulders, all the granite used on the coast of British Columbia has been quarried from these two islands, and shipments are now being made to Seattle. The Granite island quarries are worked by Messrs. Kelly and Murray, of Vancouver.

### Texada Island.

Marble has for some time been known to occur on Texada island, fine specimens of black marble having been obtained from the north end of the island. Samples of red marble have also been obtained, which when polished had a very handsome appearance, and a body of this material has lately been located by Mr. Alex. Henderson.

### West Coast of Vancouver Island.

Marble has been found at various points on the West coast of Vancouver island, notably on Barkley sound and at Nootka, the samples from the latter place being very fine. While some of the West coast marbles are nearly white, they are generally of a faint blue-gray colour.

# VICTORIA DISTRICT.

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## VICTORIA MINING DIVISION.

### REPORT OF GRANVILLE CUPPAGE, MINING RECORDER.

I have the honour to submit herewith the annual report on mining operations in this Division for the year 1904.

I have to thank Mr. E. J. Hearn, of Duncans, for the interesting report on the Tyee and other claims in the Cowichan and surrounding districts.

### MOUNT SICKER.

**Tyee Mine.**

The operations at the *Tyee* mine have been most successful this year. From the 1st January to 31st December, 1904, the Tyee Copper Company's smelter at Ladysmith has been in blast 267 days of 24 hours each, and has smelted 57,450 tons of Tyee ore, and 7,953 tons of custom ore, making the total ore smelted 65,403 tons. The product from this was 6,025.688 tons of copper matte, containing 5,120,870 pounds of copper, 179,769.19 oz. of silver, 11,088.830 oz. of gold. Total value, less refining charges only, $831,902.41. From October, 1902, when the shipping of ore to the Ladysmith smelter commenced, to this present month of December, 110,000 tons of ore have been shipped, and there is still a large tonnage of ore in sight in the mine, and several hundred feet of unexplored country from the eastern stopes to the east boundary line of the Tyee Company's property. Heavy development work has been carried on throughout the year, and the main shaft has now attained a depth of 600 feet, and will soon be carried down to the 1,000-foot level. The development work of the past year has demonstrated that, instead of the ore being carried in disconnected lenses, it is in one ore-body. Taking the *Lenora* and *Tyee* as geologically one mine, this means an ore-body of at least 2,400 feet in length, and which, to the shallow depth already explored, will probably yield a quarter of a million tons of ore.

A hoisting engine, boiler and compressor has been installed on the *X. L.*, which is part of the Tyee Company's property, and a two-compartment shaft has been sunk to the depth of 150 feet. Extensive cross-cuts and drifts will be run from this shaft to thoroughly explore the ground, which is south-west from the *Tyee* mine and on the direct run of the lode.

The Tyee Copper Company has paid dividends to the total amount of 20 per cent during the present year, and the directors are following the wise and conservative course of building up a large reserve fund. A large sum has been expended on capital account, in adding to buildings and machinery at both mine and smelter, thus increasing the efficiency of the works. All of this has been paid for out of profits.

### VANCOUVER ISLAND MINING AND DEVELOPMENT COMPANY, LTD.

This London company owns a large tract of mineral land to the east of the *Tyee*. A complete mining outfit has been installed on the *Westholme*, comprising hoisting engine, boiler and compressor plant, and a two-compartment shaft has been put down to a depth of 500 feet. The rock is hard diabase, and so far nothing of importance has been discovered.

### Richard III. Mining Company, Ltd.

The *Richard III.* mine closed operations last spring because of insufficient working capital, and the directors do not consider it advisable to make any heavy sacrifice at the present time to obtain the same, owing to the fact that strong companies are working each side of them on the lode. When work was discontinued, ore was showing strongly on the floor of the 500-foot workings, and was apparently rising up from the as yet unexplored depths of the *Richard III.* and *Tyee* mines.

### Koksilah and Colvin Mountains (Koksilah River).

A fair showing of copper ore has been uncovered on the *King Solomon* claim, from which two small shipments have been made to the Tyee smelter, Ladysmith, with satisfactory results. A number of claims have been staked in the district during the year, but very little work has been done beyond the necessary assessment work.

### Richard Mountain.

On the *Ironclad* claim near Westholme, on the E. & N. railway, owned by Mr. Bevan, a good body of heavily mineralised schists has been discovered, and the claim, which is being worked privately, looks very encouraging.

### Renfrew District.

Mr. J. J. Baird, of Port Renfrew, reports that there has not been the usual stir in mining during the past year, but the work accomplished has been very satisfactory.

On the *San Juan Iron Group*, managed by Mr. H. E. Newton, 114 feet of cross-cutting was done on the lead, and all in good iron ore, and another tunnel has now been started.

Messrs. Bentley and McGregor have done considerable work to prove the continuance of the immense surface body of ore on the iron claims in which they are interested, on Bugaboo creek. The San Juan Mining Co., holding a number of claims in the district, has kept its men employed during the past year, and intends shortly to make a shipment to test the value of the copper ore.

### Office Statistics—Victoria Mining Division.

| | 1903. | 1904. |
|---|---|---|
| Free miners' certificates issued | 667 | 561 |
| " " (special) | 16 | 9 |
| Mining claims recorded | 150 | 125 |
| Placer " | 4 | .... |
| Certificates of work issued | 344 | 235 |
| " improvements issued | 59 | 28 |
| Grants of water rights for mining | 4 | 1 |
| Conveyances recorded | 114 | 62 |
| Abandonments " | .... | 1 |
| Placer leases issued | 3 | 1 |
| Permits recorded | 6 | 1 |
| Lay-overs " | 2 | .... |
| *Revenue.* | | |
| Free miners' certificates | $5,518 75 | $4,821 95 |
| Mining receipts, general | 3,878 85 | 1,526 75 |
| | $9,397 60 | $6,348 70 |

## VICTORIA MINING DIVISION.

NOTES BY W. F. ROBERTSON, PROVINCIAL MINERALOGIST.

### SOOKE COPPER PROPERTY.

The following is from a Report by W. M. Brewer, on a copper property at East Sooke, owned by H. B. Thompson and others, of Victoria:—

**Claims—Area, Location.**

The Sooke copper property comprises six full-sized mineral claims and one fraction. These are known as the *Golden Thrush*, *Willow Grouse Fraction*, *Willow Grouse*, *Blue Bird*, *Donaldson*, *Jack* and *Sydney* mineral claims. The total acreage comprised within the boundaries of this group of claims is approximately 300 acres. This group of mineral claims is located on the Sooke peninsula, about 25 miles distant from Victoria by waggon road, and about the same distance by water. The group is admirably situated when the transportation facilities are under consideration, because the main workings are within about 3,000 feet from a point in Sooke harbour, where vessels can lie at anchor, well sheltered from storms, while receiving or discharging cargoes. The difference in elevation is about 300 feet between salt water and the point where the chief workings have been carried on at the mine. A gravity tramway, with an easy grade, could be constructed at a low cost, by following the course of a ravine which extends from the present mine workings to salt-water, and at the point where this ravine forms a junction with the shore line, there is a splendid opportunity to construct bunkers and a wharf, so that all the material handled from the mine could be delivered on board a vessel with the least possible manual labour.

**Geology.**

The Sooke peninsula is made up entirely of igneous rocks belonging to the Vancouver Series, as described by the late Dr. Dawson. Evidently this peninsula was the scene of very heavy volcanic disturbances, which have been followed by the formation of mineral-bearing zones of considerable extent, in which have been deposited bodies of chalcopyrite, pyrrhotite and iron pyrite. All the rocks observed by the writer belong to the hornblende or pyrexene series, and in the areas mentioned are found to occur as masses and crystals disseminated through a highly basic intrusive rock, which in several places on the peninsula occupies fissured zones, through which there have been considerable shearing movements subsequent to the eruptive action which produced these fissured zones, as is attested by the numerous slicken-sided cleavage planes, but not sufficient to produce well-defined schistosity. So far as at present known, the most pronounced of these zones occurs in the property described in this report. This is easily traceable for a long distance on the *Blue Bird* and *Willow Grouse* mineral claims, where its boundaries on either side are well-defined and persistent, and are found to be composed of a coarsely-grained granitoid rock, which should probably be classified as a syenite.

**Characteristics.**

At a point close to the No. 1 stake of both the claims mentioned, the first discovery of an outcropping of chalcopyrite was made. This discovery was followed by a serious attempt on the part of the owners to determine the extent and probable permanency of the ore-body. This has determined several important characteristics of the main ore-body. The occurrence of a fissured zone fully 100 feet in width and of undetermined length has been fully established. Within this zone occur not only several extensive lenses or pockets of high-grade chalcopyrite, but the green basic rock, which is really the matrix of the ore, is found to be thoroughly impregnated with masses and grains of chalcopyrite deposited as sheets and elongated kidneys.

As already stated, the full extent of the zone has not yet been determined, but where the main work has been carried on the width of ore-bearing ground opened up is fully 50 feet. This has been exploited by actual openings for a length of 150 feet, while about 500 feet in a south-westerly direction down the ravine there is exposed in a shallow open cut the same character of ore-bearing material showing chalcopyrite as impregnations. Northerly from the main workings these surface indications, where such are exposed, show the green basic rock which fills the fissured zone where the ore-body has been opened, as well as the well-defined boundaries on the hanging and foot-wall sides, clearly indicating that the zone maintains continuity in that direction for a considerable distance. The dip of the hanging-wall is almost vertical at the surface, the slight inclination there is being towards the west.

So far as the writer could see, the true foot-wall, while being generally well-defined, has not been exposed in any of the workings, but is situated about 40 feet easterly from the shaft which has been sunk at the edge of the ravine. That the lenses of solid ore in this zone possess extent is demonstrated by the fact that the main showing of ore, which carries from 11 to 18 per cent. copper, as exposed in a deep open cut and shaft, is upwards of 70 feet in length, with solid ore still showing at the north end of the cut, and from 4 feet in width at the end to about 11 feet in width at the south end. Surface stripping beyond the deep part of the cut at the north end show that the lenses occur lying in echelon to the one referred to, and these show an aggregate width of nearly 15 feet.

At the southerly end of the open cut a vertical shaft has been sunk 50 feet in ore, and a cross-cut tunnel has been driven from the bottom towards the hanging-wall, or western boundary of the ore-bearing zone. At the time of the writer's examination, he was unable to make any inspection of these workings, because they were full of water and he had no facilities at hand to pump it out, but during the progress of sinking the shaft in 1902 he made two visits to the property, and saw that the shaft was being sunk in ore. As the cross-cut through had not been made at that time, he is unable to describe the condition from personal knowledge. On information, and judging from the material on the dump, it would appear that this cross-cut had been driven a portion of the distance through solid ore, and all of the distance where solid ore was not encountered through the green basic rock, which is the matrix of the ore, and a large portion of which carries sufficient ore as impregnations to give it commercial value.

**Developments.** The work of development has been confined to the open cut and shaft, with cross-cut from the bottom, together with several shallow prospecting pits and some surface stripping. As a result of the main workings, a dump containing probably 400 tons of chalcopyrite ore has been accumulated, which, judging from the samples taken by the writer at various times, will yield an average value of 10 per cent. copper, with low gold values. The length of the deepest part of the open cut is about 70 feet, and surface stripping has been done for a distance of about 50 feet in addition, thereby exposing ore at the particular point for a distance of 120 feet. Southerly from this cut, shallow pits have been made, exposing ore a further length of probably 30 feet, while another shallow pit, sunk in the ravine about 500 feet distant from the main workings, also exposes ore.

**Conclusions.** After having made a careful examination of this Sooke copper property and also other deposits on the Sooke peninsula, which have been in the past prospected as iron properties, it is the opinion of the writer of this report that the Sooke copper property is a prospect possessing great possibilities, and meriting a most thorough exploitation and development. With regard to the so-called iron-ore deposits, the writer is of the opinion that they have no value when judged on their possibilities for produc-

ing iron ore of a commercial grade, but that when considered from the standpoint of their possibilities of developing into copper propositions, on the theory that the so-called iron ore is merely an iron capping covering a deposit of ore (copper ore), the writer is of the opinion that they also merit further and systematic exploitation.

There is every facility for carrying on mining operations on the Sooke copper property as economically as can possibly be done in other sections of the Province, when it is considered that this is a sinking proposition, but owing to the possibilities of extent of the mineral-bearing ground, and the character of the rock, it will very probably be shown that the "glory hole" system of mining could be adopted, and a great saving in cost for the timbering thereby made.

The cost for transportation from the mine to salt water by means of a well constructed tramway should not exceed 10 cents per ton, while the cost for transportation to either of the British Columbia smelters on the east coast of Vancouver Island should not exceed 50 cents per ton.

The following analysis of an average sample from the dump, taken by Mr. D. W. Moore, ore-buyer for the Canadian Smelting Works, of Trail, shows that the ore is practically self-fluxing, and, consequently, could be smelted at as low a cost as is possible:—Gold, .03 oz. per ton; silver, trace; copper, 11.1 per cent.; iron, 15.7 per cent.; silica, 49 per cent.; lime, 2.8 per cent.; sulphur, 13 per cent.

## MANUFACTURE OF PORTLAND CEMENT.

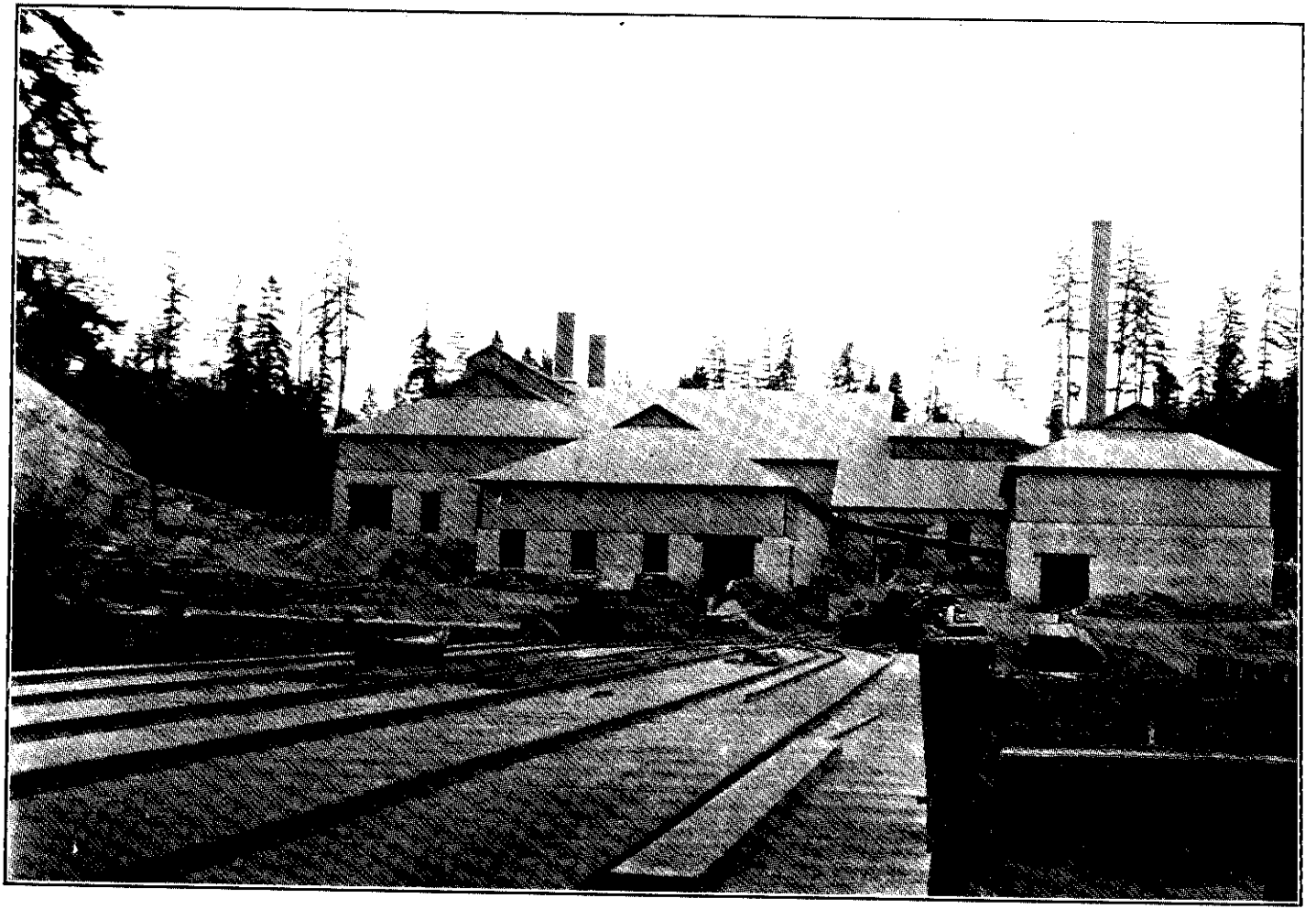
One of the greatest disadvantages that the mineral industry of the Province has been labouring under is that practically there is little or no home market for, and consequently little or no home manufacture of, products, in a merchantable form, from the minerals (other than coal) of the Province. The result has been that in British Columbia there have hitherto entered into the category of "valuable minerals" only such as were rich enough to stand the heavy cost of transportation to eastern markets.

The establishment, therefore, at Tod Inlet, near Victoria, of a cement manufacturing plant which will make a valuable product out of the formerly valueless limestone and clay, of which there is more than a sufficiency, is noted as a matter of more than usual importance to the mineral industry, and as a pioneer enterprise which is sure to bring in its wake similar, if not allied, manufactures. The success of the enterprise is largely assured by the personnel of the company, who are not amateurs in the business, but men who have for years been successfully engaged in the same class of manufacture in Ontario, and who, before embarking on this new enterprise, have brought their Eastern experience to bear on a quiet but thorough investigation of the natural deposits and the facilities, and also of the probable market for the finished product.

The Vancouver Portland Cement Co. is a limited liability company, registered in British Columbia, with a capital of $500,000. The president of the company is Mr. E. R. Woods, of Toronto, who is also a director of the Grand Trunk Pacific Railway, of the Crow's Nest Pass Coal Co., etc., etc. The managing director is Mr. R. P. Butchart, who formerly acted in the same capacity with the allied cement companies at Shallow lake and Lakefield, in Ontario, and the treasurer is Mr. H. A. Ross. The company has taken an office in the Board of Trade building, Victoria, which will be made the head office of the company.

**Location of Works.**

The plant is located on the shore of Tod Inlet, a branch of Saanich Arm, and is distant from Victoria by waggon road about 13 miles, and from Keating, a station on the V. & S. Railway, about 2½ miles. Transportation of the product will be exclusively by water, the facilities for which are of the very best, as the waters of the Saanich Arm and of Tod Inlet are deep, and navigable by any sea-going vessel, and, being sheltered, admit of scows being used with safety.



VANCOUVER PORTLAND CEMENT CO.'S WORKS, TOD INLET VICTORIA M. D.

The factory buildings are about 100 feet from the shore of the inlet, into which a pile wharf, about 36 feet wide, has been run out for about 200 feet. This wharf is most substantially built, and is arranged to receive two scows on either side, while the end is provided with an adjustable apron to connect with car-transfer scows, from which the railway cars can be run directly into the works to be loaded or unloaded, standard gauge tracks having been laid for this purpose. The level of the wharf is about 5 feet lower than the floor of the shipping room, bringing this floor and the car platforms on a level.

**Raw Materials.** The raw materials used in the manufacture of the cement are limestone and clay. The limestone forms a ridge running parallel with the water front and about 100 yards back of the factory buildings. The limestone quarry has been opened up at such a level as to give a slight down-grade track to the factory bins, the bottoms of which are higher than the crushing plant. To reach the quarry, an open cut about 200 feet long, and some 20 feet in depth at the deepest point, has been driven through clay which overlies the flank of the limestone, and this clay forms the other ingredient in the manufacture of the cement, so that both the raw materials are found at the proper elevation, within 100 yards of the bins, and are both delivered over the same tram track. The only preparation the lime or clay quarries required was the stripping of a few feet of surface soil with its forest growth, so that (as will be seen) the occurrence of the raw material is as nearly as possible ideal.

The lime quarry was being opened up by two men with a steam drill, the steam being supplied from the factory boilers. The face at present is about 40 feet long and can be extended either way for an indefinite distance, while the height of face can eventually be made about 40 feet above the track level. The lime rock is a blue-gray crystalline limestone, of which the following is given as a general analysis :—

| | |
|---|---|
| Carbonate of lime | 96 to 99 % |
| Silica | 0.3 to 2 % |
| Alumina and iron | .15 to 1 % |
| Magnesia | trace to 0.3 % |
| Sulphuric acid | trace |

The clay deposit extends from the lime quarry down to, and covers the site selected for, the works, the supply being practically unlimited. The following is given as the analysis of the clay :—

| | |
|---|---|
| Silica | 60 to 63 % |
| Alumina and iron | 25 to 28 % |
| Lime carbonate | 3.75 % |
| Magnesia | trace to 2 % |
| Sulphuric acid (about) | 0.29 % |
| Alkali | trace to .75 % |
| Moisture and organic matter (about) | 5.75 % |

These materials are used in the proportion approximately of three of clay to one of limestone.

**Plant.** The factory buildings are five in number, so grouped together as practically to form one ; as in some instances the dividing walls consist of pillars only. The walls of all the buildings are of lime concrete about 15 inches thick, the lime having been burned on the spot in an old lime-kiln built by the former owners. To these walls an outer coating of cement will ultimately be given. The roof trusses are of wood, with iron tension bolts, while the roofs are boards covered with malthoid, a

prepared roofing felt. The concrete walls are about 20 feet high, and in these buildings where the process creates much dust, are surmounted by a wooden framework about 8 feet high, filled in with wooden lattice work between the concrete wall and the wall plate, thus securing ample light and ventilation, the projection of the eaves being sufficient to prevent rain from entering.

The plant has been laid out on what is known as the "level site" principle, as distinguished from the "successive bench" plan; that is, the working floors are all on the same level, for the sake of compactness, the material being elevated by mechanical means between the successive stages. The exception in this case is that the stock-room is at a level 10 feet lower than the factory floors.

Following the line of the process, the first building is entered from the end, at about the level of the eaves, by the tram-line from the quarries, which tram-line runs directly over the limestone and clay storage bins. The bins are not much used at present, as the source of supply is so very convenient that the raw material is taken directly from the quarry to the crushing plant. The bins, however, serve for holding a reserve for night work or bad weather.

The preliminary crushing plant consists, for the limestone, of a Gates crusher, the top, or feed end, of which is set just below the floor level of the bins, and which discharges into a "rotary dryer," a hollow wrought-iron cylindrical shell 5 feet in diameter and 42 feet long, set on tires, with a slight inclination down from the feeding end, so that by the revolving of the cylinder, the crushed material travels through the dryer and is automatically discharged. Through the "dryer" is conducted a portion of the hot waste gases from the "rotary kiln" (described later), the amount taken being regulatable by dampers. These gases pass into the lower end of the dryer, meeting the crushed material and drying it, and pass out of the upper end into a separate stack.

The crushed and now thoroughly dried limestone is discharged from the "dryer" into a screw conveyor, which carries it horizontally, underneath the floor level, to the boot of a bucket-elevator, by which it is raised and deposited in the feed bin of a "Krupp ball mill," into which it is automatically fed. This "Krupp ball mill" is a horizontally-revolving iron shell, about 6 feet in diameter and 6 feet long, lined with a heavy chilled-iron screen, into which is fed the partially crushed limestone. In the mill there are a number of round steel cannon balls which, as the mill is revolved, roll over and through the crushed limestone, gradually grinding it until it is fine enough to pass through the enclosing screen, which in this case is 100 meshes to the lineal inch, and is then discharged through the end of the cylinder.

From the Krupp mill the now finely ground limestone, practically a dust, is discharged directly into a bucket-elevator, by which it is raised and deposited in the "ground limestone stock-bin," the bottom of which is some 8 feet above the floor level, and which has a storage capacity of about 50 tons of crushed limestone.

The clay is received over the same tramway as is the limestone, being dumped into the bin or fed direct to a "Potts disintegrator," practically a pair of rolls and revolving knife-like teeth, which thoroughly disintegrate the clay. From here it passes into the same "dryer" into which the limestone was fed, and which is used, as required, alternately for limestone or clay. Leaving the "dryer," the clay is found to be so finely divided as not to require to be passed through a Krupp mill, and is elevated directly to the "ground clay stock-bin," a companion bin to that in which the ground limestone was stored, the two being located side by side. At this point the materials, which so far in the process have been treated and handled separately, are mixed.

In front of both the ground limestone and ground clay stock-bins, and set on the general floor level, is an automatic weighing scale, so constructed that it can be set to receive a definite weight of ground material, and by the adjustment of these two scales any desired weight of limestone or clay is weighed off and gradually discharged from both scale hoppers into one horizontally placed screw conveyor, in which the two ingredients are thoroughly mixed and conveyed to an elevator, and so raised and deposited in an elevated hopper bin, from which by gravity the now mixed materials are fed down into two "tube" mills, in which they are still more fully incorporated and ground.

These "tube" mills, as the name implies, are iron tubes made of boiler plate, about 5 feet in diameter and 22 feet long, set horizontally on rollers so that they may be revolved at a speed of about 25 revolutions a minute, by power applied through a cogged tire fitted around the tube. This tube is lined with very hard, tough, cut flint stones, imbedded in cement, the lining having a thickness of several inches. Inside the mill, and loose, are a number of larger round flint pebbles, which, as the tube is revolved, roll over and through the ground limerock and clay, fully mixing and more finely grinding them, the now thoroughly ground and mixed material being discharged at the lower end of the tube mills into a common screw conveyor, and so carried to another elevator, by which it is raised and deposited in a hopper bin, located above the end of the "rotary kiln," into which they are fed by gravity.

This kiln is an iron tube 7 feet in diameter and 70 feet long, lined with firebrick, set nearly horizontal ($\frac{3}{4}$in. to 1 foot) and mounted on rollers, and so arranged that it can be revolved by power. As the cylinder is revolved, the slight inclination given to it gradually carries the material charged in at its upper end to the lower end, where it is finally discharged, dropping through a chute into the boot of an elevator. The interior of the kiln is maintained at a temperature of about 2,700° F. by the combustion of fine, dry coal dust, so fine as to act as a gas, which is fed into the cylinder by a blast of air. The preparation of the dry coal dust will be described later.

The gases from the kiln are led by a flue to a large central stack, large enough and provided with openings for one or two additional kilns, for which latter there is room in the building. A portion of these hot gases, as already mentioned, is conducted through the "dryer" and provides sufficient heat to dry the material.

The particles of the finely crushed limestone and clay fed into the upper end of the kiln are, in their slow passage through this fiery furnace, cintered or fused together, forming what is known as "cement clinker," which, when pulverised, is cement. This red-hot clinker discharged from the kiln is raised by an open link-belt bucket-elevator to the level of the walls of the building and shot down a wrought-iron tube to the "rotary cooler," which is a revolving iron cylinder about 5 feet in diameter and 50 feet long, set with a considerable inclination. Through this cylinder a draft of cool air is induced, which so cools the clinker that it comes out of the lower end of the "cooler" at a temperature sufficiently reduced to permit of its further handling. As the cooled clinker drops from the "cooler," any large clinkers are automatically screened out and broken by hand.

At this point about 1 % of gypsum is added, for the purpose, it is said, of making the subsequent cement set a little more slowly. This gypsum is at present imported from the Central Western States, as none is as yet being mined in the Province.

From the "cooler" the clinker drops into an elevator and is deposited in an elevated hopper bin, from which it is automatically fed into a "Bonnet" ball mill, 5 feet in diameter and 8 feet long, which is, in principle, similar to the Krupp mill already described, where it is partially crushed. From the "Bonnet" mill the material is conveyed by a screw conveyor to

an elevator, the discharge from which is led into a "tube" mill, similar to the two already described, from which it is discharged, crushed, 95 % of it, to 100-mesh size, as a finished product, and is finally conveyed by a belt conveyor to the stock room, where it is deposited in bins ready for sacking and subsequent shipment. The sacks each hold 87½ lbs., that is, there are four sacks to the "barrel."

**Power.**

The power-house is a building separate from, but adjoining, the factory, and having cement concrete walls and partitions separating the engine and boiler rooms. Steam is generated in a battery of five tubular boilers, fired partly by wood and partly by slack coal. The engine is a 600 horse-power, compound Corliss, made by Goldie & McCullough, of Galt, Ont., and is supplied with condenser, pumps, feed water heater, etc. While at present power is generated by steam, it is the intention of the company to operate eventually by electric power, to which end a water power of 2,000 horse-power has been secured at Sooke—about 10 miles distant—where a generating station will be built and the electricity conveyed across country to the works at Tod inlet.

**Coal Grinding Plant.**

Adjoining the engine and boiler-house is a separate building, about 50 feet by 80 feet, in which the fuel for the kiln is prepared. About half of the building is given up to coal stock bins, into which the coal—slack coal or culm—is to be conveyed by a belt conveyor directly from a scow alongside the wharf. From these bins the culm is taken by a link belt elevator to a Bartlett rotary cylindrical dryer—essentially an inclined, revolving, iron cylinder, about 5 feet in diameter and 20 feet long—heated externally underneath by a fire-box using both wood and coal. The slack coal is delivered by the elevator mentioned into the upper end of this cylinder, and in its passage through the heated cylinder is thoroughly dried. The dried culm is then conveyed to a Raymond 3-roll mill, a circular iron pan in which, revolving around a central axis, are three rolls—very much on the principle of the Huntingdon mill—which crush the coal until it is fine enough to be carried off by an exhaust draft, and so conveyed to an elevated iron tank in the kiln building, from which it is fed as required into the kiln by a blast of air.

**Capacity of Plant.**

The plant as at present completed has a capacity of 300 barrels of Portland cement a day, and with the increased machinery, for which accommodation has been provided in the present buildings, this capacity can be doubled at short notice. In April, 1905, the first shipment of the product of the works was made, by the barge "Alexander."

**Quality.**

The only tests that the product of the mill could have been subjected to at this early date are laboratory tests, but such are the tests by which the quality of cements are gauged. It is understood that the Canadian Government standard for neat cement briquettes is that they shall have, after 7 days' setting in water, a tensile strength of 450 lbs. to the square inch section. The product of the Tod inlet works is reported by the company's chemist, Mr. Heiberg, to have an average tensile strength, after setting for seven days in water at the temperature of the air, of 700 lbs. to the square inch, and even after setting for only two days, to have a tensile strength of 400 lbs. A number of briquettes tested on a Fairbanks cement tester in the presence of the writer came fully up to the averages given, while one briquette, which had set for ten days, successfully resisted a tension of 1,000 lbs.

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## NEW WESTMINSTER MINING DIVISION.

Notes by W. F. Robertson, Provincial Mineralogist.

### Britannia Mine.

The immense deposit of copper-bearing schists constituting the *Britannia* mine, on Howe Sound, has been known, and its extent well authenticated, for several years, and a very full description of the property and its exposures of ore was given in the Report of this Bureau for 1900. While the importance of the deposit has for some time been fully realised, the scale upon which it must necessarily be worked to secure the best economic results was so large, and demanded the outlay of such a large amount of capital, that only within the last year have operations leading to the actual exploration of the property been begun.

The property is held now as in 1900 by the Britannia Copper Syndicate, Ltd. The name of the company remains the same, although the personnel has changed largely, owing to transfers of interests to capitalists already interested in copper mining in Montana and elsewhere, whereby working capital was secured.

The officers of the company are: President, Hon. Edgar Dewdney, Victoria, B. C.; Secretary, J. W. Lee, Britannia Beach; Managing Director, Geo. H. Robinson, Britannia Beach; Engineer, C. W. McMicking, Britannia Beach.

The Provincial Mineralogist visited the property on November 1st, 1904, and found in process of construction what promises to be one of the largest concentrating plants in British Columbia, the completion of which must have a powerful influence upon the mining development of this section of the Province. At the mine it was found that very little development of the ore-bodies had been made since the property was previously reported on, which fact must not be taken to imply that this important matter has been neglected, but rather that the development of 1900 was so satisfactory as to justify, without further work, the present large expenditure being made for plant. The importance of the enterprise and the fact that the Report of 1900 is now out of print, seem to make it necessary to repeat from that Report some of the description then given, which description still holds good.

The *Britannia Group* is situated at an elevation of about 3,500 feet above and 3.8 miles from deep salt-water, on the eastern shore of Howe Sound, and is about 28 miles distant to the north from the City of Vancouver. The present examination was confined to the actual underground workings, which are fairly described in extracts from the report of the former managing director, which is quoted later. These workings are sufficient to satisfy anyone that there is here an immense zone in the schists which has been impregnated with an appreciable amount of copper, constituting an exceedingly large, low-grade concentrating proposition of very great importance, and requiring a very extensive plant and a large amount of capital.

The following has been extracted from a report made by the late managing director of the syndicate, Mr. C. E. Walters, under whom the developments were chiefly made:—

"*Claims, Area, Title, etc.*

"Seven claims, the *Fairview, Edith Fraction, Jane, Clifton, Heather Fraction, William* and *Mineral Creek*, containing 297.04 acres and covering over 8,500 feet of the lode, on its strike, are included in the *Britannia Group*. The title is absolutely perfect, Crown grants (the equivalent of U. S. Patents), having been duly obtained from the Government.

"Note.—Under the law of the Province a full-sized mineral claim is 1,500 by 1,500 feet square, all lines descending vertically, thus summarily disposing of the vexatious 'apex' question.

"*Vein Characteristics, Etc.*

"The Britannia claims are traversed by a lode, or zone, of schistose silicious ore, 300 to 600 feet wide, impregnated with copper and iron pyrites and enclosed by a green, porphyritic rock on the south, and black slate on the north, the general strike being north-west and south-east, with dip to the south. Locally, this feature is known as the 'Britannia mineral zone,' and has been definitely traced for several miles in either direction from the *Britannia Group*, which appears to occupy the central position.

"*Ore Disclosures.*

"*No. 1, Jane, outcrop and open-cut.*—Near the western end of the *Jane* claim are the *Jane* original workings. At this point the leached, silicious outcrop has been broken into by occasional shots and surface trenches for over 80 feet in width by 250 feet in length, revealing copper and iron pyrites in the schistose-quartz; also massive yellow-copper (chalcopyrite); samples of this outcrop yielding 4 to 13 % copper, with $1.50 to $2 in gold and silver per ton. On the north or foot-wall slope of this outcrop, an open cut, 15 feet wide by 20 feet high on the upper side, has been driven 60 feet, following the strike, entirely in copper-gold ore averaging by careful, repeated independent sampling over 5 % copper, with $1.75 in gold and silver per ton, while much of the ore exposed on the hanging side of the cut, where chalcopyrite occurs most generously, will average 8 % copper, and may readily be graded by rough-hand selection to 15 %. The highest copper results obtained in the open-cut referred to range from 15 to 25 %, large blocks of the massive yellow copper being tried.

"*No. 2, Jane, cross-cutting and drifting.*—About 100 feet (vertically) below the *Jane* open-cut a cross-cut, prospecting tunnel has been driven 215 feet, entirely in low-grade, mineralised, vein-matter, which may be treated when the property is equipped on a scale proportionate with its known large ore-bodies, but to which no attention has yet been given. Continued to the hanging side of the lode, this tunnel will open large bodies of ore visible on the surface. One hundred and fifty feet from the mouth of this cross-cut, a drift has been run west, turning gradually to the south until, at 100 feet from the initial point, the ore-body was encountered and a 26-foot cross-cut was driven, entirely in massive ore, 20 feet of which will average better than 5 % copper with $1.75 gold and silver, the remainder averaging 8 %, much clean chalcopyrite occurring on the hanging side in a continuous streak of 2½ to 4 feet, clean blocks of which carry 15 to 25 % copper, with the accustomed amount of gold and silver per ton. East and west drifts having been run from the 26-foot cross-cut on this ore-body, a combined distance of 138 feet, its continuity has been proven for that length, at an average depth of 130 feet from the surface, and, despite the fact that at this level the evidences of local disturbances are plentiful, permanence of the ore-body is well assured. Although these workings were started in the *Jane* ground the west drift has penetrated the *Clifton* over 100 feet, and stands at present for the only development, aside from a short, open surface-cut, on the *Clifton* claim.

"*No. 3, Mammoth Bluff outcrop.*—East of the *Jane* workings previously described, a small basin of erosive origin occurs, about 900 feet across, at the eastern extremity of which a great body of silicious ore is visible in the form of perpendicular bluffs, shaped like a huge, recumbent letter **Z**, 600 feet long, and having an average visible height of 200 feet from the exposed base, and an average visible width of 150 feet, all of which has been very conclusively proven to be pay-ore of most remarkably uniform general character, this having been determined by a 91-foot tunnel, driven crossing the ore-body at about 45°; a 17-foot cross-cut and by 24 shots, exposing a 45-foot vertical face of live ore; also a succession of shots, intended to be 20 feet apart, along the entire length of the great ore outcropping at its visible base, all of the workings and every effort at investigation of this phenomenal ore-body being entirely in ore, no

bands of waste or intrusion of any character having thus far been encountered. Sampled and re-sampled by independent examiners, a fair exhibit of values present in this great ore-body, as indicated by the average results obtained from the working exposures, viz.: the 91 and 17-foot tunnels and the 45-foot vertical face, is,—Gold, 095 oz.; silver, .55 oz.; copper, 3.84%. This ore being very silicious, the pyrites finely distributed, will require water concentration, with fine grinding, and tests made indicate 6 to 1 as a satisfactory basis, if the concentrates were to be sold at a custom smelter, or 4 to 5 tons of crude ore to 1 ton of concentrates, if the product were to be smelted on the ground.

"The visible tonnage in this body of ground, 600 feet long by 200 feet high by 150 feet wide, has been estimated by various examiners at 1,800,000 to 3,000,000 tons; the owners' estimate, upon which 'a guaranty of $5,000 was given, that $10,000,000, gross value, would be found in sight,' was based upon 1,500,000 tons of $7 (or better) ore in sight, and this guaranty they were not obliged to pay.

"As this ore-body may be worked as an open quarry for many years, since from the eastern end of the *Mammoth* ore outcrop the vein-matter forms a huge 'hogback' over 400 feet through at the base, and extends, continually rising, over 1,700 feet, to the eastern end of the *Britannia Group*, the mining costs may be reduced to the very minimum, and the daily tonnage output will, from the start, be limited only by the will of the operator and the capacity of the equipment provided.

"*No. 4, Fairview showings.*—From the *Mammoth Bluff* outcrop, through the *Edith Fraction*, and cutting the *Fairview* from end to end, is the huge ridge, or "hogback" of outcropping vein-matter referred to in the preceding paragraph. Leached and weathered on the surface, often to great depth, investigation of this claim has, thus far, been confined to surface prospecting, with most satisfactory results; on and along both slopes of the outcrop good ore has been broken into in numerous places, across over 400 feet in width, a continuous "chute" of high-grade ore coming to the surface for some 300 feet along the northern slope.

"That the *Britannia* lode is continuous, going eastward from the *Clifton*, through the *Jane*, *Edith Fraction* and *Fairview* claims, and that the high-grade ore disclosures in the *Fairview* surface openings are not only permanent but of great importance, is underwritten, as it were, by the fact that the owners of the *Empress Group*, adjoining the *Fairview* on the east, near the close of the season—the lode being covered in the *Empress*—succeeded in tracing the lode from the *Fairview* showings, over the divide and down the opposite slope to a point 800 to 1,000 feet below the *Fairview* east end-line, where they uncovered a section of the *Mammoth Britannia* lode and speedily drove a 20-foot cross-cut tunnel in splendid copper ore, a duplicate of the *Fairview* product.

"*General Physical Features.*

"All natural features are as if designed by nature for the operation, at minimum cost, of a great mine. The *Britannia Group* lies parallel to and below the summit of the main range, at an elevation of 3,500 feet above sea level. Britannia creek, the main water-course of the locality, rises east of and flows parallel to the *Britannia Group*, at an elevation of 2,000 feet above sea level, and at a point opposite (below) the *Jane* workings (basin) is 4,000 feet distant, surface measurement, therefrom. (Note.—These figures are approximately correct.) The main feeders of Britannia creek, also, chiefly have their sources in the *Britannia Group*, so that the abrupt descent from the *Jane* claim to Mineral creek, at or near the mouth of Jane creek, some 1,500 feet in 4,000, is all exceedingly favourable either for the development of water-power, the operation of gravity trams, or for access to deep levels of the *Britannia* lode by a tunnel, driven from any desired point above Britannia creek. From the mouth of Jane creek

to deep salt water, where any ship may safely land, the grade is less precipitous, admitting of the operation of either waggon or railroad and yet affording sufficient head in feet for two or three additional water-power installations.

"*Water Supply, etc.*

"The local water resources consist of the right, by lease from the Provincial Government, at a nominal rental per annum, to take the water of Britannia creek out of the channel three times (returning and picking it up again after use), between a point above the mouth of Jane creek, affording a head of 500 feet at the latter point, and mouth of Britannia creek at Britannia beach. At all times the volume of Britannia creek is abundantly equal to all ore-dressing requirements, and by estimate will afford 1,000 horse-power, minimum, for four months in the year, and up to 2,000 horse-power or more for the remaining eight months.

"AN AVERAGE ORE VALUE EXHIBIT OF BRITANNIA GROUP DISCLOSURES OF ORE, IN WORKING QUANTITIES, AS DETERMINED BY STRICTLY INDEPENDENT EXAMINATIONS.

"The following results were obtained from samples taken by two visiting engineers, who subjected all of the *Britannia Group* disclosures of ore, in working quantities, to most searching examination *in the interest of their principals;* being wholly independent, the results are worthy of credence and we believe the ore, when worked in quantity, will yield greater values.

"WORKINGS SAMPLED AND CONTENTS PER TON OF 2,000 LBS.—MAMMOTH BLUFF OUTCROP.

| | Gold, ozs. | Silver, ozs. | Copper, per cent. |
|---|---|---|---|
| "*No. 1.*—Main Tunnel, 91 feet, driven at visible base of western face crossing ore-body at 45°, five samples along entire length of tunnel; the fifth including 'leached shell' at tunnel mouth, should not be included in average values | .034 | .36 | 2.81 |
| | .04 | .44 | 2.73 |
| | .12 | .55 | 3.46 |
| | .065 | .52 | 2.98 |
| | .13 | .52 | .63 |
| "*No. 2.*—Seventeen-foot cross-cut tunnel at visible base of northern face of outcropping ore, about 125 feet east of *No. 1* | .08 | .44 | 3.16 |
| | .14 | .30 | 3.20 |
| "*No. 3.*—Forty-five-foot perpendicular breast of live ore, at 'Water Course,' disclosed by 24 holes drilled and fired by men suspended over face of bluff by rope-ladders, in order that 'leached sheil' might be removed and fact demonstrated that the great *Mammoth Bluff* outcrop is ore from top to bottom, as well as from end to end of the visible dimensions, namely: 600 feet long, 150 feet wide and 200 feet average height, above the level of the main (91-foot) cross-cut tunnel; representing in all, 1,500,000 tons of visible ore | .104 | .82 | 4.20 |
| | .14 | .38 | 5.40 |
| | .14 | .80 | 6.87 |
| | .075 | .76 | 5.12 |
| | .1 | .82 | 5.80 |
| | .07 | .43 | 3.62 |
| "Combined totals, (13) | 1.238 | 7.14 | 49.98 |
| "Average contents per ton | .095 | .55 | 3.84" |

The ore exposures mentioned are all located in the bluffs which surround a basin at the head of Jane creek, and as already noted, little further development has been done on these since 1900. The *Jane* tunnel has been run to a total distance of 360 feet, and the cross-cut therefrom has been extended further, developing the ore already noted. With a view to the active exploitation and treatment of the ore, construction work was proceeding energetically. Elevated trestles were being built connecting both the *Jane* tunnel and the *Big Bluff* workings with a central receiving bin situated at the upper terminal of the aerial tramway.

**Trestles.**

The *Jane* trestle will be about 600 feet long, with a down grade to the receiving bin of 8½ per cent., whereas that from the *Big Bluff* will be about 640 feet long, with only a slight down grade to the bin. On each of these trestles one or more 10-ton self-dumping cars, operated by wire-rope haulage from an engine, will convey the ore to the central point. Here, it is understood, it is proposed to

instal Blake crushers, crushing the ore to say 2 or 3-inch cubes, whence it will pass on to a sorting belt. On this belt the first-class shipping ore and also the waste rock will be picked off, the former going to a special bin and the latter to the waste dump, while the bulk of the ore will be delivered to the receiving bin for transmission by the tramway to the concentrating plant. This receiving bin was nearly completed, and was 60 feet long by 17 feet wide by 20 feet high, built of logs, and has a capacity of about 1,000 tons of crushed ore.

A compressor plant will be installed at the mine, driven by electricity generated at the beach, and transmitted by the three-wire system over a pole line which follows the tram line.

**The Tram Line.** The aerial tramway will be 16,800 feet long, in two sections, with an intermediate dumping and re-loading or transfer station, at a point where an angle in the line was unavoidable. The upper section will be 5,800 feet long, in which distance it will drop 1,400 feet, while the lower section will be 11,000 feet long, with a drop of 1,800 feet. All the supports for the cables were in place, and the terminals were approaching completion. The pole line was nearly finished, the copper wire being on the ground ready to be strung.

**At the Beach.** A substantial dock has been built, and a commodious office and quarters for the officers of the company erected, together with a store, hotel, and several private houses. The concentrating plant was under construction, but was not sufficiently advanced for the reception or erection of the machinery. The concentrator building is a large rectangular building—built upon piles at the water's edge—and having two floors, the lower of which will be largely occupied by bins, while the upper will be provided with an extensive equipment of reciprocating tables and slimers. Excavations were being made on a bench about 100 yards from the concentrator, and 100 feet above the sea level, for the crushing plant, which will be capable of crushing 500 tons of ore a day to a fineness of about 40 mesh, the crushed material being conveyed in launders to the concentrator for the separation of the mineral.

The mining and transporting of the ore are straightforward propositions, for which perfectly definite plans can be made, but, from the nature of the ore, or rather from its mode of occurrence, the methods of crushing and of concentration must be, to a certain extent, developed by experiment; and as the plant has not as yet been installed, it is thought best not to enter into a description of plans which may be materially modified, further than to say that the crushing plant will consist of Blake crushers and rolls, to be followed, for finer crushing, by Huntingdon and Chilian mills. The concentrating ore, after the shipping ore has been sorted out, will probably not run over 3 per cent. of copper, contained as chalcopyrite in the quartzose schist. This should produce a concentrate ranging about 15 per cent. copper, which will require to be smelted, and which will, for the present at least, be shipped to some of the coast custom smelters for treatment.

**Power.** Water for power is to be taken from the creek, the intake being 1,900 feet above the beach, at which point the water-wheels will be situated. The intake dam has been constructed and the grading done for a line of pipe, the upper portion of wood and the lower of steel, which will convey the water to the power plant. The distribution of power will be by rope transmission to the nearer points, and to the mine and points more removed, by electricity.

## MOUNT BAKER MINES.

NOTES BY H. CARMICHAEL, PROVINCIAL ASSAYER.

The Mount Baker mines are situated south of Chilliwhack, near the International Boundary, which forms the southern limit of the New Westminster Mining Division. From Chilliwhack the municipal roads are followed south till the Chilliwhack river is reached, where the broad, flat valley of the Fraser is left behind, the trail following east along the north bank of the Chilliwhack through a rugged country, the Cheam range lying to the north, while to the south, across the river, is a rough, mountainous country, with unnamed peaks.

The Chilliwhack is a river of considerable size, and is fed from the south by several fairly large creeks, notably Tamiky and Slesse creeks, which are torrential streams subject to rapid rises and falls. Slesse creek rises some six miles south of the International Boundary and flows into the Chilliwhack river about twelve miles above the municipality, and the majority of the claims in the Mount Baker district are reached by a trail following up this creek from its junction with the Chilliwhack, which river is crossed by a pack bridge. A shorter route than the present (which is about 40 miles), from Chilliwhack to the International Boundary, would be through a pass in the Cheam range to the Chilliwhack river, and thence south. Within half a mile of the International Boundary, a wild mountain stream called Glacier creek, and having its source among the glaciers of Red mountain, falls into Silicia creek from the south-west. About a mile and a half from the Boundary, and east of Slesse creek, is Tamiky mountain, a jagged, irregular peak which is a landmark in the district.

During the mining excitement of a few years ago, some misunderstanding was caused by an observation post placed on Slesse creek when the forty-ninth parallel was first surveyed in 1859-61. The post was taken for a boundary mark, and to ascertain whether certain claims in the neighbourhood were in Canada or in the United States the boundary was re-surveyed in 1901, and is now clearly marked with iron posts, the line being chopped out through the timber.

In 1898 gold-bearing quartz was discovered on the Nooksack river, a few miles south of the Boundary, and from there prospecting has been pushed north into British Columbia; but, with the possible exception of the *Pierce* claims, no mineral in workable quantity has so far been found in the drainage area of Slesse creek. There is, however, a wide range of country still unexplored and unprospected, and the region lying to the east along the Boundary seems well worthy of attention.

About four miles from the Chilliwhack river, on the left bank of the creek and near the point where it is crossed by the pack-bridge, several mineral claims have been located, of which the *Telaca* and *King Solomon* chiefly have been worked. These claims are owned by T. Beaumont, of Sumas, B. C. The mountains here rise abruptly on either side of the creek, and on the left bank a few shots have been put into a zone of contorted slate, slightly mineralised with iron pyrites.

Higher up the mountain, about 70 and several hundred feet respectively, there are two felsitic dykes, also slightly mineralised with pyrites, on which some work has been done. Samples from all of these workings were taken, but upon assay disclosed nothing of value.

The *Queen* mineral claim is situated on Slesse creek, near the mouth of Glacier creek, and is owned by Louis Fromer, of Chilliwhack. A drift has been run for about 20 feet into a zone of altered slate, about two or three feet wide, cut by a felsitic dyke, both being slightly mineralised with iron pyrites. Selected samples from this vein gave only a trace of gold, and two-tenths of an ounce of silver to the ton.

From the mouth of Glacier creek, Slesse creek rises rapidly, and on the right bank, some two and a quarter miles above the bridge, are the *Jumbo* and *Lincoln* mineral claims, owned by Thos. Lay, *et al.*, of Chilliwhack. These claims show generally a decomposed black oxide of iron, in zones of movement in slate, traversed by felsitic dykes, and carry low values in silver, with some copper pyrites. Some 150 feet of tunnel, entirely in country rock, had been run by former owners of the property.

Across Slesse creek from the *Jumbo*, and on the western slope of Tamiky mountain, is the *Tin Cup* mineral claim, the workings on which are 1,000 feet above the creek, and are reached by a steep zig-zag trail. A mountain torrent has here denuded the hillside, laying bare a few stringers of quartz, frozen tight in a granitic formation. These stringers appear, from samples taken, to carry values so low as to make their profitable working improbable. Red mountain is a semi-circle of rock towering high above timber line, its sides being covered with blue glaciers, and its summit crowned with perpetual snow. The oxidation of the iron, with which the rock is mineralised, has stained the mountain side, giving the appearance from which its name is derived. On a spur of this mountain, between Glacier and Slesse creeks, a trail leads to the claims of the Red Mountain Company, half a mile south of the International Boundary. Near a cabin built on a shelf of rock on the mountain side, a tunnel and upraise are being driven, to tap a quartz vein which is exposed higher up the mountain. When the claims were visited the snow rendered this quartz vein inaccessible, but the writer was informed that it was 2 feet wide and carried good values.

There are, south of the boundary line, a number of claims, which, although in American territory, are more easily accessible from Canada, the most notable of these being the *Post Lambert Group*, of which the *Lone Jack* is the principal claim. The *Lone Jack* is situated on the southern slope of Bear mountain, four miles south of the boundary, and while it may be reached from the Nooksack river by crossing a high divide, it is more easily reached from Canadian territory, by a trail following up Slesse creek, which heads among the glaciers of Bear mountain. In the Geological Survey Report of the State of Washington, the *Lone Jack* is described as having a 2-foot quartz vein in slate walls, on which vein a 10-stamp mill has been erected and considerable development work and stoping done, the values averaging $32 to the ton, in free gold and tellurides.

The *Pierce* mineral claims are situated on the western slope of Tamiky mountain, and as they could be reached only by returning down Slesse creek to the Chilliwhack river, and thence making a long detour up Nesaquatch creek, they were not visited. The property is said to have a 4-foot quartz vein, averaging $40 to the ton, with good water power, and it is reported that the erection of a stamp-mill is contemplated.

## NEW WESTMINSTER MINING DIVISION.

Report by C. C. Fisher, Acting Mining Recorder.

I have the honour to submit the following report of mining operations in the New Westminster Mining Division for the year 1904.

The claims recorded during the year were distributed as follows:—Howe sound and vicinity, 34; head of Harrison lake and vicinity, 33; Seymour, Lynn, and Capilano creeks, 25; Pitt lake and vicinity, 16; Stave lake and vicinity, 15; Chilliwhack and vicinity, 4; Nelson island, 3; Squamish, 3; Jervis inlet, 1. The claims recorded show a slight falling off, while the development work recorded remains about the same as in the previous year. The only new development work in the district, worthy of special report, has been done by the May-

flower Mining & Milling Company, on the *Mayflower Group* of six mineral claims, which are situate about 1½ miles from the Indian village of Skookumchuck, 20 miles from the head of Harrison lake. The company has spent the sum of $20,000 in developing the claims and in machinery, etc. The ore-body, where it occurs on the *Mayflower*, rises to an elevation of 100 feet above the surrounding country. The vein is strong and well defined, and is heavily impregnated with fine iron pyrites and a little galena and blende, carrying gold and a little silver. From the development work already done, the company estimates that it has 250,000 tons of ore in sight. The development work consists of a main cross-cut tunnel of 160 feet, all in ore, with 100 feet of "backs" and several other drifts in the direction of the vein and shaft. Assays average about $5 per ton. The company considers it a cyaniding proposition, and is conducting tests to prove the extraction of different products. The company has installed a lot of machinery, which consists of a Hendy triple-discharge, 2-stamp mill with 1000-pound stamps, a Blake ore-crusher, and a Challenge ore-feeder, which is used for testing the milling qualities of the ore-body. The company has also erected offices, blacksmith shop, cook and bunk-houses to accommodate 20 men, superintendent's quarters, etc., and has stretched a cable, 300 feet in length, at a height of 60 feet above water, across the river, on which passengers and freight can cross. It intends also to erect a crushing and cyaniding plant, with a capacity of 100 tons a day.

The Britannia Copper Syndicate, Ltd., the owners of the *Britannia Group* of mineral claims, situate on Howe sound, has made considerable expenditure on its properties during the past year. The work consists of a concentrating mill, nominal capacity 500 tons daily, together with an aerial tramway for the transportation of the ore from mine to mill, a distance of about three miles, necessary ore bins, etc. Power is to be generated by means of water wheels and electric generators. A portion of the machinery has been placed, while a portion of it has not yet arrived upon the ground. The plant is expected to be in operation during the early part of 1905.

OFFICE STATISTICS—NEW WESTMINSTER MINING DIVISION.

| | 1903. | 1904. |
|---|---|---|
| Free miners' certificates issued | 855 | 673 |
| Quartz claims recorded | 173 | 134 |
| Certificates of work recorded | 192 | 184 |
| " improvement recorded | 13 | 7 |
| Conveyances recorded | 32 | 33 |
| *Revenue.* | | |
| Free miners' certificates | $5,384 85 | $4,451 85 |
| Mining receipts, general | 2,912 05 | 1,664 05 |
| Total | $8,296 90 | $6,095 90 |

# INSPECTION OF METALLIFEROUS MINES.

Report of James McGregor, Inspector, West Kootenay and Boundary Districts.

I have the honour to submit my annual report for the year 1904, with respect to the condition of the metalliferous mines in my district.

## Slocan District.

The mines in the district have done considerably more developing and shipping than during the previous year. I found at all times, when I inspected the mines, care was being exercised in thawing powder, timbering, placing of ladder-ways and landings. The prevailing method of opening mines in this district is by tunnel. The few shafts which are in use are well equipped with safety catches, guides and signals. The bunk-houses appear to be in a sanitary condition.

## Lardeau District.

In this district the mines have not increased their output to any great extent during the year, owing to several causes, the principal one being bush fires and snow-slides, which caused serious damage and delay; however, a large amount of prospecting and developing has been done in the district during the year.

## Ainsworth District.

In this district there has not been any great increase over the previous year. The two mines which are working are well equipped in every respect.

## Nelson District.

The mines in this district have operated the entire year with little variation, the latest methods in thawing powder and timbering being used. The bunk-houses, so far as I can judge, are in a good sanitary condition.

## Ymir District.

The shipping mines in this district have worked continuously during the year. On others than those at present shipping a considerable amount of development work has been done, all of which has been in accordance with the Act.

## Trail District.

In this district several new properties have been opened during the year; also a great amount of development has been done in the older and larger properties, which are now becoming quite extensive. In and around all of these workings, I find the ropes, guides, catches, ladder-ways and machinery in good condition. The timbering also is carefully prepared and placed. The various appliances used for signalling are in good condition, as are the equipments for thawing powder.

## Boundary District.

In this district, during the year, there has been a number of new mines put in operation, but as yet are not extensive. The older mines have worked continuously with increased force. The greater amount of ore is quarried, but where shafts are in use they are well equipped with guides, safety catches, ladder-ways and signals. The timbering is safely done, where required, and the powder carefully thawed.

I beg to report on the mode of ventilation in all of the districts. With few exceptions, it is natural; in some instances assisted by fans; in others by connecting the different levels; often by upraises or winzes. On the whole, I find it fair.

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REPORT OF THOS. MORGAN, INSPECTOR OF EAST KOOTENAY DISTRICT.

I have the honour, as Inspector of Metalliferous Mines for the East Kootenay District, to submit my annual report for the year 1904.

During the year, the following mines have been working:—The *Sullivan* mine, situated on Sullivan hill, near Fort Steele; the *St. Eugene* mine, situated at Moyie, B. C.; the *North Star* mine, near Fort Steele; the *Alice* mine, near Creston, B. C.

**Sullivan Mine.** My last inspection of this mine, of which James Finlay is superintendent, was made August 5th. An aerial tramway, 1¼ miles in length, has been built from Kimberley railroad to the mine, and bunkers have been erected at the mine and at the railway. Very little work has been done during the year in this mine, but guides have been put in the shaft and an iron cage put on. This mine is ventilated by natural ventilation.

**St. Eugene Mine.** This is a very extensive mine, under the superintendence of James Cronin, manager, and a considerable amount of work has been done during the past year. My last inspection was made September 2nd, when I found everything in good order, and the mine well ventilated both by natural and artificial ventilation. A concentrator, capable of handling 400 tons per day, is installed near the mine, and is run by water power, as is also the electric machinery used in lighting the works. Two hundred and twenty-three men were employed at this mine.

**North Star Mine.** This mine, in charge of Neil McL. Curran, superintendent, has been working all the year. My last inspection was made August 3rd, when I found everything in good order and the ventilation good. Twelve men were employed at this mine.

**Alice Mine.** My last inspection of this mine (John Hampson, superintendent) was made October 4th, when I found everything in good order and the mine well ventilated. An aerial tramway, one mile in length, has been built from the Crow's Nest Railroad to the mine, and a concentrator has been put in. Twenty-three men were employed at this time.

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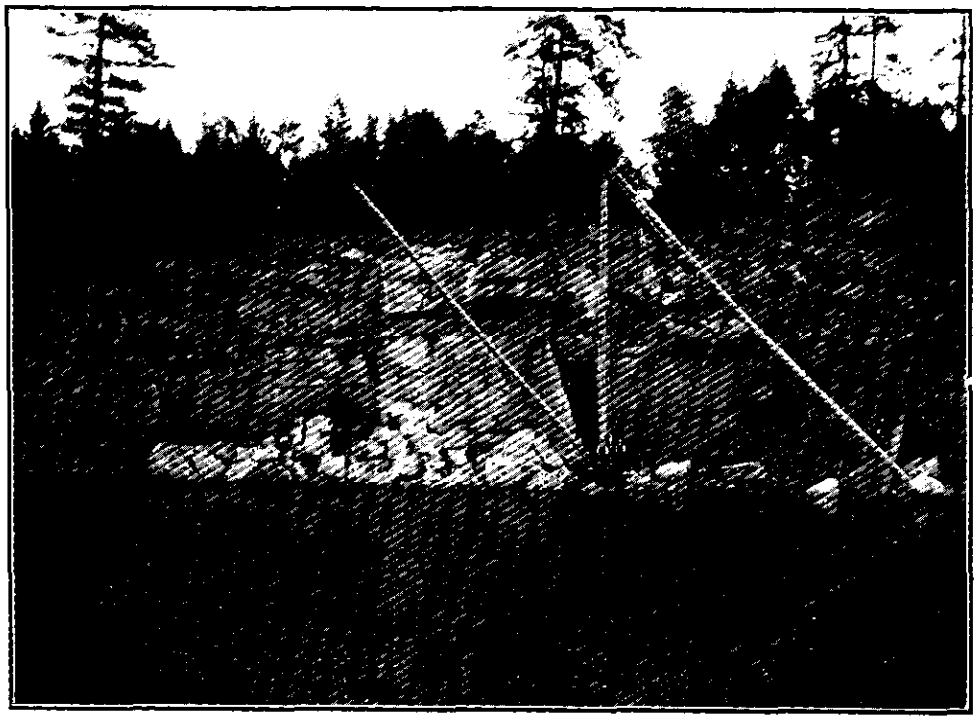
## LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1904.

| No. | Mine. | Date. | Name. | Occupation. | Details. |
|---|---|---|---|---|---|
| 1 | Le Roi, Rossland | Jan. 2 | G. T. McKenzie | Miner | Small bone in ankle broken by fall of rock in stope. |
| 2 | Centre Star | " 11 | Chas. McPhee | " | Skull fractured and one eye destroyed. Drilling into old hole containing powder. |
| 3 | " | " 11 | Frank Geddo | " | Killed. Drilled into old hole containing powder. |
| 4 | Ruth, Slocan | " 27 | Wm. Estib | " | Killed by fall of rock in stope. |
| 5 | Le Roi | Mar. 9 | John Hogan | Shoveller | Back and ankle slightly bruised by fall of rock in drift. |
| 6 | " | " 12 | J. Misski | " | Thigh slightly bruised by car in mine. |
| 7 | " | " 26 | John Carlsen | Miner | Killed by falling down chute. |
| 8 | Old Ironsides (Boundary) | April 7 | Peter Carlsen | Mucker | Severely injured by falling down timber chute. |
| 9 | Peyton Tunnel (Rossland) | June 8 | L. J. Brimm | Shoveller | Hand crushed by rock rolling down chute. |
| 10 | Le Roi | " 14 | J. A. McLeod | " | Hand crushed by car. |
| 11 | War Eagle | " 14 | Jas. Lyon | Blaster | Killed by blast. |
| 12 | Centre Star | " 16 | A. Pinkerton | Skip tender | Killed by falling down shaft. |
| 13 | Le Roi | July 12 | John Berg | Miner | Ankle slightly bruised by piston pin. |
| 14 | Ymir | " 21 | Frank Silveston | Labourer | Six ribs broken and scalp wounds by falling down winze. |
| 15 | Le Roi | ..... | Frank Nicholls | Timberman | Foot slightly cut by axe. |
| 16 | War Eagle | Aug. 17 | Jas. Kalasky | " | Killed in the shaft by being caught between skip and timbers. |
| 17 | Knob Hill, Phœnix | " 31 | B. Shartenberg | Nipper | Fatally injured by rock rolling down muck pile. |
| 18 | Le Roi | Sept. 3 | J. D. Coleman | Timberman | Wrist slightly cut through collapse of staging. |
| 19 | " | " 16 | Richard Cooper | Shoveller | Leg and back bruised by car. |
| 20 | " | " 21 | Earl Martin | Miner | Thumb cut off by block pulley. |
| 21 | Ymir Mine | " 23 | Robert Brown | Nipper | Killed by cable in ore-hoisting shaft. |
| 22 | Le Roi | " 25 | J. A. Anderson | Miner | Head and hand slightly cut and leg bruised by rock falling in stope. |
| 23 | " | Oct. 3 | Mike Sado | Shoveller | Caught between car and chute, end of little finger taken off. |
| 24 | Idaho, Alamo | " 11 | Frank Spits | Miner | Killed by drilling into missed hole. |
| 25 | Le Roi | " 13 | Wm. Purcell | Timberman | Collar-bone broken by piece of loose rock falling down man-way. |
| 26 | Highlander (Ainsworth) | " 26 | Gus Weda | Miner | Bruised by falling rock while timbering. |

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1904.—*Concluded.*

| No. | Mine. | Date. | Name. | Occupation. | Details. |
|---|---|---|---|---|---|
| 27 | Le Roi | Nov. 15 | Louis Tyckson | Miner | Rock fell on end of pole, which flew up and bruised head and face. |
| 28 | Le Roi No. 2 | " 24 | Emil Mikolem. | Top cager | Killed by falling down shaft. |
| 29 | Silver Cup, Lardeau | " 27 | W. S. Laing | Miner | Killed by fall of rock in the stope. |
| 30 | Le Roi | Dec. 1 | Mike Supple | Timberman. | Skull fractured and hip dislocated by falling down timber chute. |
| 31 | Old Ironsides (Phœnix) | " 3 | Chas. Johnston | Mucker foreman | Severely injured by falling down timber-way. |
| 32 | Ymir Mine | " 5 | Mercer Antler. | Miner | Fatally injured—crushed between car and chute. |
| 33 | Le Roi | " 10 | Britton Duke | Timberman. | Slightly bruised by machine-drill falling on him. |
| 34 | Knob Hill, Phœnix | " 14 | S. Fife | Miner | Severely injured by falling rock in raise. |
| 35 | Le Roi | " 17 | Wm. Tomkins. | Miner | Slight scalp wound from falling rock. |
| 36 | Payton Tunnel (Rossland) | Dec. 30 | James Brighton | Miner | Finger slightly cut by chute door. |
| 37 | St. Eugene (East Kootenay) | Oct. 4 | O. Paulson | Mucker | Seriously injured about the head by the explosion of powder in muck. |
| 38 | " | " 4 | C. McDonald | Miner | " " " |
| 39 | " | " 4 | K. D. Stinson | Miner | Slightly injured at the same time as above. |
| 40 | Tyee, Mount Sicker | Feb. 22 | Arch. McPhail | Mucker | Serious scalp wound and bruises. Fell from second to sill floor, flooring having been removed and not replaced. |
| 41 | " " | May 31 | Edw. Mannier. | Mucker | Slight scalp wound, caused by being struck by cage in shaft. |
| 42 | " " | Aug. 20 | John Hooker | Mucker | Fracture of small bone of left arm and bruises, caused by falling into ore-chute. |
| 43 | " " | Sept. 1 | Wm. Stayner | Teamster | Fatally injured in head by being struck by skid while unloading logs. |
| 44 | " " | Nov. 12 | D. McAulay | Miner | Ankle dislocated—foot caught and twisted in loose lagging. |
| 45 | Nahmint, Alberni | Dec. 12 | J. McGilvray | Miner | Fatally injured by drilling into missed hole. |



GEORGIA STONE CO.'S QUARRY, JACK'S POINT NANAIMO HARBOUR.

GABRIOLA ISLAND SANDSTONE QUARRY--NANAIMO M. D.

Tabulated List of Accidents, Metalliferous Mines, 1904.

| | Cause of Accident. | Extent of Injury. | | | Total. |
|---|---|---|---|---|---|
| | | Fatal. | Serious. | Slight. | |
| A | Blasting | 1 | 0 | 0 | 1 |
| B | Defective Powder | 0 | 0 | 0 | 0 |
| C | Drilling into old holes containing powder | 3 | 1 | 0 | 4 |
| D | Powder in muck | 0 | 2 | 1 | 3 |
| E | Shafts and cages, accidents connected with | 2 | 0 | 1 | 3 |
| F | Falling down shafts or winzes | 2 | 1 | 0 | 3 |
| G | Falling down chutes | 1 | 3 | 2 | 6 |
| H | Mine cars | 1 | 0 | 4 | 5 |
| I | Rock falling in stopes, levels, etc | 3 | 1 | 6 | 10 |
| J | Rock falling down chutes or openings | 0 | 1 | 1 | 2 |
| K | Timbering | 0 | 0 | 2 | 2 |
| L | Miscellaneous, underground | 0 | 0 | 4 | 4 |
| M | Surface | 1 | 0 | 1 | 2 |
| | Totals | 14 | 9 | 22 | 45 |
| Accidents for each 100,000 tons ore mined | | 0.959 | 0.616 | 1.508 | 3.082 |
| Accidents for each 1,000 men employed | | 4.242 | 2.727 | 6.666 | 13.636 |

# COAL MINING IN BRITISH COLUMBIA.

The only coal fields of British Columbia being actually mined for coal are those of Vancouver Island and of the Crow's Nest Pass, and these seem to be more than able to supply the markets at present available, as in neither field have the mines been able to work the year through with a force as great as could have been employed. The gross amount of coal mined in the Province during the year 1904, was 1,685,698 tons (2,240 lbs.), an increase over the preceding year of 203,785 tons. The distribution of this output of coal and of the coke produced is shown in the following table:—

COAL AND COKE PRODUCED, EXPORTED, ETC., BY PROVINCE, 1904.

| SALES AND OUTPUT FOR YEAR. | COAL. | | | | COKE. | | | |
|---|---|---|---|---|---|---|---|---|
| (Tons of 2,240 lbs.) | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. |
| Sold for consumption in Canada | 537,744 | .... | ..... | .... | 129,337 | | | |
| " export to U. S. | 532,436 | .... | ..... | .... | 100,281 | | | |
| " " to other countries | 1,157 | .... | ..... | .... | ..... | | | |
| Total sales | ..... | .... | 1,071,337 | .... | | | 229,618 | |
| Used in making Coke | 432,070 | .... | | | | | | |
| Used under colliery boilers, etc. | 159,651 | .... | | | | | | |
| Total for colliery use | ..... | .... | 591,721 | | | | | |
| Stocks on hand first of year | 8,130 | .... | | | | | | |
| " last of year | 30,770 | .... | | | | | | |
| Difference added to Stock during year | ..... | .... | 22,640 | .... | ..... | .... | 8,810 | |
| Output of collieries for year | ..... | .... | 1,685,698 | .... | ..... | .... | 238,428 | .... |

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

| CHARACTER OF LABOUR. | UNDERGROUND. | | ABOVE GROUND. | | TOTALS. | |
|---|---|---|---|---|---|---|
| | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. |
| Supervision and clerical assistance | 89 | $6 87 | 51 | $4 50 | 140 | $5 68 |
| Whites—Miners | 1,614 | 3 75 | ..... | ..... | 1,614 | 3 75 |
| Miners' helpers | | 2 75 | ..... | ..... | ..... | 2 75 |
| Labourers | 1,378 | 2 87 | ..... | 2 50 | ..... | 2 68 |
| | | | 547 | | 1,925 | |
| Mechanics and skilled labour | | 2 62 | ..... | 3 62 | ..... | 3 02 |
| Boys | | 1 87 | ..... | 1 33 | ..... | 1 60 |
| Japanese | 17 | 1 37 | 28 | 1 25 | 45 | 1 31 |
| Chinese | 180 | 1 37 | 549 | 1 25 | 729 | 1 31 |
| Indians | ..... | ..... | ..... | ..... | ..... | ..... |
| Totals | 3,278 | ..... | 1,175 | ..... | 4,453 | ..... |

In addition to the coal fields actually producing, there are a number of others which have been developed to such an extent as to settle definitely the question of their commercial importance.

In the East Kootenay District, large coal fields have been developed on the Elk River, above the junction of Michel creek, and also on one of its eastern tributaries, Fording river.

On the north fork of Michel creek good coal seams have been proved, but little development has taken place this past year.

On the south fork of the same creek there are valuable seams, owned by the Crow's Nest Pass Coal Co., but as this company has at present sufficient openings already accessible by railway, these newer exposures are dormant.

All the above proved fields can be easily reached by railways, which will doubtless be built as soon as there is a stronger market demand for the fuel.

In the Flathead country there has been some active prospecting going on for both coal and oil, but of the success of these operations there is no official information.

In the vicinity of Kamloops some development of coal seams has taken place, as mentioned in the Report of the Gold Commissioner of that District.

In the vicinity of Nicola the known coal fields have been extensively explored and prospected by two or three companies, and according to analyses given elsewhere in this Report, some very good coal has been proved, and the building of the long-expected railway through this section will in all probability lead to the opening up of these fields.

The coal fields of the Telkwa river, a branch of the Skeena above Hazelton, and at least near the line that must be adopted by the Grand Trunk Pacific Railway, were more thoroughly explored and mapped out by Messrs. McEvoy and Leach, of the geological staff of the Crow's Nest Pass Coal Co. Mr. McEvoy reports extensive seams of semi-anthracite found in a nearly horizontal and undisturbed bed, probably formed from beds of bituminous coal acted upon by the heat produced by a very large volcanic overflow deposit of later date. There seems definite promise that these properties will be opened up in advance of the railway mentioned.

Of the coal areas on the Peace river to the east of the Rockies, but well within the Province of British Columbia, there has been little heard this past year, as they are supposed to be upon land "reserved" since Confederation, and from which the Dominion Government has a right to make a selection.

## VANCOUVER ISLAND COLLIERIES.

The output of the collieries of Vancouver Island for the year 1904 was 1,023,013 tons, gross, of which 784,169 tons were sold as coal, 135,034 tons were used under the producing company's boilers, 22,640 tons were added to the stock piles, and 81,170 tons were used in making coke; producing of this latter commodity 19,571 tons, all of which is shown in the tabulated Returns which follow. During the preceding year (1903) the gross output of coal was 860,775 tons, and there was taken from stock some 46,285 tons of coal, so that the consumption of Vancouver Island coal in 1903 was 907,060 tons. The gross output of coal for 1904, therefore, shows an increase over the preceding year of 162,240 tons, an increase of 20 per cent., while the gross consumption of coal shows an increase of 115,954 tons, or 12.7 per cent.

The present output shows a distinct gain, but is not so great as it was two or three years ago, before the invasion of the California market by fuel oil, for California, in 1902, was the market for about three-quarters of the coal output of these collieries, and as the following table shows, still absorbs about 53 per cent. of the coal sold. The following table gives an aggregate summary of the output, etc., for the Vancouver Island and Coast Inspection District as is permitted by section 53 of "Coal Mines Regulation Act." The returns for the individual mines, however, can not be given without the permission of the individual owners, as such is prohibited under the same section, and this permission has been refused by both the producing companies.

AGGREGATE SUMMARY OF RETURNS FROM VANCOUVER ISLAND COLLIERIES FOR THE YEAR 1904.

| | Coal. | | Coke. | |
|---|---|---|---|---|
| | Tons. | Tons. | Tons. | Tons. |
| Sold for consumption in Canada | 368,764 | | 10,333 | |
| " export to United States | 414,248 | | 2,591 | |
| " " other Countries | 1,157 | | | |
| Total sales | | 784,169 | | 12,924 |
| Used in making Coke | 81,170 | | | |
| " under Colliery boilers | 135,034 | | | |
| Total for Colliery use | | 216,204 | | |
| | | 1,000,373 | | |
| Stock on hand first of year | 8,130 | | 631 | |
| " last of year | 30,770 | | 7,278 | |
| Difference added to stock during year | | 22,640 | | 6,647 |
| Output of Collieries for year 1904 | | 1,023,013 | | 19,571 |

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC., VANCOUVER ISLAND.

| Character of Labour. | Underground. | | Above Ground. | | Totals. | |
|---|---|---|---|---|---|---|
| | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. |
| Supervision and Clerical Assistance | 47 | $6 87 | 37 | $4 50 | 84 | $5 68 |
| Whites—Miners | 993 | 3 75 | | | 993 | 3 75 |
| Miners' Helpers | 449 | 2 75 | | | 449 | 2 75 |
| Labourers | 337 | 2 87 | 53 | 2 50 | 390 | 2 68 |
| Mechanics and Skilled Labour | 19 | 2 62 | 220 | 3 62 | 239 | 3 02 |
| Boys | 86 | 1 87 | 23 | 1 33 | 109 | 1 60 |
| Japanese | 17 | 1 37 | 28 | 1 25 | 45 | 1 31 |
| Chinese | 180 | 1 37 | 525 | 1 25 | 705 | 1 31 |
| Indians | | | | | | |
| Totals | 2,128 | | 886 | | 3,014 | |

# INSPECTION OF COAL MINES, 1904.

## VANCOUVER ISLAND AND COAST INSPECTION DISTRICT.

(Joint Report of Arch. Dick, Inspector, and Francis H. Shepherd, Acting Inspector, during Inspector Dick's absence.)

The collieries operating during the year were:—

Nanaimo: Western Fuel Company—No. 1 shaft, Protection Island shaft, Harewood mine, No. 4 Northfield mine, and re-opening operations at the old Fitzwilliam mine, which has been closed since 1881.

Extension: Wellington Colliery Company—Nos. 1, 2 and 3 mines, all worked from what is known as the No. 1 tunnel.

Cumberland: Nos. 4 and 7 slopes and Nos. 5 and 6 shafts.

## Western Fuel Company.

*(This Company has refused permission to publish its Official Returns.)*

The Western Fuel Company has been working the following mines during the year, during the first half of the year, under the superintendency of Mr. Thomas Russell, and during the latter half under that of Mr. Thos. R. Stockett as manager and Mr. Thomas Graham as superintendent.

### No. 1 Shaft, Esplanade, Nanaimo.

Mr. Joseph Randle and, later, Mr. Thos. Mills, Managers.

The winning drivages of this mine have been extended continuously during the year, the most important levels being Nos. 7 north and south levels, both of which are being driven into new territory. The No. 7 level going to the south is being driven into an entirely unexplored portion of the field, and with very satisfactory and promising results.

The dip workings off No. 3 north level have also been extended and pillars extracted in the upper portion of the section.

The workings up the three main inclines off No. 1 level north have been confined chiefly to the extraction of pillars. Two new winning inclines have been commenced off No. 1 level and are preparing to open out on pillar and stall work.

On May 29th the splendid head-gear and pit-top were entirely destroyed by fire, but fortunately, no lives were lost. With commendable enterprise, the management immediately put the Protection shaft in readiness, and continued to hoist the output from that shaft while the new head-gear and the screening and washing plant were being installed. The new works were re-modelled with an up-to-date installment, of a capacity of 1,500 mine cars in a single working shift. Advantage was taken of the accident to remodel the hoisting machinery and to install a very efficient air compressing plant.

### Protection Island Mine.

Manager, Mr. Joseph Randle and, later, Mr. Thomas Mills, with Mr. George Wilkinson as overman.

The operations at this mine have been confined to the extraction of pillars in the upper seam, and to long-wall working in the lower seam. A rock tunnel has been driven to the lower seam to win a larger area and facilitate haulage and ventilation. This seam continues to produce splendid coal, and the management is preparing to open it up at other points of the mine.

No. 4, NORTHFIELD.

Manager, Mr. George Bradshaw.

This is an entirely new installation and is winning both the upper and lower seams. Parallel slopes have been successfully driven under the channel to Newcastle island, and the lower seam is now being opened up by the long-wall system. The old Fitzwilliam mine is being pumped out, and will be utilised as an air connection, and the old mining area attacked.

Extensive hoisting and screening works are being erected, and substantial wharves and storage bunkers constructed.

HAREWOOD.

Mr. Thomas Budge, Manager.

This mine discontinued operations in the latter half of the year, and at the present time is still closed.

## Wellington Colliery Company, Limited.

*(This Company has refused authority to publish its Official Returns.)*

The Wellington Colliery Company, Limited, has been operating the following mines during the year 1904, under the general management of F. D. Little, M. E. :—

The Wellington Colliery, in Cranberry District (Extension); Andrew Bryden, Manager.

The Wellington Colliery, in Comox District; John Matthews, Manager.

EXTENSION.

*No. 1 or Tunnel Mine.*

The developing drivages in this mine are confined to the slope to the dip of No. 1 east level. A new motor road is being driven to connect this slope with the main tunnel, and is nearing completion. In other parts of this mine considerable pillar extraction is being done.

*No. 2 Mine.*

Mr. Alex. Shaw, Overman.

Three pairs of levels are being driven into new territory to the east, and the slope to the dip of No. 4 level is being pushed into the solid. This section gives off considerable inflammable gas, but precautions are used in the district to ensure safety.

*No. 3 Mine.*

James Sharp, Overman.

The winning drivages of this mine are confined to the No. 3 slope and workings, and to the No. 1 level. Both stall work and extraction of pillars are in operation.

The three mines, collectively, are under the supervision of Mr. Andrew Bryden, and are well ventilated and timbered, and have a capacity of 2,000 tons per day.

COMOX.

*No. 4 Slope.*

Richard Short, Overman.

This slope is now down 2,500 yards, and work is going on on the west side, in what is known as No. 11 level, with Nos. 1 and 2 inclines from the same. All the workings in this

district are in good order, being worked on the pillar and stall system. Ventilation is good. For this district a new return airway has been made to the surface, and a new fan erected, which at the date of inspection was found to be passing 45,000 cubic feet of air, in which current of return air no trace of gas was detected.

To the east side of this No. 4 slope, known as the "diagonal slope," work is going on in the 11, 12 and 13 east levels. All the mining here is confined to extracting pillars (coal), work having been started at the inside, and continuing from there out. In this "diagonal slope" the water that was run into the mine some years ago, when it was on fire, is being pumped out, and it is expected that the coal face will soon be reached. Ventilation was good, the air going in by 13 level and returning by 12 and 11 levels. The company has only recently got the face of the slope, and has started to open out, and, as I have said, the workings are 2,500 yards from the entrance. From No. 4 there is also a slope turned off to the east, which is known as

*No. 2 Slope.*

This slope, at the face, is the lowest workings in the No. 4 mine, and is badly caved, and there is yet much water to pump, which makes very slow work. The company has now got below the No. 10 east level, which is being cleared and put in order. All the work being done down here is at pillars. Ventilation was very good. From this No. 2 slope turns off what is known as

*No. 3 Slope.*

All the working here is at the pillars, on both sides of the slope. Including the slope pillars, the coal is now nearly all out up to No. 6 level, where it is proposed to stop for a time when all the workings below No. 6 level will be permanently closed up. Ventilation is very good. This No. 4 mine has given much trouble, the company having been under the necessity of flooding it on two occasions. The water proved very destructive, bringing down the roof and in many cases where the roof did not come down, the floor raised and met it. It will be a long time before No. 2 slope gets to the solid, but in other places the company is in a fair way to get coal out soon.

*No. 5 Shaft.*

The working of this mine is on the long-wall system, but it is not possible to have the working faces in line, as much trouble is caused by faults. There is plenty of rock to pack solid the workings behind, and in many cases the workings will not hold all the débris, so that some has to be taken out. The districts in this shaft are known as the No. 1 and 2 inclines, both of which are worked on the same principle and under the same troublesome conditions. Ventilation is very good, the air current travelling along the face where the men work.

*No. 6 Shaft.*

John Kesley, Overman.

This No. 6 shaft is about one mile in a southerly direction from No. 5 shaft, with a roadway under ground between the two mines. All the mining here is on the pillar and stall system. In many places the coal is thin, but the workings are kept in fine condition. Ventilation is good, and conducted well into the face by brattice, and cross-cuts through the pillars. In this mine there is a system of water pipes to the face, or near enough to reach them with a hose. The water can be turned on at any time if the works should be getting dry, or in case of fire, as there are taps at the different ends of the pipes. The water in the pipes is pumped up the shaft, and is under about 500 feet pressure. In this shaft work has been started in what is known as the upper seam, which is about half-way down. This vein is about 7 feet between roof and floor, but contains impurities of various kinds.

*No. 7 Slope.*

David Walker, Overman.

This is the mine where anthracite coal was reported as found. This slope is now down about 500 yards, on a gentle pitch. The coal is of very good quality, but here, as in the other mines, there have been drawbacks, with faults of one kind and another. There is not much coal being taken out, but preparations are being made for a large output in the near future. There is an air shaft down here which will be between the No. 1 and 2 slopes, and will be the upcast for both slopes.

No 2 slope is only a short distance from No. 1 at the entrance, but goes off at an angle, which widens as they go down. Coal from both slopes will be landed at the same tipple. The works are being put in shape on the surface for the handling of a large quantity of coal. The haulage from the above slopes is to be with a $\frac{5}{8}$-inch endless chain, which is now on the ground.

This No. 7 mine is about five miles from No. 5 mine, from which place there is a good railway of the standard gauge, in connection with the company's railway system. I think this mine will be an extensive producer.

The detailed list of accidents occurring during the year is given under that heading and in tabular form.

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## EAST KOOTENAY INSPECTION DISTRICT.

REPORT OF THOMAS MORGAN, INSPECTOR.

I have the honour, as Inspector of Coal Mines for the East Kootenay District, to submit my Annual Report for the year 1904. My period as Inspector for this District commenced on March 17th, 1904. The only company actually producing coal in this District, as yet, is the Crow's Nest Pass Coal Co., Ltd., but this company is operating three separate and distinct collieries.

### Crow's Nest Pass Coal Co., Ltd.

| *Officers.* | *Address.* |
|---|---|
| Hon. Geo. A. Cox, President, | Toronto, Ont. |
| Robert Jaffray, Vice-President, | " |
| G. G. S. Lindsey, Secretary and Managing Director, | " |
| E R. Wood, Treasurer, | " |
| R. G. Drinnan, General Superintendent, | Fernie, B. C. |

Capital of the Company, $3,500,000.

The above Company is now operating the following extensive collieries on the western slope of the Rocky Mountains in the East Kootenay District, viz.:—

Coal Creek Collieries, situated on Coal creek, about 5 miles from the town of Fernie, on a branch railway to the mines.

Michel Collieries, situated on both sides of Michel creek, on the line of the C. P. Railway, being 23 miles in a north-easterly direction from Fernie.

Carbonado Collieries, situated on Morrissey creek and connected with the C. P. Railway and the Great Northern Railway at Morrissey. The colliery is about 14 miles from Fernie, by rail, in a south-easterly direction.

The total output of the Company's collieries for the past year was 662,685 tons. Of this 350,900 tons were used in the manufacture of coke, yielding 218,857 tons, of which 119,004 tons were sold for consumption in Canada, and 97,690 tons were exported to the United States.

The coal exported to the United States amounted to 118,188 tons, while 168,980 tons were sold for consumption in Canada.

The amount and disposition of this combined output is more fully shown in the following table:—

RETURNS FROM CROW'S NEST PASS COAL COMPANY'S COLLIERIES.

| SALES AND OUTPUT FOR YEAR. | COAL. | | | | COKE. | | | |
|---|---|---|---|---|---|---|---|---|
| (Tons of 2,240 lbs.) | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. |
| Sold for consumption in Canada | 168,980 | .... | ..... | .... | 119,004 | .... | | |
| " export to United States | 118,188 | .... | ..... | .... | 97,690 | .... | | |
| " " to other countries | ..... | .... | ..... | .... | ..... | .... | | |
| Total Sales | ..... | .... | 287,168 | .... | ..... | .... | 216,694 | — |
| Used in making Coke | 350,900 | .... | | | | | | |
| " under Colliery Boilers | 24,617 | .... | | | | | | |
| Total for Colliery Use | ..... | .... | 375,517 | .... | | | | |
| Stocks on hand first of year | ..... | .... | ..... | .... | | | | |
| " last of year | ..... | .... | ..... | .... | | | | |
| Difference taken from Stock during year | ..... | .... | ..... | .... | ..... | .... | 2,163 | |
| Output of Colliery for Year | ..... | .... | 662,685 | — | ..... | .... | 218,857 | — |

NUMBER OF MEN EMPLOYED IN CROW'S NEST PASS COMPANY'S COLLIERIES.

| CHARACTER OF LABOUR. | NUMBER EMPLOYED. | | TOTAL NUMBER EMPLOYED. |
|---|---|---|---|
| | Underground. | Surface. | |
| Supervision and clerical assistance | 42 | 14 | 56 |
| Whites—Miners | 621 | ..... | 621 |
| Miners' helpers ..... | | | |
| Labourers ..... | | | |
| Mechanics and skilled labourers ..... | 487 | 251 | 738 |
| Boys ..... | | | |
| Japanese ..... | ..... | ..... | ..... |
| Chinese ..... | ..... | 24 | 24 |
| Indians ..... | ..... | ..... | ..... |
| Total ..... | 1,150 | 289 | 1,439 |

COAL CREEK COLLIERY.

Andrew Colville, Manager.

This colliery is situated about 5 miles in an easterly direction from Fernie, where No. 1, No. 9 and No. 5 tunnels, on the north side of Coal Creek, and No. 2 and No. 3 on the south side, have been working.

*No. 1 Mine.*

David Martin, Overman.

This mine is worked by pillar and stall. My last inspection of this mine was made on the 5th and 6th of December. In the slope district I found a little gas in three places over the timber, and in the incline district I found gas in five places above the timber; also gas in cross-cut off No. 5 stall. All other places were clear.

The slope district received 32,000 cubic feet of air per minute for 55 men and 5 horses, while the incline district received 21,000 cubic feet per minute for 50 men and 5 horses. The main level district, which is abandoned, was supplied with 14,400 cubic feet of air per minute. The total air supplied to the mine was 96,000 cubic feet per minute, which gives a leakage of 28,600 cubic feet per minute for roads, doors, etc. A Guibal fan, 4½ by 14 feet, is the motive power of ventilation for this mine.

*No 3 Mine.*

John McClimont, Overman.

Pillar and stall work and extraction of pillars are being carried on in this mine. My last inspection was made December 8th, when I found all clear, and 25,200 cubic feet of air per minute for the use of 37 men and 3 horses. This mine and No. 2 have the same motive power for ventilation. The total air in the fan shaft was 165,000 cubic feet per minute, which gives a leakage of 49,940 cubic feet per minute.

*No. 2 Mine.*

John McClimont, Overman.

This mine is also worked by pillar and stall. My last inspection was made December 7th. Found a little gas in the cross-cut off No. 1 stall, all other places being clear. No. 1 district is not working, but received 14,000 cubic feet of air per minute. No. 2 district received 30,360 cubic feet of air per minute for 68 men and 6 horses, while 45,500 cubic feet per minute were supplied to district No. 3 for the use of 70 men and 6 horses. The motive power for ventilation is a Guibal fan, 8 by 16 feet.

*No. 5 Mine.*

John Hunt, Overman.

This mine is worked by pillar and stall. My last inspection was made December 8th, when I found a little gas in three inside stalls, all others being clear, with 34,450 cubic feet of air per minute for 30 men and 4 horses. The motive power of ventilation is a Guibal fan, 3 by 10 feet.

*No. 9 Mine.*

David Martin, Overman.

This mine is worked by long-wall, my last inspection being made December 5th. I found a little gas in two places, all the rest being clear, and 24,960 cubic feet of air per minute were supplied to 34 men and 4 horses. The motive power for ventilation is a Guibal fan, 3 by 10 feet.

The following are the official returns of the Coal Creek Colliery for the year ending 31st December, 1904:—

| Sales and Output for Year. | Coal. | | | | Coke. | | | |
|---|---|---|---|---|---|---|---|---|
| (Tons of 2,240 lbs.) | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. |
| Sold for consumption in Canada | 95,799 | .... | | .... | 63,287 | | | |
| " export to U. S. | 47,217 | .... | | .... | 54,527 | | | |
| " " to other Countries | | .... | | .... | | | | |
| Total Sales | | .... | 143,016 | .... | | .... | 117,814 | |
| Used in making Coke | 190,567 | .... | | | | | | |
| " under Colliery Boilers, &c. | 12,318 | .... | | | | | | |
| Total for Colliery use | | .... | 202,885 | | | | | |
| Stock on hand first of year | | .... | | | | | | |
| " last of year | | .... | | | | | | |
| Difference added to stock during year | | .... | | .... | 737 | | | |
| Output of Colliery for year | | .... | 345,901 | .... | | .... | 118,551 | |

Number of Hands Employed, Daily Wages Paid, &c.

| Character of Labour. | Underground. | | Above Ground. | | Totals. | |
|---|---|---|---|---|---|---|
| | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. |
| Supervision and clerical assistance | 21.50 | | 5.50 | | 27.00 | |
| Whites—Miners | 334.53 | | | | 334.53 | |
| Miners' helpers, Labourers, Mechanics & skilled labour, Boys | 254.47 | | 131.96 | | 386.43 | |
| Japanese | | | | | | |
| Chinese | | | | | | |
| Indians | | | | | | |
| Totals | 610.50 | | 137.46 | | 747.96 | |

## Michel Colliery.

Arthur R. Wilson, Manager.

This colliery is situated 24 miles in an easterly direction from Fernie, where No. 4, No. 6 and No. 8 mines are working at the present time. Upper No. 3, Lower No. 3 and No. 5 mines have been worked until recently, the fans being kept running slowly to keep the mines clear.

*No. 4 Mine.*

William Powell, Overman.

Pillar and stall work is being carried on in this mine. My last inspection of this mine was made on December 12th, when I found all clear of gas. No 5 South Level District was supplied with 41,000 cubic ft. of air per minute for the use of 17 men and 1 horse. No. 4 West

Level District is not working at present, but received 21,000 cubic feet of air per minute to keep it clear, and No. 2 level, which is not working, was supplied with 12,000 cubic feet of air per minute. Lower No. 3 mine and No. 4 mine are ventilated by No. 4 fan. The east side of No. 3 mine received 12,600 cubic feet of air per minute, and the west side 14,000 cubic feet per minute, while the total air in the return at the fan shaft was 134,400 cubic feet per minute, which shows a leakage of 33,800 cubic feet per minute.

*No. 6 Mine.*

Thomas Corkill, Overman.

This is a new mine, and as yet only a level and an air-way have been driven, and a slope started off the level. My last inspection was made December 12th, when I found 4,200 cubic feet of air per minute for the use of 16 men and 2 horses. This is natural ventilation, for a fan will be put up when connection is made with No. 7 tunnel, which is partly driven.

*No. 8 Mine.*

John Lee, Overman.

Pillar and stall work is being carried on in this mine. My last inspections were made December 12th and 13th, when I found all clear of gas. The main level district was supplied with 29,000 cubic feet of air per minute for the use of 50 men and 7 horses, while the main incline district received 18,440 cubic feet per minute for 30 men and 2 horses. The total air in the return at the fan shaft was 100,000 cubic feet per minute, which shows a leakage of 52,560 cubic feet per minute. A Guibal fan, 8 by 14 with 1-inch water gauge, is the motive power for ventilation.

The following are the official returns of the Michel Colliery for the year ending December 31st, 1904:—

| Sales and Output for Year. | Coal. | | | | Coke. | | | |
|---|---|---|---|---|---|---|---|---|
| (Tons of 2,240 lbs.) | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. |
| Sold for consumption in Canada | 66,986 | — | | | 55,091 | 00 | | |
| " export to U. S | 9,045 | — | | | 39,075 | 00 | | |
| " " to other Countries | | | | | | | | |
| Total Sales | | | 76,031 | — | | | 94,166 | — |
| Used in making Coke | 152,991 | — | | | | | | |
| " under Colliery Boilers, &c | 6,234 | — | | | | | | |
| Total for Colliery Use | | | 159,225 | — | | | | |
| Difference added to stock during year | | | | | 1,519 | 00 | | |
| Output of Colliery for Year | | | 235,256 | — | | | 95,685 | — |

Number of Hands Employed, Daily Wages Paid, &c.

| Character of Labour. | Underground. | | Above Ground. | | Totals. | |
|---|---|---|---|---|---|---|
| | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. |
| Supervision and Clerical Assistance | 13.50 | ..... | 4.50 | ..... | 18.00 | |
| Whites—Miners | 177.28 | ..... | ..... | ..... | 177.28 | |
| Miners' Helpers, Labourers, Mechanics and Skilled Labour, Boys | 181.32 | ..... | 74.23 | ..... | 255.55 | |
| Japanese, Chinese, Indians | ..... | ..... | 24.00 | ..... | 24.00 | |
| Totals | 372.10 | ..... | 102.73 | ..... | 474.83 | |

Carbonado Colliery.

Charles Simister, Manager.

This colliery is situated on Morrissey creek, about 13 miles from Fernie, and during the past year Nos, 0, 1, 3 and 4 mines have been working.

*No. 0 Mine.*

Elijah Heathcote, Overman.

This mine is worked by long-wall. My last inspection of this mine was made December 2nd, when I found it clear of gas and well ventilated, with 19,200 cubic feet of air passing per minute, for the use of 26 men and 1 mule. A Guibal fan, 3 by 10, is the motive power for ventilation.

*No. 1 Mine.*

This mine has not been worked since the disastrous outburst in November, which has been reported on.

*No. 3 Mine.*

David Wilson, Overman.

Pillar and stall work, and extraction of pillars, is being carried on in this mine. On my last inspection, December 2nd, I found it clear of gas and the ventilation good; 60,000 cubic feet of air were passing per minute for the use of 35 men and 2 mules. A Guibal fan, 8 by 16, with 1½-inch water gauge, is the motive power for ventilation.

*No. 4 Mine.*

Norman Fraser, Overman.

During the year considerable prospecting has being going on in this mine. On my last inspection I found a cap of gas in the main level; all the other places were clear and well ventilated, with 35,200 cubic feet of air per minute for the use of 13 men and 2 horses. A Guibal fan, 8 by 16 with 1½-inch water gauge, is the motive power for ventilation.

The following are the official returns of the Carbonado Colliery for the year ending 31st December, 1904:—

COAL AND COKE PRODUCED, EXPORTED, ETC.

| SALES AND OUTPUT FOR YEAR. | COAL. | | | | COKE. | | | |
|---|---|---|---|---|---|---|---|---|
| (Tons of 2,240 lbs.) | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. | Tons. | cwt. |
| Sold for consumption in Canada | 6,195 | .... | ..... | .... | 626 | | | |
| " export to United States | 61,926 | .... | ..... | .... | 4,088 | | | |
| " " other Countries | ..... | .... | ..... | .... | ..... | | | |
| Total sales | ..... | .... | 68,121 | .... | ..... | .... | 4,714 | |
| Used in making Coke | 7,342 | .... | ..... | | | | | |
| " under Colliery boilers, etc. | 6,065 | .... | ..... | | | | | |
| Total for Colliery use | ..... | .... | 13,407 | | | | | |
| Stock on hand first of year | ..... | .... | | | | | | |
| " last of year | ..... | .... | | | | | | |
| Difference taken from stock during year | ..... | .... | ..... | .... | 93 | | | |
| Output of Colliery for year | ..... | .... | 81,528 | .... | ..... | .... | 4,621 | |

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

| CHARACTER OF LABOUR. | UNDERGROUND. | | ABOVE GROUND. | | TOTALS. | |
|---|---|---|---|---|---|---|
| | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. | No. Employed. | Average Daily Wage. |
| Supervision and clerical assistance | 6.83 | ..... | 3.50 | ..... | 10.33 | |
| Whites—Miners | 109.61 | ..... | ..... | ..... | 109.61 | |
| Miners' helpers, Labourers, Mechanics and skilled labour, Boys | 50.56 | ..... | 44.68 | ..... | 95.24 | |
| Totals | 167.00 | ..... | 48.18 | ..... | 215.18 | |

## COKE.

A considerable amount of coal is used in the manufacture of coke of an excellent quality, which is in constant demand. At Michel there are 464 bee-hive ovens, at Fernie 412, and 240 at Carbonado.

## PROSECUTIONS UNDER THE "COAL MINES REGULATION ACT."

July 20th—Alfred Severns, for having a match in No. 0 mine, Carbonado, was fined.

Oct. 20th—Joseph Roche, Frank Zeeman, H. Richardson, Joe Smith and And. Schaffar, were fined for tamping the holes with coal dust in Michel mine, contrary to Rule 9, Section 82, of the "Coal Mines Regulation Act."

## ACCIDENTS.

I deeply regret to report that 19 fatal accidents and 14 serious and slight accidents have occurred in the coal mines of the East Kootenay District during my period as Inspector.

Of the fatal accidents, 14 were occasioned by an outburst of gas, which is described below. One death was caused by a fall of coal and rock, due to the breaking of a stringer. One fatality was caused by mine cars, being a pure accident. Another death resulted from the deceased slipping on a rail and striking his head on the same, an accident for which no one could be blamed. A piece of flying timber, caused by a shot, claimed another victim, whilst the remaining fatality happened on the pit-head by the deceased being caught with a belt.

Of the 11 serious accidents that occurred, 7 were caused by mine cars, 2 of which were due to the men's carelessness, the remaining 5 being pure accidents. One serious accident happened from a fall of coal and 2 from falls of rock, to men in their working places. The other accident of a serious nature occurred on the pit-head, where the slate-picker fell down the chute.

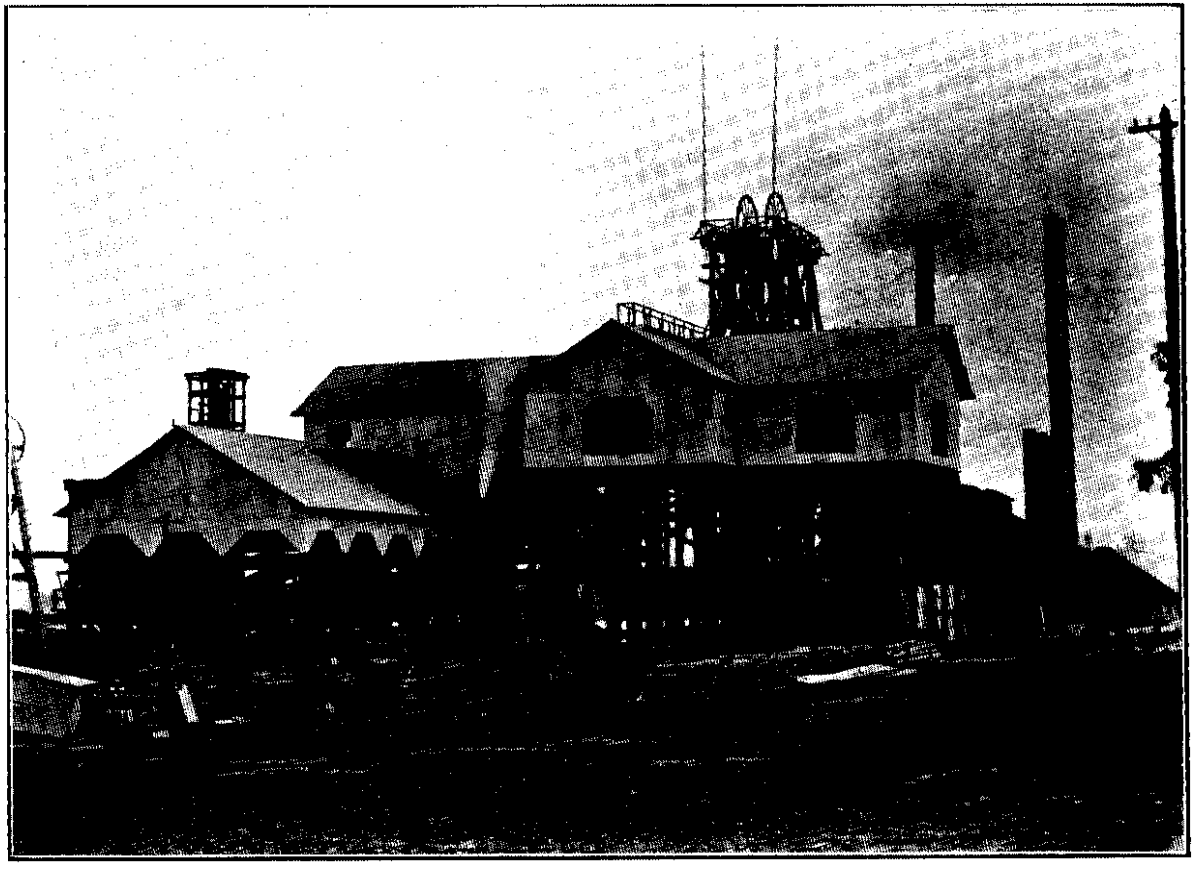
Three slight accidents were also reported, one being caused by a fall of coal, one by a rope, and one by a small explosion of gas.

I have made strict examination and inquiry into all such accidents, and inquests have been held whenever necessary, verdicts of such inquests being on file in the Attorney-General's Office.

You will find appended a detailed account of all such accidents.

## ACCIDENTS IN BRITISH COLUMBIA COLLIERIES DURING 1904.

| CAUSES OF ACCIDENT AND NATURE OF INJURY. | NAME OF COLLIERY. | | | | | | | | | | | | TOTAL FOR 1904. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nanaimo. | | | Union. | | | Extension. | | | Crow's Nest. | | | | | | |
| | Fatal. | Serious. | Slight. | Fatal. | Serious. | Slight. | Fatal. | Serious. | Slight. | Fatal. | Serious. | Slight. | Fatal. | Serious. | Slight. | Total. |
| Gas—Explosion or suffocation by | | | | | | | | | | | | | | | | 29 |
| Fatal | | | | | | | | | | 21 | | | 21 | | | |
| Slight | | | | | | 5 | | | 2 | | | 1 | | | 8 | |
| Falls of Coal | | | | | | | | | | | | | | | | 18 |
| Fatal | 1 | | | | | | 2 | | | 2 | | | 5 | | | |
| Serious | | 3 | | | 4 | | | 4 | | | 1 | | | 12 | | |
| Slight | | | | | | | | | | | | 1 | | | 1 | |
| Falls of Rock | | | | | | | | | | | | | | | | 12 |
| Fatal | | | | 3 | | | 1 | | | | | | 4 | | | |
| Serious | | 1 | | | 4 | | | | | | 2 | | | 7 | | |
| Slight | | | | | | 1 | | | | | | | | | 1 | |
| Mine Cars | | | | | | | | | | | | | | | | 23 |
| Fatal | | | | 1 | | | | | | 2 | | | 3 | | | |
| Serious | | 2 | | | 3 | | | 3 | | | 7 | | | 15 | | |
| Slight | | | 2 | | | 1 | | | 1 | | | 1 | | | 5 | |
| Shot | | | | | | | | | | | | | | | | 2 |
| Fatal | | | | | | | | | | 1 | | | 1 | | | |
| Slight | | | | | | 1 | | | | | | | | | 1 | |
| Locomotive | | | | | | | | | | | | | | | | 1 |
| Serious | | 1 | | | | | | | | | | | | 1 | | |
| Post or Timber | | | | | | | | | | | | | | | | 2 |
| Serious | | | | | | | | 2 | | | | | | 2 | | |
| Ropes, Hoisting or Haulage | | | | | | | | | | | | | | | | 2 |
| Serious | | | | | 1 | | | 1 | | | | | | 2 | | |
| Slight | | | | | | | | | | | | | | | | |
| Miscellaneous | | | | | | | | | | | | | | | | 5 |
| Fatal | | | | 1 | | | | | | 2 | | | 3 | | | |
| Serious | | 1 | | | | | | | | | 1 | | | 2 | | |
| Total | 1 | 8 | 2 | 5 | 12 | 8 | 3 | 10 | 3 | 28 | 11 | 3 | 37 | 41 | 16 | 94 |



WESTERN FUEL CO.'S NEW PIT-HEAD, NANAIMO, B. C.

## SUMMARY—TABLE SHEWING ACCIDENTS OCCURRING IN B. C. COLLIERIES IN TEN YEARS—1895 TO 1904.

| For the year ..... | 1895. | | | | 1896. | | | | 1897. | | | | 1898. | | | | 1899. | | | | 1900. | | | | 1901. | | | | 1902. | | | | 1903. | | | | 1904. | | | | Total for 10 years. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output of coal—tons. | 939,654 | | | | 896,222 | | | | 882,854 | | | | 1,135,865 | | | | 1,306,324 | | | | 1,590,179 | | | | 1,691,557 | | | | 1,641,626 | | | | 1,481,913 | | | | 1,685,698 | | | | 13,251,892 | | | |
| No. persons employ'd | 2,924 | | | | 2,753 | | | | 2,433 | | | | 2,988 | | | | 3,780 | | | | 4,178 | | | | 3,974 | | | | 4,011 | | | | 4,264 | | | | 4,453 | | | | 35,758 | | | |
| Nature of Injury. / Cause of Accident. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. | Fatal. | Serious. | Slight. | Total. |
| Explosion (cause unknown). | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 64 | .. | .. | 64 | 125 | .. | .. | 125 | .. | .. | .. | .. | 14 | .. | .. | 14 | 203 | .. | .. | 203 |
| Gas explosions ..... | .. | 5 | 7 | 12 | 1 | 3 | 8 | 12 | .. | 2 | 2 | 4 | 2 | 14 | 3 | 19 | 3 | 9 | 18 | 30 | .. | 2 | 22 | 24 | 2 | 2 | 12 | 16 | 1 | .. | 8 | 9 | 21 | .. | 16 | 37 | 7 | .. | 8 | 15 | 37 | 37 | 104 | 178 |
| Falls of coal..... | 1 | 4 | .. | 5 | 3 | 4 | 1 | 8 | 1 | 3 | 2 | 6 | 3 | 4 | .. | 7 | 1 | 4 | 3 | 8 | 2 | 14 | 3 | 19 | 6 | 9 | 2 | 17 | 1 | 4 | 1 | 6 | 4 | 5 | 2 | 11 | 5 | 12 | 1 | 18 | 27 | 67 | 15 | 105 |
| " rock ..... | 5 | 13 | .. | 18 | 2 | 8 | .. | 10 | 2 | 7 | 2 | 11 | 1 | 5 | 3 | 9 | 3 | 5 | 4 | 12 | 6 | 15 | 3 | 24 | 6 | 8 | 4 | 18 | 7 | 6 | 2 | 15 | 8 | 8 | 4 | 20 | 4 | 7 | 1 | 12 | 44 | 82 | 23 | 149 |
| Mine cars..... | 2 | 9 | .. | 11 | 1 | 8 | .. | 9 | 3 | 4 | .. | 7 | 1 | 9 | 3 | 13 | 3 | 9 | 4 | 16 | 4 | 7 | 3 | 14 | 3 | 5 | 5 | 13 | 3 | 6 | 5 | 14 | 5 | 7 | 2 | 14 | 3 | 15 | 5 | 23 | 28 | 79 | 27 | 134 |
| " mules ..... | .. | .. | .. | .. | .. | 2 | .. | 2 | .. | 1 | .. | 1 | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 5 | .. | 5 |
| " timber ..... | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | 2 | .. | 2 | .. | 2 | 2 | .. | .. | 2 | 1 | 2 | .. | 3 | .. | 2 | .. | 2 | 3 | 9 | 1 | 11 |
| Hoisting, ropes, &c . | .. | 3 | .. | 3 | .. | 1 | .. | 1 | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | 2 | .. | 2 | .. | 2 | .. | 2 | .. | 4 | 1 | 5 | .. | 2 | .. | 2 | 1 | 16 | 1 | 18 |
| Powder, &c., explo'n | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | 3 | 1 | 4 | .. | 2 | 1 | 3 | 1 | 3 | 3 | 7 | .. | 4 | 6 | 10 | .. | .. | 1 | 1 | 1 | 5 | .. | 6 | .. | .. | .. | .. | 2 | 18 | 12 | 32 |
| Shot ..... | 2 | 3 | .. | 5 | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 3 | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | .. | 2 | 1 | .. | 1 | 2 | 3 | 7 | 4 | 14 |
| On surface — miscellaneous. | .. | 2 | .. | 2 | 2 | .. | .. | 2 | .. | .. | .. | .. | .. | 2 | .. | 2 | 1 | .. | .. | 1 | 3 | 1 | .. | 4 | 2 | 2 | 2 | 6 | .. | 3 | 1 | 4 | 2 | .. | 1 | 3 | 3 | 3 | 0 | 6 | 13 | 13 | 4 | 30 |
| Fire in Mine ..... | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 19 | .. | .. | 19 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 19 | .. | .. | 19 |
| | 10 | 39 | 7 | 56 | 9 | 29 | 9 | 47 | 6 | 21 | 6 | 33 | 7 | 39 | 10 | 56 | 11 | 29 | 30 | 70 | 17 | 43 | 38 | 98 | 102 | 34 | 31 | 167 | 139 | 21 | 18 | 178 | 42 | 33 | 26 | 101 | 37 | 41 | 16 | 94 | 380 | 329 | 191 | 900 |

## DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1904.

### V. I. COLLIERIES, REPORTED BY ARCHIBALD DICK, INSPECTOR, AND F. H. SHEPHERD, ACTING INSPECTOR.

| No. | Colliery. | Date. | Name. | Occupation. | Details. |
|---|---|---|---|---|---|
| 1 | Extension..... | Jan. 13 | James Hill.... | Miner ..... | Scalp wounds, dislocation of collar-bone, dislocation and fracture of knee. Caused by two sets of timbers being swung out by weight of rock above. |
| 2 | Union ..... | " 13 | C Matthews... | Fireboss ..... | Slightly burned by ignition of small quantity of gas while cleaning a cave which blocked air-course at the botton of No. 3 Slope. |
| 3 | " ..... | " 13 | Lee (Chinaman) | Bratticeman... | Slightly burned. Same cause as No. 2. |
| 4 | Extension..... | Feb. 3 | Jos. Acquilanti | Miner..... | Killed by fall of top coal. |
| 5 | Nanaimo..... | " 12 | Sam Cottle.... | Mule driver... | Injured about body by being caught between car and prop while driving a mule. |
| 6 | Union ..... | " 18 | Geo. Wilson... | Miner ..... | Slightly burned by flame from a shot and using a short squib. |
| 7 | Extension..... | March 3 | Wm. Hogan... | " ..... | Two ribs broken by piece of coal falling from face. |
| 8 | Union ..... | " 7 | Ah Chung..... | Runner..... | Leg broken by rope breaking while running box down in stall. |
| 9 | " ..... | " 8 | Wong Chong.. | Rope-rider.... | Killed by striking his head on roof while riding on top of full trip. Fractured neck. |
| 10 | " ..... | " 12 | Peter Inkster.. | Miner ..... | Leg broken by fall of coal while mining in No. 4 Slope. |
| 11 | " ..... | " 14 | Wm. Marshall | Labourer ..... | Nose broken by brake handle while lowering a trip of cars in No. 4 Mine. |
| 12 | Extension..... | " 16 | John Johnson . | Conductor..... | Leg broken by being caught by switch rope in No. 2 Mine. |
| 13 | " ..... | April 4 | John Barlow .. | Runner..... | Killed by fall of roof in his working place in No. 2 Level, No. 3 Mine. |
| 14 | Union ..... | " 9 | Mah Hay..... | Track-layer's | Killed by fall of rock in No. 4 Mine. |
| 15 | " ..... | " 9 | Mah Jung..... | Miner[helper | |
| 16 | Nanaimo ..... | " 11 | Dan Morgan... | Runner..... | Fractured pelvis. Jammed between car and roof while riding on a car of coal drawn by a mule in longwall workings, Protection. |
| 17 | Union ..... | " 11 | Sing..... | Labourer ..... | Hip dislocated by falling off buffer of car while applying brake. |
| 18 | " ..... | " 26 | Chung..... | Miner ..... | Leg fractured while wedging down a piece of coal cap-rock in No. 5 Shaft. |
| 19 | Extension..... | May 3 | James Vear... | " ..... | Burned about face and hands with gas. Caused by going into his place after being told by fireman to await his arrival. |
| 20 | " ..... | " 5 | Robert Jones.. | " ..... | Arm broken while taking down top coal in No. 3 Mine. |

DETAILED STATEMENT OF ACCIDENTS IN V. I. COLLIERIES DURING 1904.—*Continued.*

| No. | Colliery. | Date. | Name. | Occupation. | Details. |
|---|---|---|---|---|---|
| 21 | Union ..... | May 7 | Thomas Brown | Miner ..... | Crushed about body by fall of top coal in No. 3 Slope, No. 4 Mine. |
| 22 | " ..... | " 10 | Tong Hing.... | " ..... | Killed by fall of roof near bottom of No. 7 Shaft. |
| 23 | Extension..... | " 23 | Richd. Morgan | Driver boss.... | Broken arm and ruptured kidney. Caused by being crushed between a box and prop while breaking in a horse. |
| 24 | Union ..... | June 3 | Geo. Davis.... | Miner ..... | Leg badly injured while lowering a box in in his stall. Leg got caught between rope and post. No. 4 Mine. |
| 25 | " ..... | " 3 | Yeddo (Jap.).. | Labourer ..... | Broken leg caused by fall of top coal in. No. 4 Mine. |
| 26 | Extension..... | " 9 | Sam Choti .... | Loader ..... | Collar-bone broken by pulling down some top coal. |
| 27 | Union ..... | " 13 | Da Tsic..... | Miner ..... | Hip dislocated by fall of roof in his working place, No. 5 Shaft. |
| 28 | Nanaimo..... | " 16 | F. Green, Jr.. | " ..... | Broken thigh. Caused by fall of top coal, No. 1 Shaft. |
| 29 | " ..... | " 28 | Arthur Spencer | " ..... | Severely injured about head and shoulders by fall of rock in his working place, Newcastle Shaft. |
| 30 | Extension..... | July 11 | John Livic.... | Runner..... | Squeezed about body. Caused by getting in front of loaded car, after being warned. |
| 31 | Union ..... | " 23 | Sacko (Jap.)... | Miner ..... | Leg broken by fall of roof in his working place, No. 4 Mine. |
| 32 | Nanaimo..... | Aug. 1 | Chas Drake ... | " ... .... | Fractured knee. Caused by fall of top coal while working in pillars, No. 1 Shaft. |
| 33 | Union ..... | " 9 | Jun Juk ..... | Miner ..... | Both slightly burned on hands and neck by ignition of small quantity of gas which had accumulated owing to derangement of ventilation by the firing of a shot. |
| 34 | " ..... | " 9 | Jun Chue..... | " ..... | |
| 35 | Extension..... | " 10 | Wm. Smith... | " ..... | Broken leg. Caused while taking down top coal in No. 3 Mine. |
| 36 | " ..... | " 12 | Victor Celle... | Motor-driver.. | Fractured skull, entailing loss of brain matter. Supposed to have got head jammed between cars and motor while coupling his motor to a trip. Now convalescent and mentally sound. |
| 37 | " ..... | " 18 | James Haddow | Miner ..... | Killed by fall of top coal in No. 3 Mine. |
| 38 | " ..... | Sept. 13 | John Wargo... | " ... .... | Leg broken and back injured by fall of top coal while timbering No. 3 Mine. |
| 39 | Union ..... | " 21 | Carl Liapiatt.. | " ..... | Crushed about back by fall of coal while mining in No. 4 Mine. |
| 40 | " ..... | " 23 | F. Macintosh.. | Pumpman .... | Slightly burned on face by ignition of small quantity of gas in diagonal slope, No. 4 Mine. |
| 41 | " ..... | " 24 | Sam (Chinam'n) | Labourer ..... | Hand and head slightly injured by falling in front of a trip of cars being lowered down incline, No. 6 Shaft. |

DETAILED STATEMENT OF ACCIDENTS IN V. I. COLLIERIES DURING 1904.—*Concluded.*

| No. | Colliery. | Date. | Name. | Occupation. | Details. |
|---|---|---|---|---|---|
| 42 | Extension..... | Sept. 27 | John Lundy... | Driver..... | Slightly burned about hands and face. He crawled into a hole in the gob to head off a mule, and lit a little gas with above result. No. 3 Mine. |
| 43 | Nanaimo..... | Oct. 12 | Frank Green .. | Miner ..... | Small bone of leg broken above ankle and head cut by fall of top coal while cutting out rock between top and bottom coal, No. 1 Shaft. |
| 44 | Union ..... | " 23 | David Potter.. | " ..... | Back bruised by fall of middle rock while working in his place. |
| 45 | Extension..... | Nov. 10 | N. Badovinace | Runner..... | Fractured leg. He was going down a shaft gradient in front of loaded car, contrary to orders. No. 3 Mine. |
| 46 | Nanaimo..... | " 14 | J. W. McKenzie | Miner ..... | Fatally injured by fall of top coal in No. 1 Shaft. Died in transit to bottom of shaft. |
| 47 | " ..... | " 24 | Fing Shu..... | Surface labour-[er | Left leg broken while unloading mine timber in yard at No. 1 Mine. |
| 48 | " ..... | ..... | David Moffatt. | Miner ..... | Bruised about shoulders while trying to jump on to trip of cars while in motion. No. 1 Shaft. |
| 49 | " ..... | Dec. 12 | Yin Moy ..... | Surface labour-[er | Compound fracture of leg. Caused by falling off locomotive in yard. |
| 50 | " ..... | " 14 | Geo. Hall..... | ..... | Bruised foot by getting it entangled in loop of rope while lowering car down slope, Protection Mine. |
| 51 | Union ..... | ..... | Jas. Strang.... | Overman..... | Fatally injured. Leg severed by coal car in motion. |
| 52 | " ..... | " 20 | Lee (Chinaman) | ..... | Arm broken by fall of piece of middle rock, No. 6 Shaft. |

NOTE.—On the afternoon shift of the 14th November, 1904, Joseph Carpentaro, a miner, aged 52 years, was found dead in his working place. I examined the place and failed to discover any evidence of mechanical injury, or that his death was due to any condition of his working place, or the mine generally. The Coroner, Dr. L. T. Davis, after examining the body, decided that death was due to heart disease, and that an inquest was not necessary.

This death has not been included in the above list of accidents, because, death ensuing from natural causes, this is not an accident, and, therefore, is not chargeable to the industry.

## DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1904.

Reported by Archibald Dick and Thomas Morgan, Inspectors of Crow's Nest Collieries.

| No. | Colliery. | Date. | Name. | Occupation. | Details. |
|---|---|---|---|---|---|
| 1 | Michel ..... | Jan. 8th | D. Roberts.... | Miners .... | These seven men were killed by an explosion of gas in the Michel Colliery, on the 8th January, 1904. |
| 2 | " ..... | " 8th | W. McAllister. | | |
| 3 | " ..... | " 8th | Jack Sale..... | | |
| 4 | " ..... | " 8th | Wm. King.... | | |
| 5 | " ..... | " 8th | B. Dean ... | | |
| 6 | " ..... | " 8th | Tom Evans ... | | |
| 7 | " ..... | " 8th | D. Thomas.... | | |
| 8 | Carbonado .... | Feb. 27th | Jos. Patterson. | " ..... | Struck and killed by a runaway car on the incline in No. 3 Mine, Carbonado, on 27th February, 1904. |
| 9 | Coal Creek.... | Mar. 22nd | H. McDonald . | Motorman's.... helper | Foot crushed. In bumping cars together the first car climbed the motor with above result. No. 1 Mine. |
| 10 | Michel ..... | " 23rd | Wm. Anthony. | Timberman ... | Killed by fall of coal and rock. No. 8 Mine. |
| 11 | Carbonado .... | April 7th | — Patala ..... | Driver ..... | Hip dislocated by wheel of car, while stepping off front end of car. No. 0 Mine |
| 12 | Michel ..... | " 9th | Geo. Blake.... | Engineer ..... | Fatally injured. Caught by belt at pithead, and thrown over pulley. |
| 13 | Coal Creek.... | " 12th | John Thomson. | Driver ..... | Lost three fingers of right hand by getting jammed between car and timber. No. 5 Mine. |
| 14 | " .... | " 14th | Job Lewellyn . | " ..... | Two ribs broken and lung injured by being crushed by car. |
| 15 | " .... | May 4th | Isaac Simpkin. | Miner ..... | Left ankle sprained by fall of top coal. No. 2 Mine. |
| 16 | " .... | " 12th | Wm. E. Paton. | Driver ..... | Killed. Turned horse loose, and got feet entangled in reins, falling in front of car which ran over him. No. 2 Mine. |
| 17 | " .... | June 13th | Geo. Campbell. | Miner ..... | Leg broken. Riding on empty car and got caught between car and timber. No. 3 Mine. |
| 18 | Michel ..... | July 14th | John Micone .. | Timberman ... | Fatally injured. Skull fractured by falling on rail. No. 8 Mine. |
| 19 | Coal Creek.... | " 18th | Ed. Gallagher.. | Miner ..... | Leg broken by fall of coal. No. 2 Mine. |
| 20 | " .... | " 20th | John Langdon. | Boy ..... | Leg broken between two cars while jumping on motor trip. No. 5 Mine. |
| 21 | " .... | " 23rd | Ralph Smith.. | Miner ..... | Several ribs broken by fall of coal in No. 2 Mine. |
| 22 | Michel ..... | " 27th | Robert Lee.... | Shot-lighter .. | Fatally injured by blow from flying post, blown out by shot. No. 8 Mine. |
| 23 | Coal Creek.... | Aug. 3rd | Wm. Sutton .. | Rope-rider.... | Right foot broken. Crushed while lifting car on to track. No. 2 Mine. |
| 24 | " .... | " 10th | D. Warlow ... | Miner ..... | Three fingers badly lacerated. Lowering car, when hand was drawn into wheel. No. 5 Mine. |

DETAILED STATEMENT OF ACCIDENTS IN CROW'S NEST COLLIERIES DURING 1904.—*Concluded.*

| No. | Colliery. | Date. | Name. | Occupation. | Details. |
|---|---|---|---|---|---|
| 25 | Michel ..... | Sept. 22nd | Louis Vince... | Miner ..... | Slightly burned by ignition of small quantity of gas. No. 8 Mine. |
| 26 | Carbonado .... | " 24th | Robt. Hewitt . | Slate-picker... | Arm taken off. Fell down chute, getting caught between chute and picking table. |
| 27 | Coal Creek.... | Oct. 1st | Alex. Page.... | Miner ..... | Right leg broken by fall of rock. No. 2 Mine. |
| 28 | Carbonado .... | Nov. 18th | Wm. Jenkins.. | Bratticeman . | These fourteen men were killed by a terrific outburst of gas, which filled the level with coal for 400 feet. Foreman reported everything clear and quiet at face 20 minutes before the outburst. The level had not been working for two weeks, and outburst must have come from the counter level above, or from the incline, which is also full of coal. |
| 29 | " .... | " 18th | Louis Craker.. | Miner ..... | |
| 30 | " .... | " 18th | Mike Gustick.. | Mule-driver . | |
| 31 | " .... | " 18th | Pat Boyle..... | " .. | |
| 32 | " .... | " 18th | Wm. Platt.... | " .. | |
| 33 | " .... | " 18th | A. Pechmick .. | Miner ..... | |
| 34 | " .... | " 18th | V. Wenzl..... | Miner's help. | |
| 35 | " .... | " 18th | M. Kuzlatski.. | " | |
| 36 | " .... | " 18th | Peter Tenney.. | Miner ..... | |
| 37 | " .... | " 18th | A. Brindach... | " ..... | |
| 38 | " .... | " 18th | A. Johnson ... | Miner's help. | |
| 39 | " .... | " 18th | Jos. Luchie ... | " | |
| 40 | " .... | " 18th | Jas. Greenman. | Miner ..... | |
| 41 | " .... | " 18th | John Brindach. | Miner's help. | |
| 42 | Coal Creek.... | Dec. 22nd | Steph'n Hunter | Miner ..... | Killed by fall of coal and rock. |

# LIST OF CROWN-GRANTED MINERAL CLAIMS.

## CROWN GRANTS ISSUED IN 1904.

### CASSIAR.

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| Yellow Jacket .... | Atlin..... | North Columbia G. M. Co ..... | 191 | 51.65 | July 9 |

### EAST KOOTENAY.

| | | | | | |
|---|---|---|---|---|---|
| B. C..... | Windermere. | H. E. Forster and Celina M. Kimpton ..... | 1732 | 51.65 | Sept. 27 |
| Black Watch ..... | Fort Steele.. | Henry B. Thomson ..... | 3329 | 30.72 | Mar. 29 |
| Blackwater ..... | " .. | " ..... | 3330 | 34.10 | " 29 |
| Bodie ..... | " .. | Robt. W. Riddell *et al*..... | 3458 | 51.65 | May 14 |
| Celt ..... | " .. | David Griffith ..... | 6205 | 46.30 | Mar. 25 |
| Charlotte ..... | Golden ..... | Wm. G. Carlin ..... | 405 | 51.65 | Oct. 31 |
| Erin ..... | Fort Steele.. | Henry B. Thomson ..... | 3332 | 37.20 | Mar. 29 |
| Gold Bug Fr. No. 2 | " .. | Eugene B. Braden ..... | 6191 | 2.76 | Feb. 15 |
| Hot Punch..... | Windermere. | Willis B. Abel *et al*..... | 5100 | 51.65 | Sept. 30 |
| Isaac ..... | " . | Harold E. Forster ..... | 5344 | 31.43 | " 27 |
| Lentz Lode ..... | Fort Steele.. | David Griffith ..... | 6203 | 39.25 | Mar. 7 |
| Malachite..... | " .. | Henry B. Thomson ..... | 3331 | 22.10 | " 29 |
| Minnie ..... | Golden ..... | Wm. G. Carlin ..... | 419 | 51.65 | Oct. 31 |
| Ruth ..... | " .. | " ..... | 418 | 49.75 | " 31 |
| Sweepstake ..... | Fort Steele.. | Luke Creek Gold Copper Mg. Co., Ld. (N.P.L.) | 6577 | 51.65 | Dec. 16 |
| Tilbury..... | Windermere. | Harold E. Forster and Celina M. Kimpton.. | 1733 | 40.81 | Sept. 27 |
| Tit for Tat..... | Fort Steele.. | David Griffith ..... | 6202 | 44.80 | Mar. 25 |

### WEST KOOTENAY.

| | | | | | |
|---|---|---|---|---|---|
| Agnes ..... | Trout Lake . | Henry H. Johnstone *et al*..... | 5696 | 51.65 | Nov. 11 |
| Aice..... | Lardeau .... | Wm. Howard Jackson..... | 4237 | 46.03 | Jan. 14 |
| Alhambra..... | Slocan ..... | Frank L. Christie *et al*..... | 1607 | 35.12 | Sept. 30 |
| Alice ..... | Nelson ..... | Geo. W. Chisholm ..... | 5627 | 50.98 | Mar. 9 |
| Alma ..... | Ainsworth .. | King Solomon Mg. Co..... | 6284 | 49.86 | Nov. 7 |
| Alma No. 2 ..... | Lardeau .... | Wm. Howard Jackson ..... | 3501 | 20.69 | Jan. 14 |
| Alva ..... | Ainsworth .. | King Solomon Mg. Co..... | 6283 | 51.65 | Nov. 7 |
| Antonio ..... | Nelson ..... | Gordon M. & M. Co., Ltd..... | 3276 | 49.14 | June 29 |
| Archer ..... | " ..... | Arthur V. Powys ..... | 3202 | 32.60 | Mar. 28 |
| Archie Fractional.. | Slocan ..... | Wm. J. McMillan and Robt. J. McMillan.. | 3631A | 48.34 | June 20 |
| Astral ..... | Nelson ..... | Venus G. M. Co., Ltd..... | 4296 | 35.07 | " 21 |
| August Fract..... | Ainsworth .. | King Solomon Mg. Co..... | 6287 | .09 | Nov. 7 |
| Bayonne..... | Nelson ..... | Frank C. Risdon and George Harrison ..... | 5083 | 45.53 | " 19 |
| Belle Smith ..... | Slocan ..... | Alice Trenery *et al*..... | 3824 | 34.59 | July 22 |
| Big Duluth ..... | Nelson ..... | Geo. W. Chisholm ..... | 5626 | 49.42 | Mar. 9 |
| Black Beauty ..... | Slocan City.. | Eric Lemieux *et al*..... | 2823 | 47.21 | Dec. 8 |
| Black Eagle ..... | Trout Lake.. | John Grant ..... | 4735 | 45.35 | April 28 |
| Black Eagle ..... | Ainsworth .. | King Solomon Mg. Co..... | 6266 | 41.66 | June 22 |
| Black Eagle Fr.... | " .. | " " ..... | 6270 | 28.70 | " 22 |
| Blue Bell ..... | Trout Lake.. | John Stauber *et al*..... | 5707 | 39.70 | Sept. 8 |
| Blue Jay ..... | Lardeau .... | Imperial Dev. Synd., Ltd..... | 5184 | 21.43 | Feb. 22 |
| B. N. A..... | Ainsworth .. | The B. N. A. Mines Co., Ltd..... | 5994 | 51.62 | May 30 |
| B. N. I..... | " .. | King Solomon Mg. Co..... | 6264 | 51.65 | June 22 |
| Bobbie Burt ..... | " .. | F. A. Devereux..... | 6335 | 51.65 | Sept. 23 |
| Bonner .... ..... | Nelson ..... | David G. Porter and Jacob C. Porter ..... | 6296 | 37.38 | " 27 |

WEST KOOTENAY.—*Continued.*

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| Boston | Lardeau | Met. G. & S. M. Co., of Lardeau, B. C., Ltd. | 5326 | 44.07 | Nov. 2 |
| Boulder | Slocan City | Chas. Faas and W. H. Crawford | 2819 | 22.73 | May 16 |
| Buckeye | Ainsworth | Wm. C. Dalglish and C. M. Parker | 6327 | 36.50 | Dec. 20 |
| Buckeye No. 2 | " | " " | 6328 | 28.60 | " 20 |
| Cambridge | Nelson | Venus G. M. Co., Ltd | 4299 | 29.67 | June 21 |
| Canon Fract. | Lardeau | Imperial Dev. Synd., Ltd. | 5403 | 1.61 | Mar. 14 |
| Chamois | Ainsworth | Wm. J. H. Holmes | 4892 | 51.65 | Dec. 7 |
| Chicago | Lardeau | Metropolitan G. & S. M. Co., of Lardeau | 5327 | 37.71 | Nov. 2 |
| Chicago Fract. | " | " " " | 5332 | 6.56 | " 2 |
| Chihuahua | Nelson | G. W. McBride | 5199 | 47.47 | May 9 |
| Cholla | Lardeau | Imperial Dev. Synd., Ltd. | 5399 | 18.00 | Feb. 22 |
| City | Nelson | Wm. J. Goepel | 5291 | 38.34 | Nov. 22 |
| Clara | Lardeau | Imperial Dev. Synd., Ltd | 5185 | 41.75 | Feb. 22 |
| Clara Moor | Slocan | A. R. Fingland | 5762 | 33.75 | Sept. 9 |
| Columbus | Nelson | Frank C. Risdon and Geo. Harrison | 5961 | 39.45 | Nov. 19 |
| Comstock | Ainsworth | Geo. F. Cleveland *et al* | 1027 | 41.32 | Jan. 14 |
| Corean | " | Watt R. Winstead | 6288 | 31.74 | Nov. 1 |
| Corinthian | " | Luzetta Field *et al.*, for R. D. Munro | 2090 | 45.08 | Mar. 8 |
| Cosmopolitan | Nelson | Venus G. M. Co., Ltd | 4295 | 50.55 | June 21 |
| C. P. R. | Slocan | Catherine Sterrett | 4875 | 46.19 | July 22 |
| Creole | Slocan City | Ch. S. Baxter ($\frac{2}{3}$) and Wm. D. McIntosh ($\frac{1}{3}$) | 5733 | 35.95 | Nov. 16 |
| Cristein | Slocan | A. A. McDonald and Chauncey B. Taylor | 5369 | 44.70 | July 11 |
| Crossfell | " | Robt. Ewin | 5879 | 26.42 | Sept. 30 |
| Croydon Fract. | " | Silver Band Mg. Co., Ltd | 5886 | .91 | April 13 |
| Crusader | Slocan City | Chas. Faas and W. H. Crawford | 5985A | 51.65 | May 16 |
| Delaware | Nelson | Frank C. Risdon and Geo. Harrison | 5960 | 36.06 | Nov. 19 |
| Diamond Fract. | Slocan | Robt. McTaggart *et al* | 5832 | 15.20 | Oct. 31 |
| Dora | Lardeau | Imperial Dev. Synd., Ltd | 5182 | 41.96 | Feb. 20 |
| Dip | Trail Creek | Geo. N. Taylor | 1074 | 12.00 | June 23 |
| Elated | Ainsworth | Francis A. Devereux | 3366 | 42.40 | Sept. 23 |
| Elk | Nelson | Alex. McDonald | 2081 | 51.65 | " 23 |
| Elkhorn Queen | Ainsworth | Archibald York *et al* | 5969 | 41.54 | April 12 |
| Ella Fraction | Trail Creek | Ella C. McDonald *et al* | 4920 | 8.81 | Nov. 22 |
| Emerald No. 2 | Nelson | Reginald M. Macdonald | 1486 | 51.65 | Mar. 19 |
| Enterprise | Ainsworth | King Solomon Mining Co | 6001 | 51.65 | June 22 |
| Ethel K | Slocan City | Noah F. McNaught | 4026 | 51.65 | Feb. 3 |
| Eva Fraction | Trail Creek | Jens Olsen | 4205 | 10.70 | Mar. 7 |
| Eva Fraction | Ainsworth | King Solomon Mining Co | 6285 | 2.09 | Nov. 7 |
| Excelsior | Nelson | Frank Bowser | 2085 | 51.65 | Feb. 25 |
| Fairview | Lardeau | Metropolitan G. & S. M. Co., of Lardeau | 5330 | 51.65 | Nov. 2 |
| Fairview | Ainsworth | Alex. Smith and Jas. Armstrong | 5998 | 39.10 | July 12 |
| Faringdon | Slocan | Silver Band M. Co., Ltd | 5884 | 51.65 | April 13 |
| Fidelity | Ainsworth | Attilio C. Buzzetti | 6289 | 48.90 | Dec. 7 |
| Fidelity No. 2 | " | " | 6290 | 42.42 | " 7 |
| Florence | Slocan | Thos. W. Fitzgerald *et al* | 5764 | 46.33 | April 18 |
| Fourth of July | Nelson | Broken Hill M. & Dev. Co., Ltd | 2917 | 7.77 | Sept. 23 |
| Freddy | Slocan | John A. Turner and Hugh Nixon | 4025 | 34.40 | Jan. 25 |
| Garabaldi | Slocan City | Jos. Traficanti *et al* | 5748 | 30.23 | Nov. 15 |
| Garfield | Nelson | R. W. Caldwell and C. L. Caldwell | 4939 | 50.35 | Jan. 14 |
| Gipsy | " | Arthur V. Powys | 3200 | 30.32 | Mar. 28 |
| Glasier | Ainsworth | Dan. H. Nellis | 6263 | 51.65 | June 22 |
| Gold Hill | Nelson | John Holm *et al* | 4792 | 45.57 | May 7 |
| Goldseeker Fract. | Trout Lake | Alfred O. Kirby | 1104 | .23 | June 20 |
| G. West Fract. | Nelson | Aaron H. Kelly | 4779 | 17.84 | Jan. 7 |
| Hampton | Slocan City | N. F. McNaught | 4027 | 25.94 | Feb. 3 |
| Hattie B. | Nelson | G. W. Chisholm | 5628 | 50.82 | Mar. 9 |
| Hector | Ainsworth | Johanna E. Brookhausen and Don. C. Joslyn | 5074 | 18.27 | Sept. 22 |
| Hidden Treasure | Slocan City | Chas. Faas and Wm. H. Crawford | 2818 | 43.10 | May 16 |
| Homestake | Nelson | David G. Porter and Jacob C. Porter | 6297 | 51.34 | Sept. 27 |
| Horseshoe | Ainsworth | Peter McLaren and Wm. A. Allan | 3634 | 38.90 | " 22 |

WEST KOOTENAY.—*Continued.*

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| Horse Shoe | Ainsworth | Geo. W. Chisholm | 5066 | 49.80 | March 22 |
| Horse Shoe Fract | " | " | 5067 | 20.60 | " 22 |
| Humming Bird | " | B. N. A. Mines, Ltd | 5995 | 28.20 | May 30 |
| Hunter | Lardeau | Geo. K. Morton, Hy. N. Boss, admin. estate Jno. C. Wagner, deceased | 4495 | 36.94 | Jan. 25 |
| Illinoise | Nelson | Frank C. Risdon and George Harrison | 6888 | 49.39 | Nov. 19 |
| International Fract | Slocan | Lee W. Parkinson *et al* | 2834 | 38.43 | Feb. 3 |
| Iron Hand | Ainsworth | Anna K. Paulson | 5668 | 51.65 | April 12 |
| Iron Paint | " | King Solomon Mg. Co | 6267 | 45.80 | June 22 |
| Islington | Slocan | Silver Band Mg. Co | 5883 | 23.39 | April 13 |
| Joker | Lardeau | Imperial Dev. Syndicate, Ltd | 5404 | 23.62 | Feb. 22 |
| Kentucky | Nelson | Frank C. Risdon and George Harrison | 5966 | 35.81 | Nov. 19 |
| Kit Sup | Lardeau | Walter R. Myers | 3500 | 50.60 | Feb. 15 |
| Legal | Slocan City | Wm. Jas. Johnson | 5977 | 35.94 | July 6 |
| Libbie R. | " | Frank L. Christie *et al* | 1604 | 28.22 | Sept. 30 |
| Little Joe | Nelson | Jas. R. Hunnex | 6059 | 51.65 | May 7 |
| Little Phil | Trout Lake | Elbert M. Morgan | 4733 | 41.75 | Jan. 26 |
| Louise Fract | Slocan City | A. S. Johnson *et al* | 5980 | 43.03 | July 7 |
| Lucky Bill | Ainsworth | King Solomon Mg. Co | 6276 | 51.65 | June 22 |
| Lucky Bill Fract | " | " | 6275 | 47.28 | " 22 |
| Lucky Edd | " | Alex. Smith and Jas. Armstrong | 5999 | 36.00 | July 12 |
| L. V. Fract | Lardeau | Imperial Dev. Syndicate, Ltd | 5401 | 23.07 | Feb. 22 |
| Lynx Fract | Ainsworth | B. N. A. Mines, Ltd | 5996 | 7.60 | May 30 |
| Madison Extension | Slocan | Jas. A. O. Carmichael | 5192 | 48.86 | June 30 |
| Maggie | Ainsworth | John Kelly | 2718 | 51.65 | Dec. 7 |
| Maryland | Nelson | Frank C. Risdon and George Harrison | 5085 | 23.90 | Nov. 19 |
| Metropolitan Fract | Lardeau | Metropolitan G. & S. M. Co., of Lardeau | 5331 | 5.44 | " 2 |
| Monarch | Nelson | Michael C. Monaghan | 2082 | 27.39 | Sept. 26 |
| Monday | " | Gordon M. & M. Co., Ltd | 3277 | 36.65 | June 29 |
| Montreal | Lardeau | Metropolitan G. & S. M. Co., of Lardeau | 5328 | 31.00 | Nov. 2 |
| Mother Lode | " | Wm. Howard Jackson | 1497 | 14.35 | Jan. 14 |
| Native Silver | Ainsworth | King Solomon Mg. Co | 6265 | 51.64 | June 22 |
| Native Silver Fract | " | " | 6273 | 42.60 | " 22 |
| Neenah | Goat River | Mary C. Barnes | 1373 | 51.65 | " 1 |
| Nelson | Nelson | John Paterson | 5290 | 51.65 | Nov. 22 |
| Nelson Star | " | Arthur V. Powys | 3199 | 31.10 | Mar. 28 |
| New Jersey | " | Frank C. Risdon and George Harrison | 5967 | 29.90 | Nov. 19 |
| New Victor | " | Frank Bowser | 2083 | 39.24 | Feb. 25 |
| New York | Lardeau | Metropolitan G. & S. M. Co., of Lardeau | 5325 | 36.07 | Nov. 2 |
| Noah | Ainsworth | King Solomon Mg. Co | 6286 | 47.23 | " 7 |
| North America | " | Dan. H. Nellis | 6269 | 51.65 | June 22 |
| Oakland | Slocan | Ferdinand F. Liebscher | 4876 | 50.67 | Aug. 6 |
| Ohio | Nelson | Frank C. Risdon and George Harrison | 5962 | 33.27 | Nov. 19 |
| Olds | Ainsworth | King Solomon Mg. Co | 6277 | 25.00 | June 22 |
| Onoda | " | B. N. A. Mines, Ltd | 5997 | 35.30 | May 30 |
| Orient Fract | Slocan | Robt. McTaggart *et al* | 5831 | 27.20 | Oct. 31 |
| Oxford | Nelson | Frank C. Risdon and George Harrison | 5084 | 50.70 | Nov. 19 |
| Perle | Slocan City | Donald A. Ross | 2422A | 51.65 | Feb. 15 |
| Philadelphia No. 2 | Slocan | Wm. A. Coplen *et al* | 5072 | 51.65 | May 17 |
| Phoenix No. 3 | " | Frank L. Christie *et al* | 1603 | 41.77 | Sept. 30 |
| Ping-Pong Fract | Slocan City | Noah F. McNaught | 4028 | 37.41 | Feb. 3 |
| Polo | Slocan | Howard Williams | 2260 | 25.00 | " 3 |
| Porcupine | Ainsworth | King Solomon Mg. Co | 6282 | 40.45 | Nov. 7 |
| Rapid | Nelson | Edward C. Arthur | 5302 | 22.00 | Jan. 25 |
| Redress Frac. No. 2 | Slocan | Geo. F. Ransom *et al* | 3209 | 14.75 | Oct. 31 |
| Republic Fract | Nelson | Arthur V. Powys | 3208 | 25.20 | Mar. 28 |
| Republic | " | " | 3206 | 8.74 | " 28 |
| Rita | Slocan City | A. S. Johnson and Wm. S. Johnson | 5978 | 42.07 | July 7 |

WEST KOOTENAY.—*Concluded.*

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| R. & L. | Ainsworth | L. Field and C. G. Major, for R. D. Munro. | 2089 | 45.66 | March 8 |
| Rodney | Slocan | Silver Band M. Co | 5887 | 46.60 | April 13 |
| Rustler | Nelson | Gordon M. & M. Co., Ltd. | 3275 | 51.28 | June 29 |
| Rose | Slocan City. | A. S. Johnson *et al* | 5979 | 45.76 | July 7 |
| Royal | Nelson | Frank Bowser | 2084 | 32.26 | Feb. 25 |
| Royal Charter | " | Alfred Bunker and Montague S. Davys | 3205 | 51.20 | Sept. 26 |
| Royal Seal | " | " | 3204 | 51.65 | " 26 |
| Rome | Slocan City. | Jos. Traficanti | 5747 | 50.82 | Nov. 15 |
| San Francisco | Lardeau | Metropolitan G. & S. M. Co., of Lardeau | 5329 | 51.11 | Nov. 2 |
| Silver Band | Slocan | Silver Band Mg. Co | 5878 | 51.65 | April 13 |
| Silver Belt | Trout Lake. | Henry H. Johnstone *et al* | 5695 | 51.65 | Nov. 11 |
| Silver Glance | Ainsworth | Eric Erickson *et al* | 3829 | 44.72 | Feb. 15 |
| Silver Leaf No. 2 | Slocan City. | George Long *et al* | 5763 | 51.47 | Sept. 23 |
| Shamrock | Nelson | Gordon M. & M. Co | 3274 | 51.65 | June 29 |
| Smuggler | Slocan City. | Josiah J. Godfrey | 3823 | 38.10 | July 9 |
| Snow Flake | Ainsworth | Geo. W. Chisholm | 5065 | 35.80 | Mar. 22 |
| Stanley | Slocan | Irvin A. Austin | 2102 | 51.65 | Aug. 5 |
| Summit Queen | Ainsworth | Eric Erickson *et al* | 3830 | 47.40 | Feb. 15 |
| Sunrise | " | James A. Poyntz | 5991 | 47.60 | April 12 |
| Sunset | Trout Lake. | John Grant | 4736 | 51.21 | " 28 |
| Surprise No. 2 | Ainsworth | Francis A. Devereux | 6334 | 51.65 | Sept. 23 |
| Thelma Fractl | Lardeau | Imperial Dev. Syndicate, Ltd | 5186 | 4.62 | Feb. 20 |
| Thelma | " | " " | 5183 | 41.50 | " 20 |
| Toronto | Ainsworth | Alex. Smith and James Armstrong | 6000 | 25.83 | July 12 |
| Toronto Fract | Nelson | Percy E. Doolittle | 4301 | 25.73 | Sept. 26 |
| Trapper | Lardeau | G. K. Morton and Hy. N. Boss, adm. estate of J. C. Wagner, deceased | 4494 | 51.65 | Jan. 25 |
| Treadwell | " | Imperial Dev. Syndicate, Ltd | 5402 | 14.12 | Mar. 14 |
| Trixie V | Nelson | J. B. McLaren and Edmund D. Sewell | 3848 | 42.43 | Jan. 25 |
| Tuscon | Lardeau | Imperial Dev. Syndicate, Ltd | 5400 | 30.21 | Feb. 20 |
| Twickenham | Slocan | E. F. Smith and F. E. Clute | 5885 | 51.65 | April 13 |
| Twyford | " | Silver Band Mg. Co., Ltd | 5881 | 21.40 | " 13 |
| Utopia Fractl | Nelson | David G. Porter and Jacob C. Porter | 6298 | 11.95 | Sept. 27 |
| Virginia | " | Frank C. Risdon and George Harrison | 6887 | 36.31 | Nov. 19 |
| Warwick | " | Broken Hill M. & D. Co., Ltd. | 4676 | 43.41 | Sept. 23 |
| Weymouth | Slocan City. | Chas. E. Smitheringale and John L. Farwig. | 1842 | 48.00 | Aug. 5 |
| Winton | Slocan | Silver Band Mg. Co., Ltd. | 5882 | 48.65 | April 13 |
| White Beauty | Slocan City. | Eric Lemieux *et al* | 2822 | 51.65 | Dec. 8 |
| White Warrior | Ainsworth | Geo. W. Chisholm | 5064 | 51.57 | Mar. 22 |

YALE.

| | | | | | |
|---|---|---|---|---|---|
| Ada B. Fr | Similkameen | Chas. Willarson *et al* | 839 | .33 | Nov. 12 |
| Ada B | " | " " | 835 | 35.58 | Nov. 12 |
| Alameda | Greenwood | Everett E. Bartlett and Helen H. Bartlett. | 2876 | 37.47 | July 13 |
| Alberta | Similkameen | Duncan McCallum and Wm. Towe | 1253 | 51.65 | Dec. 7 |
| Alpha | Grand Forks | John Cranstoun | 3174 | 43.38 | Oct. 24 |
| Anglo-Saxon | Greenwood | Mary A. Desrosiers | 2573 | 25.60 | Oct. 31 |
| Annie L | Similkameen | Alex. W. Smith and Pat. H. Kennedy | 787 | 48.00 | June 20 |
| Arlington | " | Richard Seeman | 1656 | 42.80 | April 18 |
| Banner | Kamloops | Thos. Hunter | 972 | 50.75 | Mar. 29 |
| Bay Horse | Grand Forks | Isaac H. Hallett and Herbert R. Davidson | 1566 | 35.20 | Sept. 27 |
| Bengall | Greenwood | Henry T. Machin | 2375 | 51.49 | Aug. 5 |
| Black Diamond | " | Robt. Wood *et al* | 2275 | 37.50 | Mar. 25 |
| Blue Bell | Similkameen | Alex. D. Ross | 132 | 29.88 | June 20 |
| Bobbs | Osoyoos | Eclipse M. & M. Co | 2966 | 26.61 | Sept. 19 |
| Boulder Cap | Kamloops | Thos. Hunter | 974 | 36.04 | Mar. 29 |
| Bristol | Greenwood | Hy. T. Machin | 2376 | 40.41 | Aug. 5 |

YALE.—*Continued.*

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| Bruce | Greenwood | Jacob C. Haas and Sydney M. Johnson | 913 | 51.65 | Feb. 20 |
| Buller | Osoyoos | Eclipse M. & M. Co | 2965 | 36.08 | Sept. 19 |
| Burns Fract. | Greenwood | Francis J. Finucane | 1281 | 21.40 | Feb. 3 |
| Butcher Boy | " | Robt. D. Kerr and Philip B. S. Stanhope | 2353 | 51.63 | Oct. 24 |
| Butte | " | Chas. D. Temple | 2956 | 25.04 | Sept. 27 |
| Caledonia | " | A. Waddell, Eug. Sullivan, Mary McMynn | 2836 | 51.60 | Oct. 29 |
| Canadian Belle | Similkameen | Richd. Seeman | 1655 | 38.62 | April 18 |
| Canadian Boy Fr. | " | " | 1657 | 2.72 | " 18 |
| Centre Star Fract. | " | Chas. Willarson *et al* | 840 | 6.66 | Nov. 12 |
| City of Armstrong | Grand Forks | Vanc. & Bdy. Ck. Dev. & Mg. Co., Ltd. | 3001 | 37.40 | Mar. 8 |
| City of Vancouv'r Fr | " | André Gire and H. S. Cayley | 2013 | 23.25 | April 22 |
| Colorado | " | Robt. Clark | 3005 | 51.65 | Sept. 14 |
| Commander Fract. | Greenwood | Isaac H. Hallett | 1708 | 6.38 | Dec. 12 |
| Copperania | Similkameen | Smith Curtis *et al* | 134 | 30.20 | Aug. 8 |
| Crown | Osoyoos | Eclipse M. & M. Co | 2969 | 51.65 | Sept. 19 |
| D. C. | Similkameen | Sydney R. Almond *et al* | 1184 | 51.65 | Mar. 28 |
| Deer Bell | Greenwood | Mary A. Desrosiers | 2572 | 49.92 | Oct. 31 |
| Diamond | Grand Forks | J. F. Cunningham and John Mulligan | 1327 | 51.65 | Nov. 2 |
| Diamond Joe | Greenwood | Jane Russell *et al* | 1523 | 43.70 | July 13 |
| Doubtful | " | " " | 1524 | 39.25 | " 13 |
| Duncan | " | Robt. Wood *et al* | 2605 | 51.65 | Sept. 13 |
| Eclipse Fract. | Osoyoos | Eclipse M. & M. Co., Ltd | 2976 | 13.16 | " 19 |
| Ellen | " | " " | 2974 | 49.49 | " 19 |
| Ennismore | Grand Forks | Esdras N. Quinette | 2595 | 41.03 | Oct. 26 |
| Eugenie | " | Vanc. & Boundary Ck. Dev. & Mg. Co., Ltd. | 2612 | 44.30 | July 13 |
| Foghorn | Greenwood | Jacob C. Haas and Sydney M. Johnson | 1457 | 38.55 | Feb. 20 |
| French | Osoyoos | Eclipse M. & M. Co | 2975 | 45.77 | Sept. 19 |
| Gertrude | Grand Forks | Wm. B. Bower | 1621 | 39.04 | Oct. 28 |
| Globe | Greenwood | Jas. Anderson | 2402 | 37.30 | Aug. 5 |
| Golden Gate | Osoyoos | Dominion, Fairview & Golden K. Synd., Ltd | 2064 | 30.82 | Mar. 4 |
| Great Republic | Similkameen | John P. McLeod and Chas. H. Bouter | 2050 | 42.47 | Sept. 8 |
| Hard to Beat | Greenwood | Mary T. McMynn and Wm. G. McMynn | 2846 | 29.95 | " 11 |
| Helena | " | Chas. D. Temple | 2955 | 20.20 | " 27 |
| Highland Mary | " | Sydney M. Johnson | 1462 | 51.65 | " 9 |
| Homestake No. 2 | Similkameen | Sydney M. Johnson & Herbert R. Davidson | 237 | 44.74 | Aug. 8 |
| Huckleberry | " | Alex. D. Ross | 129 | 51.65 | June 21 |
| Idaho | Greenwood | Wm. G. McMynn and Alex. Waddell | 2642 | 49.58 | Nov. 18 |
| Ingersoll Belle | Similkameen | Hannibal L. Jones *et al* | 234 | 37.85 | Aug. 8 |
| International | Grand Forks | Fred. Kettner | 2873 | 51.65 | Aug. 5 |
| Iowa | Osoyoos | Eclipse M. & M. Co | 2973 | 32.89 | Sept. 19 |
| I. X. L. | " | " " | 2972 | 39.57 | " 19 |
| Jack Pot Fract. | Grand Forks | Wm. T. Hunter | 3158 | 24.20 | Jan. 25 |
| Jewel | Greenwood | Wellington Elson | 2785 | 35.29 | July 6 |
| June Bug | Similkameen | Francis W. Groves *et al* | 3029 | 41.74 | Aug. 8 |
| Jubilee | Greenwood | Jacob C. Haas and Sydney M. Johnson | 919 | 36.37 | April 12 |
| Kaffir King | Greenwood | Mary T. McMynn *et al* | 2646 | 44.07 | Sept. 9 |
| Keestowe | " | Randolph Stuart *et al* | 1240 | 30.45 | Dec. 6 |
| Kenley | Similkameen | Ernest Waterman and Edwin B. Hall | 3028 | 51.65 | Oct. 28 |
| King of the Hills | Greenwood | John N. Greden | 2582 | 44.00 | Aug. 5 |
| King Solomon | " | Sydney M. Johnson *et al* | 3126 | 42.33 | Sept. 14 |
| Kinlaugh | Kamloops | Thos. D. Guest | 838 | 16.92 | Dec. 31 |
| Kitchener | Osoyoos | Eclipse M. & M. Co | 2967 | 51.65 | Sept. 19 |
| Knight Rambler | Greenwood | Wm. A. McKay and John H. McKenzie | 3015 | 45.50 | Nov. 15 |
| Kruger | Osoyoos | Eclipse M. & M. Co | 2971 | 51.65 | Sept. 19 |
| Lakeside | Grand Forks | I. H. Hallett and I. H. Hallett as administrator estate of A. M. Connor | 2871 | 4.21 | Nov. 1 |

YALE.—*Continued.*

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| Lake View | Grand Forks | I. H. Hallett and I. H. Hallett as administrator of Archd. M. Connor | 2869 | 26.90 | Oct. 25 |
| Lancaster Fract | Greenwood | Geo. A. Rendell | 2868 | 46.20 | April 20 |
| Little Annie | " | Jas. McNulty *et al* | 2389 | 27.56 | July 5 |
| Little Brown | " | " " | 2390 | 49.54 | " 5 |
| Little Pete | " | Mary A. Desrosiers | 2574 | 19.51 | Oct. 31 |
| Lone Star | Grand Forks | Thos. Kirk and Wm. J. Harris | 2878 | 51.65 | Sept. 28 |
| Lottie F | Greenwood | Wm. Farney *et al* | 2949 | 51.65 | Dec. 5 |
| Mable Fract | Similkameen | Edgar E. Burr *et al* | 3024 | 33.77 | June 20 |
| Magnetic | " | H. L. Jones and A. B. Clabon | 235 | 23.92 | Aug. 8 |
| Magnetite | Greenwood | Geo. R. Naden and Sydney M. Johnson | 920 | 48.25 | April 12 |
| Magnolia | " | William Farney *et al* | 2950 | 51.65 | Dec. 5 |
| Marquis of Lorne | Similkameen | Ernest V. Bodwell | 2752 | 40.51 | Sept. 28 |
| Marshall | Greenwood | Jas. McNulty *et al* | 2388 | 49.54 | July 5 |
| Marshall Fract | " | " " | 2404 | 4.96 | " 5 |
| Matabelle Fract | Grand Forks | Dougald McInnis | 2114 | 4.77 | Jan. 26 |
| May | Greenwood | Robt. D. Kerr *et al* | 2355 | 49.30 | Oct. 24 |
| Maze | " | G. M. Bennett *et al* | 1818 | 50.57 | Feb. 27 |
| Milo Fract | Similkameen | Edgar E. Burr *et al* | 3025 | 25.85 | June 20 |
| Mogul | " | Chas. Willarson and Peter Johnson | 255 | 24.50 | Nov. 12 |
| Mogul Fract | " | " " | 256 | 2.53 | " 12 |
| Mona | Greenwood | Mary T. McMynn *et al* | 2841 | 43.25 | Sept. 9 |
| Monte Reco | " | Jas. N. Paton *et al* | 1242 | 35. | May 10 |
| Morning Star | Similkameen | Alex. D. Ross | 131 | 39.27 | June 21 |
| Mountain View Fr. | Grank Forks | Donald D. Mann | 1710 | 2.89 | Feb. 24 |
| Nellie | Greenwood | John N. Greden *et al* | 2580 | 48.14 | Nov. 15 |
| Nellie Cotten | " | Mark Sands | 1460 | 51.65 | Jan. 13 |
| New Jack of Spades | Grand Forks | Vanc. & Bdy. Ck. M. & Dev. Co., Ltd., *et al* | 2804 | 50.23 | Sept. 19 |
| No. 3 | Greenwood | R. D. Kerr and P. B. S. Stanhope | 2354 | 32.06 | Oct. 24 |
| Nordhausen | Grand Forks | Fred. Kettner | 2874 | 47.66 | Aug. 5 |
| North Star | Greenwood | Mary T. McMynn and Wm. G. McMynn | 2837 | 42.14 | Sept. 11 |
| Norton | Grand Forks | I. H. Hallett and Herbert R. Davidson | 1569 | 30.29 | Feb. 24 |
| Nubian Fract | Similkameen | Arthur B. Clabon *et al* | 133 | 7.22 | Aug. 8 |
| Otis Fract | Greenwood | Francis J. Finucane | 1280 | 1.12 | Sept. 8 |
| Otter | Osoyoos | Eclipse M. & M. Co | 2970 | 42.88 | Sept. 19 |
| P. A. | Osoyoos | Geo. Frederick and Arthur L. Broderick | 2831 | 42.55 | Mar. 19 |
| Peacock | Kamloops | Thomas Hunter | 973 | 19.98 | " 29 |
| Penstowe | " | Fredk. J. Fulton | 1201 | 10.03 | Dec. 31 |
| Pluto | Greenwood | John P. Anderson *et al* | 2393 | 32.56 | Mar. 29 |
| Pride of Perth | " | Jacob C. Hass and Sydney M. Johnson | 1253 | 18.84 | Feb. 20 |
| Princess | Kamloops | Cecil W. Ward and Jas. O. Grahame | 832 | 51.65 | Dec. 31 |
| Queen Alexandria | Similkameen | Ernest V. Bodwell | 2753 | 46.14 | Sept. 28 |
| Red Butte Fract | " | Chas. Willarson and Peter Johnson | 238 | 2.56 | Nov. 12 |
| Red Warrior | Greenwood | Robert Markin | 984 | 45.95 | Mar. 25 |
| Rex | Vernon | Henry Leydel *et al* | 3328 | 51.48 | Oct. 28 |
| Richelieu | Greenwood | Wellington H. Craig and Wm. W. Craig | 942 | 51.65 | Mar. 26 |
| Riverside | " | Samuel T. Larsen and Victor R. Swanson | 1256 | 40.04 | May 7 |
| Ruby Gold | Vernon | John Highman *et al* | 2548 | 51.65 | " 21 |
| Shakespeare | Grand Forks | Herbert P. Griffin *et al* | 1420 | 44.60 | " 7 |
| Silver Bell | Greenwood | Mary T. McMynn and Wm. G. McMynn | 2644 | 45.87 | Sept. 11 |
| Similkameen | Similkameen | John McLean and Francis W. Groves | 136 | 29.89 | April 20 |
| Snow Shoe | Greenwood | Wm. Claude Fox | 1269 | 43.16 | Dec. 6 |
| Springfield | " | Jas. N. Paton, administrator estate of Wm. B. Paton, deceased, and Ralph Smailes | 2947 | 51.65 | Nov. 16 |
| Starlight | Grand Forks | Isaac H. Hallett and Isaac H. Hallett, administrator estate of Arch. M. Connor | 2870 | 21.50 | Oct. 25 |
| Sterlingham | Greenwood | Wm. Farney *et al* | 2953 | 47.27 | Dec. 5 |
| Strathcona | Osoyoos | Eclipse M. & M. Co | 2968 | 47.08 | Sept. 19 |
| Summit No. 2 | Similkameen | Frank Lambert | 130 | 40.38 | Mar. 28 |
| Sunrise | " | Edgar E. Burr *et al* | 3023 | 46.75 | June 20 |

YALE.—*Concluded.*

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| Tempest Fract. | Similkameen | Vermilion Forks M. & D. Co | 251 | .81 | Nov. 7 |
| Tenderfoot | Kamloops | Tenderfoot M. & D. Co., Ltd. (N. P. L.) | 882 | 20.66 | May 16 |
| Tiger | Grand Forks | Isaac H. Hallett and Herbert R. Davidson | 1567 | 18.21 | Oct. 26 |
| Toboggan | Greenwood | Sydney M. Johnson *et al* | 3149 | 43.08 | Sept. 14 |
| Toledo | " | Wm. Claude Fox | 1270 | 33.52 | Dec. 6 |
| Triangle Fract. | Similkameen | Herbert H. Thomas *et al* | 1832 | 14.94 | Feb. 19 |
| Tripod Fract | Greenwood | No. 7 Mg. Co., Ltd. | 3147 | 3.13 | " 20 |
| True Blue | " | Wm. Duncan and Geo. Grimason | 3011 | 41.82 | Nov. 15 |
| Wheeling | " | George W. Rumberger and John Mulligan | 2135 | 39.32 | Dec. 8 |
| World's Fair Fractl | " | Geo. R. Naden and John Edwards Leckie | 3146 | 2.46 | Feb. 20 |
| Yellow Jacket | Grand Forks | James F. Cunningham and John Mulligan | 1327 | 46.45 | Nov. 2 |

COAST AND VANCOUVER ISLAND.

| | | | | | |
|---|---|---|---|---|---|
| Amazon | Quatsino | Wm. Grant and Thomas S. Lippy | 182 | 35.30 | Dec. 12 |
| Asa Thor | " | Yreka Copper Co. | 107 | 27.22 | Sept. 23 |
| Baden-Powell | Victoria | Richard T. Godman | 141 | 36.81 | Feb. 24 |
| Barkoola | New West'r. | Alonzo Boley *et al* | 2067 | 49.03 | " 25 |
| Bendigo | " | John T. Humphreys & J. Herrick McGregor | 1920 | 51.65 | Mar. 28 |
| Blizzard | Skeena | British America Development Co., *et al* | 264 | 51.41 | Feb. 19 |
| Cadet | Nanaimo | Edward Phillips | 138 | 25.39 | Oct. 1 |
| Cheapside | New West'r. | George Wagg | 1933 | 41.30 | April 12 |
| Copper King | Victoria | M. Howe *et al* | 64G | 38.28 | Nov. 1 |
| Copper Prince | Nanaimo | British America Development Co., Ltd., *et al* | 2083 | 51.65 | Mar. 25 |
| Copper Queen | " | " " " | 2082 | 39.06 | " 25 |
| Copper Queen | Victoria | M. Howe *et al* | 65G | 51.50 | Nov. 1 |
| Croydon | New West'r. | Thos. T. Turner | 1925 | 51.31 | Sept. 29 |
| Cumberland | Skeena | British America Development Co. *et al* | 265 | 34.26 | Mar. 22 |
| Cyclone | " | " " " | 263 | 39.94 | Feb. 19 |
| Dartmouth | Skeena | British America Development Co., Ltd. | 260 | 50.48 | " 19 |
| Doubtful Fract | Victoria | Tyee Copper Co., Ltd. | 87G | 35.74 | Nov. 22 |
| Edith Fract | Quatsino | Yreka Copper Co. | 82 | 1.53 | Sept. 23 |
| Elva | " | " | 81 | 50.47 | " 23 |
| Europe | Nanaimo | Edw. Phillips and Angelo Calori | 133 | 51.60 | Oct. 1 |
| Gabriola Fract | " | Edw. Phillips | 139 | 4.13 | Oct. 1 |
| General French | Victoria | Richd. T. Godman | 139 | 28.24 | Feb. 24 |
| General White | " | " | 142 | 30.41 | " 24 |
| Gladys C | Nanaimo | Edw. Phillips and Angelo Calori | 135 | 51.65 | Oct. 1 |
| Globe | Skeena | British America Development Co., Ltd., *et al* | 259 | 51.65 | Feb. 19 |
| Golden Eagle | New West'r. | Alonzo Boley *et al* | 2065 | 50.70 | " 25 |
| Goodall Fract | Nanaimo | Puget Sound Iron Co | 234 | 20.16 | April 13 |
| Great Copper Chief | " | Edw. Phillips and Angelo Calori | 134 | 42.33 | Oct. 1 |
| Hampton | Victoria | Charles E. Clarke | 77G | 36.12 | Nov. 1 |
| Happy John No. 1 | Alberni | Alvin J. Engvik | 607 | 37.39 | June 22 |
| Happy John | " | " | 606 | 50.62 | " 22 |
| Helen | Quatsino | William Grant and Chas. S. Lippy | 181 | 47.40 | Dec. 12 |
| Hiawatha Fract | " | Yreka Copper Co. | 88 | 24.57 | Sept. 23 |
| Imperial Fract | Victoria | Tyee Copper Co. Ltd. | 86G | 34.71 | Nov. 22 |
| Iron Crown | Nanaimo | Laurence Manson | 126 | 51.65 | Jan. 27 |
| Iron Knob | Quatsino | Wm. Grant and Thos. S. Lippy | 184 | 51.65 | Dec. 12 |
| Josie | Nanaimo | David R. Cowan *et al* | 1906 | 49.00 | Mar. 7 |
| June | Quatsino | Wm. Grant and Thomas S. Lippy | 180 | 47.90 | Dec. 12 |
| Key Fract | Nanaimo | Edward Phillips | 141 | 5.36 | Oct. 1 |
| Klaanch | " | Laurence Manson *et al* | 128 | 32.36 | Jan. 27 |

COAST AND VANCOUVER ISLAND.—*Concluded.*

| Claim. | Division. | Grantee. | Lot No. | Acres. | Date. |
|---|---|---|---|---|---|
| Klondyke | Victoria | John A. Humbird and Edw. J. Palmer | 68G | 24.90 | Nov. 1 |
| Leonard | Nanaimo | Edw. Phillips and Angelo Calori | 136 | 32.47 | Oct. 1 |
| Leopold | New West'r. | Thomas. T. Turner | 1963 | 51.65 | Sept. 29 |
| Letitia | Nanaimo | John Mathers *et al* | 130 | 38.80 | Jan. 27 |
| Little Bobs | Victoria | Richard T. Godman | 140 | 29.88 | Feb. 24 |
| Magnet | Nanaimo | John Mathers *et al* | 129 | 41.69 | Jan. 27 |
| Middlesex | Skeena | British America Development Co. *et al* | 267 | 51.53 | Mar. 22 |
| Mohican Fract. | Quatsino | Yreka Copper Co. | 112 | 12.25 | Sept. 23 |
| Monterey | New West'r. | Alonzo Boley *et al* | 2068 | 45.39 | Feb. 25 |
| Mountain King | Quatsino | Yreka Copper Co. | 86 | 49.10 | Sept. 23 |
| Mountain Queen | " | " | 83 | 31.49 | Sept. 23 |
| New Comstock | " | Yreka Copper Co. | 90 | 51.65 | Sept. 23 |
| Nimkish | Nanaimo | John Mathers and Adam Mathers | 127 | 49.03 | Jan. 27 |
| Nonesuch | Victoria | Matthew Howe *et al* | 66G | 21.58 | Nov. 1 |
| Norman | Nanaimo | David R. Cowan *et al* | 1904 | 42.30 | Mar. 7 |
| N. S. Fract. | Quatsino | Yreka Copper Co. | 111 | 22.62 | Sept. 23 |
| Olga | " | Wm. Grant and Thomas S. Lippy | 183 | 50.78 | Dec. 12 |
| Omega Fract | " | Yreka Copper Co. | 113 | 4.43 | Sept. 23 |
| Ougma | Skeena | British America Development Co., Ltd. | 269 | 32.07 | Mar. 22 |
| Pocahontas | Quatsino | Yreka Copper Co. | 85 | 49.97 | Sept. 23 |
| Porcupine | Nanaimo | David R. Cowan *et al* | 1905 | 49.40 | Mar. 7 |
| Priest | " | Edward Phillips | 137 | 27.67 | Oct. 1 |
| Quatsino Chief | Quatsino | Yreka Copper Co. | 87 | 45.90 | Sept. 23 |
| Ready Cash Fract. | " | Yreka Copper Co. | 109 | 7.90 | " 23 |
| Sardine | Nanaimo | Laurence Manson | 131 | 51.65 | Jan. 27 |
| Silver Pine | Skeena | British America Development Co., Ltd. | 266 | 39.47 | Mar. 22 |
| Sirdar | Victoria | Rich. T. Godman | 143 | 35.09 | Feb. 24 |
| Sumatra | New West'r. | Thos. T. Turner | 1924 | 51.45 | Sept. 29 |
| Superior | Quatsino | Yreka Copper Co. | 106 | 48.97 | " 23 |
| Texada | Nanaimo | Edward Phillips | 132 | 36.34 | Oct. 1 |
| Thelma Fract | Victoria | Tyee Copper Co | 85G | 27.23 | Nov. 22 |
| Thistle | New West'r. | J. Herrick McGregor | 1970 | 46.43 | Feb. 20 |
| Toledo | " | Alonzo Boley *et al* | 2069 | 42.89 | " 25 |
| Toothpick Fract. | Nanaimo | Edward Phillips | 140 | 1.65 | Oct. 1 |
| Tress Fract | New West'r. | George Wagg | 1934 | 19.80 | July 12 |
| Tuscarora | Quatsino | Yreka Copper Co. | 84 | 51.65 | Sept. 23 |
| Vancouver | Skeena | British America Development Co., Ltd., *et al* | 261 | 8.84 | Feb. 19 |
| Victoria | " | " " " | 262 | 36.39 | " 19 |
| Volunteer | Nanaimo | Edw. Phillips and Angelo Calori | 131 | 45.12 | Oct. 1 |
| Vulcan | " | Wm. H. McLaughlin | 132 | 35.50 | Jan. 27 |
| Washington | New West'r. | Alonzo Boley *et al* | 2066 | 51.48 | Feb. 25 |
| Wide West | Nanaimo (Texada) | William Lee | 65 | 51.65 | June 21 |
| Xiphis | Skeena | British America Development Co., Ltd., *et al* | 268 | 28.74 | Mar. 22 |
| Yreka Fractional | Quatsino | Yreka Copper Co. | 89 | 15.34 | Sept. 23 |

# GOLD COMMISSIONERS AND MINING RECORDERS.

| Mining Districts and Divisions. | Location of Office. | Gold Commissioner. | Mining Recorder. | Sub-Recorder. |
|---|---|---|---|---|
| **Cassiar District** | Telegraph Creek | James Porter | | |
| Stikine Division | " | | James Porter | |
| Liard | " | | " | |
| Teslin | " | | " | |
| Sub-office | Atlin | | | E. J. Thain. |
| **Atlin District** | Atlin | J. A. Fraser | | |
| Atlin Mining Division | " | | E. J. Thain | |
| Sub-office | Wells | | | J. J. McKenna. |
| **Skeena District** | Port Simpson | J. Flewin | | |
| Skeena Mining Division | " | | John Flewin | H. C. Flewin. |
| Sub-office | Masset | | | C. Harrison. |
| " | Kitsilas | | | S. A. Singlehurst. |
| " | Kitimat | | | Jas. Steele. |
| " | Essington | | | Chas. Berryman. |
| " | Skidegate, Q. C. I. | | | W. H. Dempster. |
| " | Bear River | | | John Conway. |
| " | Hazelton | | | John Kirby. |
| " | Lorne Creek | | | F. E. Holt. |
| Bella Coola | Victoria | W. S. Gore | W. S. Gore | |
| **Omineca District** | Victoria | W. S. Gore | | |
| Omineca Mining Divisi'n | Manson Creek | | Ezra Evans | |
| Sub-office | Tom Creek | | | Vacant. |
| " | Fort St. John | | | F. W. Beatton. |
| " | Fort St. James | | | Alex. C. Murray. |
| **Cariboo District** | Barkerville | John Bowron | | |
| Cariboo | " | | John McKen | |
| Quesnel | Quesnel Forks | | W. Stephenson | |
| **Lillooet District** | | | | |
| Clinton | Clinton | F. Soues | F. Soues | |
| Lillooet | Lillooet | C. Phair | C. Phair | |
| **Kamloops District** | Kamloops | G. C. Tunstall | | |
| Kamloops | " | | E. T. W. Pearse | |
| Sub-office | Nicola | | | Geo. Murray. |
| Ashcroft | Ashcroft | | H. P. Christie | |
| Similkameen | Princeton | | H. Hunter | |
| Sub-office | Nicola | | | Geo. Murray. |
| " | Hedley | | | F. M. Gillespie. |
| Yale | Yale | | Wm. Dodd | |
| **Vernon District** | Vernon | L. Norris | | |
| Vernon | " | | H. F. Wilmot | |
| **Boundary District** | | | | |
| Greenwood | Greenwood | W. G. McMynn | Geo. Cunningham | |
| Sub-office | Vernon | | | H. F. Wilmot. |
| " | Camp McKinney | | | H. Nicholson. |
| " | Beaverdell | | | A. Megraw. |
| Grand Forks | Grand Forks | S. R. Almond | S. R. Almond | |
| Osoyoos | Fairview | C. A. R. Lambly | J. R. Brown | |
| Sub-office | Olalla | | | John McDonald. |
| " | Hedley | | | F. M. Gillespie. |
| **Golden District** | Golden | J. E. Griffith | | |
| Golden | " | | F. C. Lang | Colin Cameron. |
| Windermere | Wilmer | | E. J. Scovil | |

| Mining Districts and Divisions. | Location of Office. | Gold Commissioner. | Mining Recorder. | Sub-Recorder. |
|---|---|---|---|---|
| **Fort Steele District** | Cranbrook | J. F. Armstrong | | |
| Fort Steele Division | " | | Jas. Hislop | |
| Sub-office | Elkmouth | | | M. Phillipps. |
| " | Fernie | | | L. Forbes. |
| " | Kimberley | | | Vacant. |
| " | Moyie | | | Fred. J. Smyth. |
| " | Steele | | | Joseph Walsh. |
| **Revelstoke District** | Revelstoke | Fred Fraser | | |
| Revelstoke Division | " | | W. E. McLauchlin | |
| Illecillewaet | " | | " | |
| Lardeau | Camborne | | G. Sumner | |
| Trout Lake | Trout Lake | | F. C. Campbell | |
| Sub-office | Poplar Creek | | | J. Simpson. |
| **Slocan District** | Kaslo | E. E. Chipman | | |
| Slocan Mining Division | New Denver | | Angus McInnes | |
| Sub-office | Sandon | | | E. M. Sandilands. |
| Slocan City Mining Div. | Slocan City | | H. R. Jorand | |
| Ainsworth | Kaslo | | A. Lucas | |
| Sub-office | Howser | | | W. Simpson. |
| " | Poplar Creek | | | J. Simpson. |
| **Nelson District** | Nelson | R. Renwick | | |
| Nelson Mining Division | " | | C. D. Blackwood | |
| Sub-office | Ymir | | | P. J. Gleazer. |
| " | Creston | | | J. Wilson. |
| Arrow Lake | Nakusp | | W. Scott | |
| Sub-office | Vernon | | | H. F. Wilmot. |
| **Rossland District** | Rossland | John Kirkup | | |
| Trail Creek Division | " | | J. A. Hooson | |
| **Nanaimo District** | Nanaimo | Marshal Bray | | |
| Nanaimo Division | " | | Marshal Bray | |
| Sub-office | Alert Bay | | | W. Woollacott. |
| **Alberni District** | Alberni | A. L. Smith | | |
| Alberni Mining Division | " | | A. L. Smith | |
| Clayoquot | Clayoquot | | W. T. Dawley | |
| Quatsino | Yreka | | B. W. Leeson | |
| **Victoria District** | Victoria | W. S. Gore | | |
| Victoria Mining Division | " | | G. V. Cuppage | |
| New Westminster | New Westminster | | C. C. Fisher | |
| Sub-office | Harrison Lake | | | L. A. Agassiz. |
| " | Vancouver | | | R. J. Skinner. |
| " | Chilliwhack | | | J. Pelly. |

# TABLE OF CONTENTS.

## TABLE OF CONTENTS.—*Concluded.*

# INDEX.

## A.



## B.

## C.

## D.



## E.



## F.

## N.

## O.



## P.

## T.



## U.

## V.



## W.



## X.



## Y.



## Z.

# LIST OF ILLUSTRATIONS.

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Annual Report of the Minister of Mines for the year ending 31st December, 1904, being an account of mining operations for gold, coal, etc., in the Province. William Fleet Robertson, Provincial Mineralogist. 317 p., plates, maps, 1904.

Victoria, Government Printing Office, 1905.

Author.

**Robertson, William Fleet.** (*Provincial Mineralogist.*)

Annual Report of the Minister of Mines of British Columbia for the year ending 31st December, 1904, being an account of mining operations for gold, coal, etc., in the Province. (British Columbia. Bureau of Mines.) 317 p., plates, maps, 1904.

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