ANNUAL REPORT

OF THE

MINISTER OF MINES

FOR THE

YEAR ENDING 31st DECEMBER,

1903,

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
1904.

REPORT

OF THE

MINISTER OF MINES,

1903.

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 Mining Industries of the Province for the year 1903 is herewith respectfully submitted.

RICHARD McBRIDE,
Minister of Mines.

Minister of Mines' Office,
March 11th, 1904.

REPORTS

—BY—

WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

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, 1903.

The following 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.

This Report is somewhat delayed owing to the difficulty experienced in getting the Statistical Returns from some of the shipping mines, these returns having in certain instances been withheld for over two months, and I must recommend that in future the penalties of the Act be strictly enforced.

I have the honour to be,
Sir,
Your obedient servant,
WILLIAM FLEET ROBERTSON,
Provincial Mineralogist.

Victoria, B. C., March 11th, 1904.

MINERAL PRODUCTION OF BRITISH COLUMBIA.

:o:

METHOD OF COMPUTING PRODUCTION.

In assembling the output for the lode mines in the following tables, the established custom of this Department 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 1903.

Gold, placer	$65,688,103
Gold, lode	26,862,348
Silver	19,997,354
Lead	11,137,265
Copper	16,803,754
Coal and Coke	63,321,869
Building stone, bricks, etc	3,325,000
Other metals	88,799
Total	$207,224,492

TABLE II.—Production for each Year from 1890 to 1903 (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
Total	$207,224,492

Table III. gives a statement in detail of the amount and value of the different mineral products for the years 1901, 1902 and 1903. As it has been impossible as yet to collect accurate statistics regarding building stone, lime, bricks, tiles, etc., these are estimated.

TABLE III.

AMOUNT AND VALUE OF MINERAL PRODUCTS FOR 1901, 1902 AND 1903.

	Customary Measure.	1901.		1902.		1903.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer	Ounces.	48,505	$ 970,100	53,657	$ 1,073,140	53,021	$ 1,060,420
" lode	"	210,384	4,348,603	236,491	4,888,269	232,831	4,812,616
Silver	"	5,151,333	2,884,745	3,917,917	1,941,328	2,996,204	1,521,472
Copper	Pounds	27,603,746	4,446,963	29,636,057	3,446,673	34,359,921	4,547,535
Lead	"	51,582,906	2,002,733	22,536,381	824,832	18,089,283	689,744
Coal	Tons, 2,240lbs	1,460,331	4,380,993	1,397,394	4,192,182	1,168,194	3,504,582
Coke	" "	127,081	635,405	128,015	640,075	165,543	827,715
Other materials			417,238		480,051		531,870
			$20,086,780		$ 17,486,550		$17,495,954

TABLE IV.

PRODUCTION OF MINERAL BY DISTRICTS AND DIVISIONS.

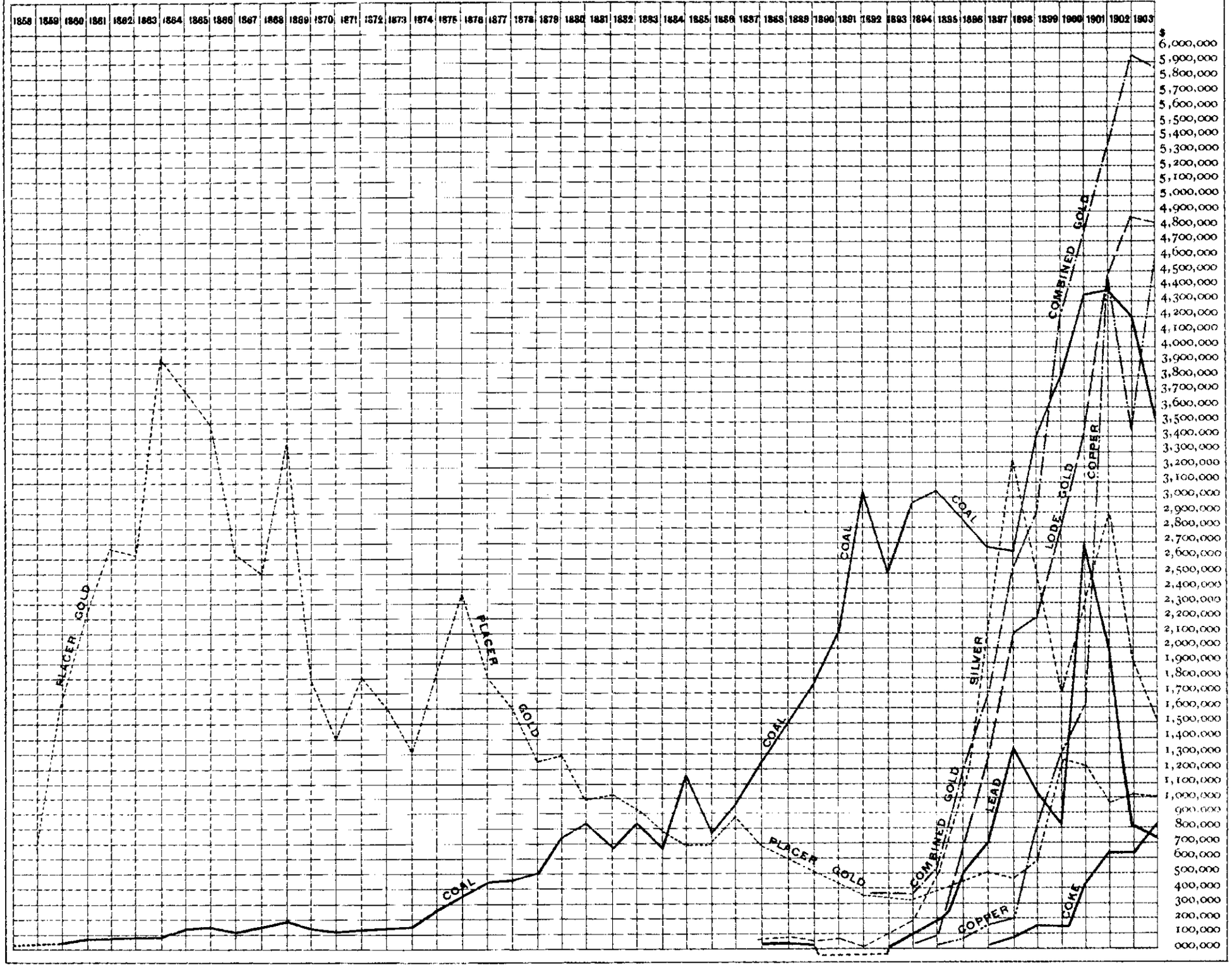
NAME.	DIVISIONS.			DISTRICTS.		
	1901.	1902.	1903.	1901.	1902.	1903.
CARIBOO DISTRICT				$ 538,700	$ 540,395	$ 475,200
Cariboo Mining Division	$ 279,600	$ 340,395	$ 314,400			
Quesnel "	240,000	160,000	132,000			
Omineca "	19,100	40,000	28,800			
CASSIAR DISTRICT				322,949	426,636	480,368
KOOTENAY, EAST, DISTRICT				2,746,839	1,477,466	1,951,128
KOOTENAY, WEST, DISTRICT				8,159,662	7,806,399	6,603,981
Ainsworth Division	331,011	272,967	219,818			
Nelson "	1,244,568	818,494	653,457			
Slocan "	1,865,752	1,608,827	1,126,986			
Trail Creek "	4,621,299	4,938,395	4,308,458			
Other parts	97,032	167,716	295,262			
LILLOOET DISTRICT				48,383	31,429	31,283
YALE DISTRICT				3,317,686	2,843,537	3,714,422
Osoyoos, Grand Forks & Kettle River Divisions	3,250,986	2,782,263	3,654,234			
Similkameen Division	4,680	2,700	2,000			
Yale "	62,020	58,574	58,188			
COAST DISTRICTS (Nanaimo, Alberni, W. Coast V. I., Victoria)				4,952,561	4,360,688	4,239,572
				$20,086,780	$17,486,550	$17,495,954

TABLE

SHOWING MINERAL PRODUCTION

OF

BRITISH COLUMBIA



PLACER GOLD.

Table V. 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 1903, 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 V.—YIELD OF PLACER GOLD PER YEAR TO DATE.

1858	$ 705,000	1881	$1,046,737
1859	1,615,070	1882	954,085
1860	2,228,543	1883	794,252
1861	2,666,118	1884	736,165
1862	2,656,903	1885	713,738
1863	3,913,563	1886	903,651
1864	3,735,850	1887	693,709
1865	3,491,205	1888	616,731
1866	2,662,106	1889	588,923
1867	2,480,868	1890	490,435
1868	3,372,972	1891	429,811
1869	1,774,978	1892	399,526
1870	1,336,956	1893	356,131
1871	1,799,440	1894	405,516
1872	1,610,972	1895	481,683
1873	1,305,749	1896	544,026
1874	1,844,618	1897	513,520
1875	2,474,004	1898	643,346
1876	1,786,648	1899	1,344,900
1877	1,608,182	1900	1,278,724
1878	1,275,204	1901	970,100
1879	1,290,058	1902	1,073,140
1880	1,013,827	1903	1,060,420
		Total	$65,688,103

TABLE VI.—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
Tot'l	1,310,321	26,862,348	34,636,407	19,997,354	298,290,128	11,137,265	127,012,401	16,880,735	74,800,721

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

TABLE VII.—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	1900		8,100	162,000						
	1901		13,980	279,600						
	1902	21	17,000	340,000	19	393	4	2		
	1903		15,720	314,400						
Quesnel "	1900		25,500	510,000						
	1901		12,000	240,000						
	1902		8,000	160,000						
	1903		6,600	132,000						
Omineca "	1900		626	12,527						
	1901		955	19,100						
	1902		2,000	40,000						
	1903		1,440	28,800						
Cassiar										
Atlin Lake Division	1900	300	22,500	450,000	120	2,479				
	1901	8	15,000	300,000						
	1902		20,000	400,000						
	1903		22,000	440,000						
All other Divisions	1900		750	15,000						
	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
East Kootenay										
Fort Steele Division	1900	86,368	500	10,000			960,411	580,303		
	1901	62,934	630	12,600			718,451	402,333		
	1902	3,621	1,650	33,000			114,500	56,738		
	1903	938	1,000	* 20,000			28,537	14,491		
Other Divisions	1900	94	15	300			2,219	1,295	2,147	348
	1901	838	40	800			34,181	19,141	3,272	527
	1902	260			16	331	27,918	13,833	8,048	936
	1903	805			17	352	59,006	29,863	2,730	361
West Kootenay										
Ainsworth Division	1900	5,313			28	578	352,167	205,454		
	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	108,678	55,187		
Nelson "	1900	94,378	30	600	31,612	653,106	109,870	64,098	36,929	5,979
	1901	109,226			32,863	679,340	377,167	211,213	1,599,449	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	415,755	190,003	96,483	345,218	45,822
Slocan "	1900	25,520			5	103	2,121,176	1,237,495		
	1901	25,493			244	5,043	2,276,250	1,274,705		
	1902	21,153			353	7,297	2,223,810	1,101,898		
	1903	12,412			257	5,312	1,466,931	744,508	181	24
Trail Creek "	1900	217,636			111,625	2,306,172	167,378	97,648	2,071,865	335,435
	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	11,667,807	1,356,066
	1903	360,786			145,353	3,004,446	209,537	105,403	8,652,127	1,145,109
All other Divisions (Revelstoke, Trout Lake, Lardeau.)	1900	622	250	5,000	208	4,297	96,416	56,249		
	1901	930	100	2,000	234	4,837	133,774	74,913		
	1902	1,662	100	2,000	652	13,477	241,584	119,705	1,900	116
	1903	5,430	100	* 2,000	2,417	49,959	392,354	199,237	3,234	436
Lillooet										
	1900	5,713	1,845	36,905	2,497	51,588				
	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	234	5,457	12	6		
Yale										
(Grand Forks, Greenwood and Osoyoos Divisions.)	1900	103,426			18,133	374,628	112,145	65,426	5,672,177	918,325
	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	883,530	219,798	108,910	14,055,582	1,739,334
	1903	697,284	150	* 3,000	50,358	1,040,900	320,749	162,876	18,485,542	2,446,561
† Similkameen Div'n. (Vernon.)	1900		240	4,800						
	1901		234	4,680						
	1902		135	2,700						
	1903		100	2,000						
Yale Division (Ashcroft, Kaml'ps.)	1900	580	2,877	57,542						
	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
‡ Coast & other Districts (Nanaimo, Alberni, W. Coast V. I., Victoria).	1900	14,346	703	14,050	2,925	60,430	36,393	21,232	2,193,962	355,202
	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	284,647	220,329	111,883	6,851,171	908,076
§ Miscellaneous (other metals, building stone, brick, etc.)	1900									
	1901									
	1902									
	1903									
TOTALS	1900	554,790	63,936	1,278,724	167,153	3,453,381	3,958,175	2,309,200	9,997,080	1,615,289
	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	998,060	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	$1,621,472	34,359,921	$4,547,535

‡ Iron Ore—2,200 tons (value included in Miscellaneous). * Estimated.

METALLIFEROUS MINES FOR 1900, 1901, 1902 AND 1903.

LEAD.		TOTALS FOR DIVISIONS.				TOTALS FOR DISTRICTS.			
Pounds.	Value.	1900.	1901.	1902.	1903.	1900.	1901.	1902.	1903.
	$	$	$	$	$	$ 684,527	$ 538,700	$ 540,395	$ 475,200
		162,000							
			279,600						
				340,395					
					314,400				
		510,000							
			240,000						
				160,000					
					132,000				
		12,527							
			19,100						
				40,000					
					28,800				
						467,479	322,949	426,636	480,368
		452,474							
			300,000						
				400,000					
					440,000				
		15,000							
			22,949						
				26,636					
					40,368				
						2,215,560	1,592,663	222,778	128,797
38,494,077	1,639,948	2,210,151							
29,129,128	1,127,036		1,541,969						
3,017,756	110,450			200,188					
717,479	27,357				61,848				
81,354	3,466	5,400							
775,016	30,226		56,694						
204,652	7,490			22,590					
951,296	36,273				66,949				
						6,020,783	8,159,662	7,716,399	6,498,961
3,366,962	143,433	349,465							
3,788,412	147,748		331,011						
3,033,039	112,839			272,967					
4,299,727	163,949				219,818				
1,485,899	63,299	737,682							
2,470,350	96,344		1,244,568						
1,680,948	61,523			773,404					
1,072,542	40,886				600,957				
19,565,743	826,310	2,063,908							
15,025,759	586,004		1,865,752						
13,651,144	499,632			1,608,827					
9,880,469	376,742				1,126,986				
		2,739,300							
1,045	45		4,621,299						
				4,893,395					
					4,255,968				
363,439	15,482	81,028							
391,844	15,282		97,032						
885,734	32,418			167,716					
1,144,239	43,630				295,262				
						88,493	48,383	31,429	31,283
		88,493							
			48,383						
				31,429					
					31,283				
						1,420,725	3,307,948	2,787,356	3,707,552
102	4	1,358,383							
2,397	92		3,250,986						
13,108	480			2,737,263					
23,531	897				3,654,234				
		4,800							
			4,680						
				2,700					
					2,000				
		57,542							
			52,282						
				47,393					
					51,318				
						450,914	682,839	449,249	1,309,606
		450,914							
			682,839						
				449,249					
					1,303,606				
						251,740	417,238	480,051	531,870
		251,740							
			417,238						
				480,051					
					531,870				
63,358,621	2,601,887					$ 11,600,221			
51,582,906	2,002,733						$ 15,070,382		
22,536,391	824,832							$ 12,654,293	
18,089,283	$689,744				13,163,657				$13,163,657

† Platinum, in 1901, $457; in 1902, $190 (included in Placer Gold). § Building Stone, Brick, &c., $525,000; Iron Ore, $6,870.

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

Coal.

YEARS.	TONS (2,240 lbs.).	VALUE.
1836-59	37,385	$ 149,548
1860	14,246	56,988
1861	13,774	55,096
1862	18,118	72,472
1863	21,345	85,380
1864	28,632	115,528
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
Total	19,989,390 tons.	$60,349,694

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
Total	594,435 tons.	$2,972,175

TABLE IX.

Showing Comparative Mineral Production for 1902 of British Columbia and Other Provinces of the Dominion.

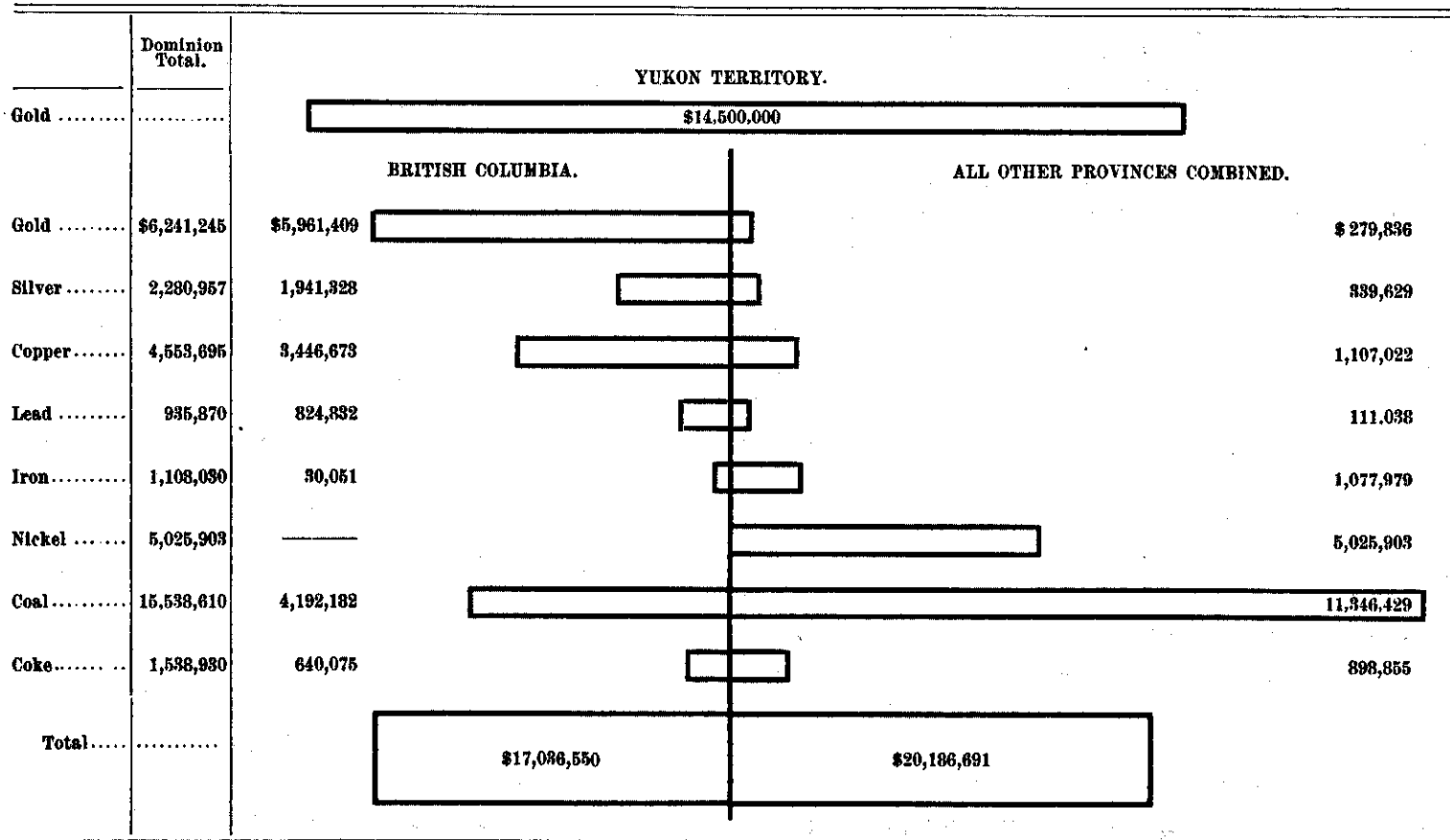
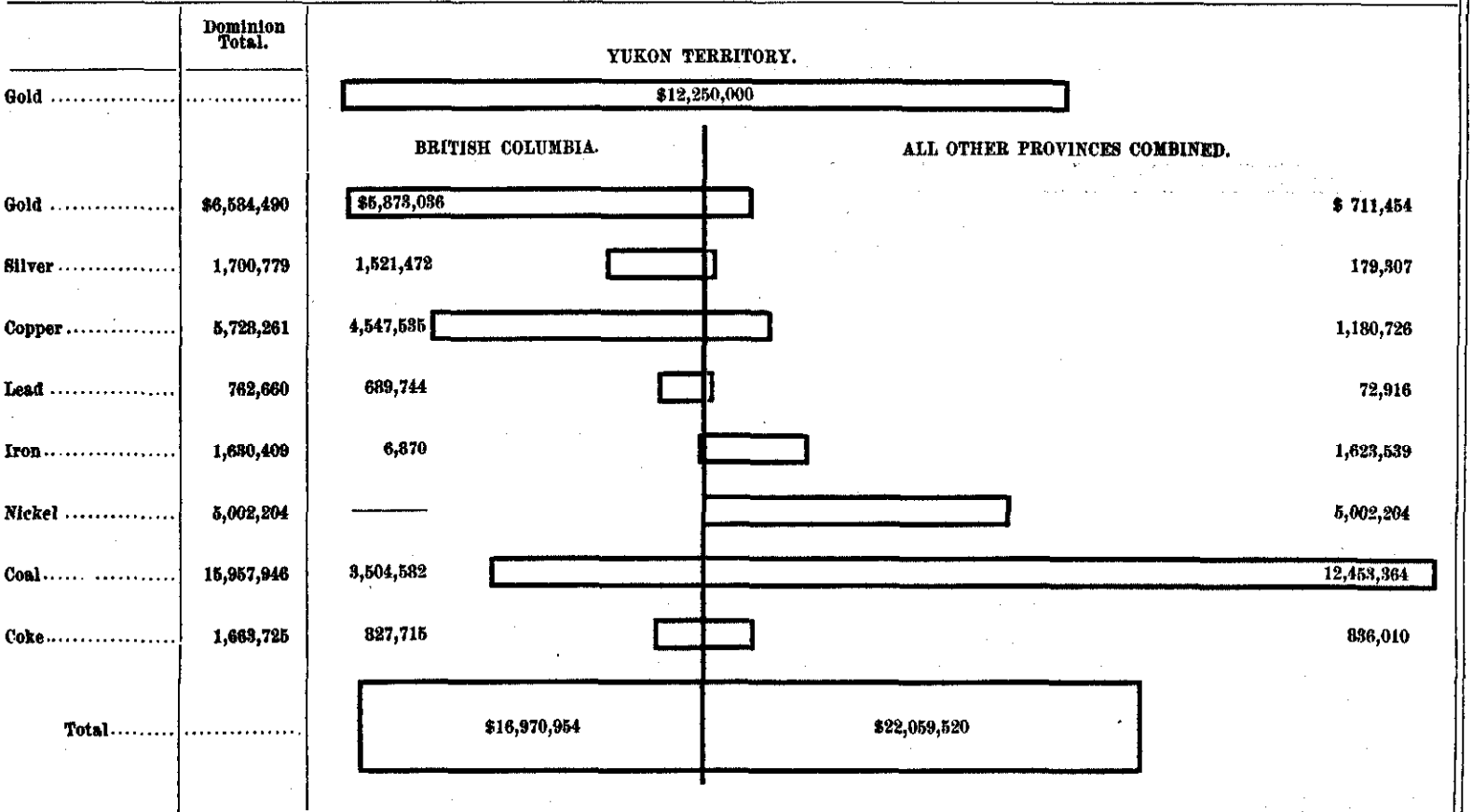


TABLE X.

Showing Comparative Mineral Production for 1903 of British Columbia and Other Provinces of the Dominion.



PROGRESS OF MINING.

The statistics of the mineral production for the year 1903, when compared with those of the previous year, do not show that increase of output which had been hoped for, and which there was reason to expect.

The gross value of the mineral products of the Province for the year 1903 was $17,495,954, an increase over the preceding year of $9,404; not a very great sum, but still an increase, and including and overcoming the decrease occurring in both the placer gold and coal mining branches of the industry, for which in both cases there are special and, fortunately, only temporary causes.

These statistics are only a record of the amount of mineral actually produced and marketed; as such they are true, but it is felt they are not quite a just measure of the progress actually made in the industry, as they take no cognizance of the improved methods of mining and treatment which have been or are being adopted, and which have so important a bearing on the chief end and object of mining, viz.:—the earning of a profit.

It is generally conceded that mining in the Province is gradually assuming a better and more secure position as a business than it formerly held, and is on a more stable basis than it was a year ago.

This has been secured by the general recognition of the necessity for, and the adoption by many companies of methods more conducive to success, while others have passed through that initial and expensive experimental stage which seems inherent to mining in a new district.

This viewing of mining from a more strictly business standpoint is gradually tending to the elimination of enterprises which were not based upon substantial merit, and which, therefore, could never succeed, but, by their very existence, cast a shadow of doubt upon legitimate enterprises.

The labour conditions too, formerly unsettled, appear now to be more stable, experience having apparently taught both employer and employee that strikes and lockouts are expensive luxuries not to be hastily indulged in, entailing not only a present but subsequent loss to both parties.

The following is a brief review of the separate branches of the industry:—

With regard to coal mining, the collieries of the Province, taken collectively, did not produce as much coal in 1903 as in the previous year. The Crow's Nest Collieries show a substantial increase both in the production of coal and coke, while the Coast Collieries show a more than equivalent decrease. The output in both these districts was greatly diminished by strikes which occurred during the earlier part of the year, causing a loss of time which could not be made up, while in the Coast district a change of ownership of one of the large properties led to alteration of plans and plant, which temporarily interfered with, although they will eventually increase, the output. There is also no doubt but that the Coast Collieries are feeling the competition in California of the fuel oil found there, since in that market a large percentage of the Vancouver Island coal has of late years been sold.

Placer gold mining has, on the whole, about held its own during the past year; there has been a decrease, but only a slight one. The northern districts have made an increased output, but the central districts show a diminished production. Of these latter districts, Cariboo requires a heavy snow and rainfall to insure success, while the valley of the Lower Fraser

requires low water in the rivers to expose the bars. Unfortunately, during this past season, these conditions were exactly reversed and the output of gold accordingly diminished.

The tonnage of ore mined by the lode mines of the Province in 1903 was 1,286,176 tons, an increase over the preceding year of 287,177 tons, or about 29 %. In certain districts, more particularly those producing lead ores, there has been a decrease, but the Boundary, Rossland and Coast districts all show large increases in tonnage of ore mined. In the Boundary district the continually improving methods of smelting and mining have rendered further low grade properties workable. These new methods are gradually widening the margin of profit in the handling of the large but notoriously low grade ore bodies of that locality.

In the Rossland district the ore mined amounted to 360,786 tons, an increase over the preceding year of 31,252 tons, or about 9½ %. The metallic contents of the output has scarcely kept pace with the increased tonnage, as the average grade of the ore mined in the camp was lower than ever before. This gradually decreasing assay value of the ore is attributable to two causes, both of which are unquestionably true, although it is difficult to know exactly the relative importance to assign to either. One of these causes is the undoubted fact that the cheaper methods of mining and of treatment charges which have followed year by year have rendered possible and advisable the handling of a lower grade ore than formerly, admitting of the utilisation of much material as ore which previously was waste. On the other hand, it is claimed that, as the ore is followed to a depth, it is actually of a lower grade, or rather that there is a smaller percentage of high grade ore in the ore body. On this point it might not be inappropriate to quote from the last annual report of the Manager of the Centre Star and War Eagle mines (two of the largest mines in the camp), who has had ample opportunity to observe the facts. He says:—

"Developments up to date show that the Centre Star Mine" (he says the same of the War Eagle) "has experienced the same general change in the character of its ore deposits which has occurred in all other productive mines in the Rossland District, and which is the general rule throughout the mining districts of the world. This is the transition from the occurrence of high grade bonanza ore bodies, capable of profit under the expensive process of smelting, to masses of lower grade requiring a treatment by milling."

This Centre Star report goes on to say that for the Company's fiscal year ending September 30th, 1903, the ore sales amounted to 88,387 tons, with an average assay contents of gold, .50 oz.; silver, 0.40 oz.; copper, 0.99 %, in which ore "the net profit in excess of all expenditures was $228,358.90."

The report of the War Eagle mine shows that for its fiscal year the ore sales have been 60,039 tons, the average assay contents of which were, gold, 0.418 oz.; silver, 1.02 oz.; copper, 1.45 %, having a smelter gross value of $9.87 per ton. The excess of revenue over expenditure was $68,512.21, of which $38,171.74 was charged off to depreciation, leaving $30,340.47 as net profit for the year.

These figures indicate that the ore has certainly not as yet reached a limit in grade so low as to be unworkable by even the present methods, although the Manager is possibly right in anticipating the transition to which he refers.

The Coast mines are rapidly assuming an importance as a factor in the production of the Province which they never before occupied, there having been mined and treated some 103,524 tons of ore, nearly four times as much as formerly, an increase which is due almost entirely to mines in the Mt. Sicker district of Vancouver Island.

The following table shows the amount of ore mined in the Province during the past year, together with the number of shipping mines, the ore shipped and the men employed in each district:—

TABLE SHOWING DISTRIBUTION OF SHIPPING MINES IN 1903.

	Tons of Ore Shipped.	No. of Mines Shipping.	No. of Mines Shipped over 100 tons in 1903.	MEN EMPLOYED IN THESE MINES.		
				Below.	Above.	Total.
CASSIAR:						
Skeena	67	1	.....	8	12	20
EAST KOOTENAY:						
Fort Steele	938	2	2	27	24	51
Windermere	806	4	1	45	17	62
WEST KOOTENAY:						
Ainsworth	24,332	9	2	77	26	103
Nelson	76,923	14	10	217	112	329
Slocan	12,412	39	17	378	172	550
Trail	360,786	13	11	.....	.....	.....
Other Divisions	5,430	11	6	137	54	191
LILLOOET	3,652	2	2	7	8	15
YALE:						
Boundary	697,284	20	16	436	378	814
ASHCROFT-KAMLOOPS	22	1	.....	9	10	19
COAST	103,524	9	7	190	132	322
Total	1,286,176	125	74	1,531	945	2,476

It will be seen from this that the number of mines shipping over 100 tons is one less than in 1902. Of the non-shipping mines the statistics are very incomplete, as few of them report to the Department and most have no representatives who can be found to give details as to the number of men employed, etc. Returns have, however, been secured from 40 non-shipping mines, and these employed a total of 274 men; 143 above ground and 131 below ground.

The statistics of the actual production of mineral are to be found in the preceding tables, which may be summarised as follows:—

Table I. gives a summary of the total values of the mineral products of the Province to the end of 1903. From this it will be seen that the mines produced a total valuation of $207,224,492; of this total $92,550,451 was derived from gold, $63,321.869 was obtained from coal, and $19,997,354 from silver, with copper and lead following next in order of importance.

Table II. shows the value produced in each year and indicates a steadily increasing output year after year. In 1903 the value of the mineral production of the Province amounted to $17,495,954, a not inconsiderable annual contribution to the material wealth of the world.

Table III. gives in detail the amount and values of the various mineral products which go to make up the total production. As will be seen, gold still retains its place as the prime factor in our output, with a valuation for 1903 of $5,873,036, and copper has the second place, with a production valued at $4,547,535.

Table IV. shows the values of the mineral products of the several districts of British Columbia. West Kootenay District is still the most important from the point of view of production, but the table shows the gradually growing importance of the Boundary and the Coast districts, the latter being largely assisted by the output of the coal mines therein and by the mineral products which enter into the building construction of the two largest cities of the Province.

Table V. gives the production of the placer gold mining branch of the industry, and shows that the yield of the placer gold mines of the Province for each year up to 1903 amounted in all to $65,688,103, of which there was produced during the year 1903 $1,060,420.

Table VI. deals exclusively with the production of the lode mines of the Province, which have made an output of mineral to the total value of $74,800,721, of which there were produced in 1903 some $11,571,367.

It will be noted that the total gross production of the lode mines of the Province now exceeds the amount produced by the placer mines since and including the earliest Cariboo times, when this country first entered the arena as a mineral-producing district.

Table VII. gives the details of production of all metalliferous mines (not including coal), showing the amount and values of each metal produced and the districts from which it was obtained.

Table VIII. refers to the coal mines and their products, and gives the amount and values of their output from the earliest days to date. The gross valuation of the production is $63,321,869, of which $60,349,694 was sold as coal, and $2,972,175 as coke.

Tables IX. and X. are graphical comparisons of the values of the products of the British Columbia mines for the years 1902 and 1903, as compared with those of all the other Provinces of the Dominion of Canada, and substantiate the claim of British Columbia to be considered the Mineral Province of Canada.

COAL.

As regards production, the coal mines of the Province, as a whole, about held their own during the past year. There were mined in 1903, 1,450,663 tons of coal, and of this total output 1,168,194 tons were sold as coal, while 282,469 tons were converted into coke, of which latter there were produced 165,543 tons. This represents, as compared with the production of 1902, a decrease of about 16 % in the quantity of coal sold, and an increase of about 29.3 % in the amount of coke produced.

As has been pointed out in previous Reports, the conditions surrounding the coal mining industry in the two extremes of the Province differ so materially that the districts must be considered separately. The coal mines of Vancouver Island were, until within the last five years, the only producers in the Province, and to-day make an output of slightly over half the coal mined. These collieries made a gross production in 1903 of 860,775 tons, of which there were sold as coal 827,857 tons, while, from the remainder, 15,779 tons of coke were produced. This represents a reduction in net production of coal of 346,036 tons, equivalent to about 29½ %, and of coke a decrease of 4,399 tons or 22 %.

In 1902 there were 673,524 tons, or about 75 %, of the coal produced by the Vancouver Island Collieries sold in California. As has been previously pointed out, the market of this State has been invaded by local fuel in the form of oil, and this has, at least temporarily lessened the demand for coal, so that in 1903 only 400,713 tons were shipped from Vancouver Island, representing only 45.2 % of the total product from these collieries.

The local market has, however, been able to consume 42,400 tons more coal this year than last, an indication of increasing home industries, which is further borne out by the fact that in 1902 the Vancouver Island Collieries sold for consumption in British Columbia 4,000 tons of coke and exported 12,000 tons, while this year the total production of 15,779 tons was consumed at home, as well as 3,719 tons taken from the stock on hand.

The collieries at Nanaimo, formerly operated by the New Vancouver Coal Company (an English Syndicate), have been taken over by the Western Fuel Company (a California Company), and this will probably stimulate the California trade.

The Crow's Nest Collieries, during the year 1903, mined 589,888 tons of coal, of which 340,337 tons were sold as such, and 249,511 tons were converted into coke, producing 149,764 tons of that commodity.

This gross output of coal is 195,927 tons in excess of the production of the previous year and represents an increase of nearly 50 %. This increase was made despite the fact that the Coal Creek mines had not recovered from the explosion of 1902 and that the equipments at the other collieries are as yet incomplete or temporary. It is safe to predict, therefore, that next year the output will show a like increase.

The market for this coal, which is entirely in the interior, both in Canada and the United States, seems to be unlimited, as in quality the coal is the best to be had in this section of the continent.

The production of coke at the Crow's Nest Collieries is 41,927 tons in excess of last year's product, a 38.8 % increase. The exports have been practically the same as last year, but the consumption in British Columbia has been increased by 40,933 tons, or is 50 % greater than last year.

Inasmuch as the consumption of coke is approximately a measure of the tonnage of ore smelted, this increase in the home consumption of coke is an index of the increased amount of ore so treated in the interior of the Province. That the coke exports have not increased is due wholly to the fact that there was no further surplus to ship, the oven capacity being taxed to the uttermost. Additional ovens have been constructed this past summer, which should increase the capacity about 25 %.

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.)	353,166	173,949	527,114
" export to United States	"	400,713	146,010	546,723
" " other countries	"	2,725	.....	2,725
Coke.				
Sold for consumption in Canada	"	19,498	122,006	141,504
" export to United States	"	.....	27,758	27,758
" " other countries	"	.....	.....	.....

GOLD.

Placer Gold. The placer gold production of the Province for the year 1903 was $1,060,420, a decrease of about $12,720 or 1 % from the year 1902, but still showing an increase over 1901 of $90,320. The Atlin and Liard Divisions of Cassiar are the only districts which this year show an increased production of placer gold. In the former Division the increase has been obtained chiefly from the working by improved methods, and on a larger scale, of an old high channel found in the benches of Pine and Spruce Creeks. The productive work in this district is still largely in the hands of individual miners or small partnerships of such, as is indicated in the report of the Gold Commissioner of the District, who says that about 75 % of the royalty has been paid by "individuals," and only 25 % by companies.

Such has been the condition thus far, but it will probably not remain so for another year, as a large number of the smaller individual enterprises, which have successfully proved their

ground, have been acquired by companies and consolidated; these properties are being equipped with plants which should materially increase the output, while at the same time, by reducing the cost of handling material, they should render available much ground now lying dormant. Next year should see these companies in full operation, working on a larger scale ground already tested, and it seems probable, therefore, that the increased production of the past year will be followed by a much greater increase in 1904.

The increase in the Liard Division has been due to the operations of the Thibert Creek Hydraulic Company, which have been comparatively successful; comparatively so, because the Company is now only opening up its pits and water supplies, and should in future be able to do much better. The operations of this Company seem to have stimulated other hydraulic enterprises in the district, for at least two other companies have preparations well under way and within two years should also be producing gold, despite the remoteness of the camp and the difficulties of transportation.

Cariboo District, as a whole, shows a drop in production of about $65,000. In the Cariboo Mining Division (Barkerville) the production has been slightly diminished as compared with 1902, but still shows a decided increase over other recent years. The output here is almost entirely due to small hydraulic concerns held by individuals or partnerships. The large companies, of which there are several, have not as yet arrived at a productive stage.

In the Quesnel Division there has also been a decreased output. Here the individual miners have done well and have maintained their proportion of the output, but the hydraulic mining companies have had a poor season, owing to the shortage of water caused by the light snow fall during the winter of 1902-3.

In the section drained by the Lower Fraser river, where placer gold mining is carried on on the bars and flats rendered available only at low water, there has been trouble this past season owing to the heavy rains in the summer, which filled the streams again, so that there was little or no "low water," and consequently a decreased output of gold.

Hydraulic Gold Mining.

Hydraulicing on a small scale in both Atlin and Cariboo has, as already stated, been fairly successful, but the few large companies operating have had a rather disastrous year. Among these the Consolidated Cariboo Company was so short of water that it could only run 53 days during the season, and the output was only little more than half that of the previous year. Hydraulic mining is so absolutely dependent on a supply of water available when required, that the necessity of being independent of the season's weather conditions is becoming apparent, and the prime requisite of a hydraulic plant is seen to be a storage capacity or drainage area sufficient to be able to average the supply of one year with another, where an insufficient minimum supply only is obtainable.

The auriferous black sand deposits of the Coast of Vancouver Island remain still unworked, despite the promising returns therefrom during 1901.

Dredging for Gold.

Dredging for gold has not as yet, in British Columbia, proved a commercial success; a number of serious attempts have been made with one or another style of dredge, each with the idea of moving a greater quantity of dirt rather than improving the methods for saving the gold dredged up. It was pointed out in last year's Report that but a fraction of the gold dredged up was saved, to which fact, rather than to the scarcity of gold, most of the failures are attributable. The continued efforts of the dredging companies prove their confidence in the presence of the gold in the river beds, and their belief that it can be raised and saved.

A new dredge has been constructed in Atlin (cuts of which are given in this report), in which the gold-saving appliances are on a separate scow and are much more complete than anything yet attempted in the Province; the result of the working of this apparatus during 1904 may prove instructive.

In New Zealand particular attention has been directed during the past few years to the saving of fine, flaky gold, such as we have to contend with in our own dredging propositions. The last Report of the Department of Mines of that Colony (1902), recently received, contains some valuable suggestions and cuts regarding the design and arrangement of gold-saving tables, having more particular reference to the proper and even distribution of the sand upon such tables, all of which might well be studied by our dredge masters, and could probably be applied in connection with under-currents in many of our hydraulic mines. Some of these cuts will be reproduced in this Report.

Lode Gold Mining.

The production of gold from lode mines has this past year amounted to $4,812,616, a decrease of 1½ % as compared with that of 1902. There has been a serious falling off in the production of the Rossland and Nelson Districts, which has, however, been met by a corresponding increase in the Coast, Boundary and the Trout Lake and Lardeau Districts.

In the Nelson District the tonnage of ore mined has been about the same, but the assay value of the ore has been materially lower.

In the Rossland District the tonnage has increased about 9½ %, but the gold production has decreased about 10 %.

In the Boundary District the tonnage of ore treated has increased about 34 %, and the gold produced nearly 20 %, indicating that ores of a lower gold assay value have been treated, a reduction which it is calculated, however, has been more than met by cheaper methods of treatment and mining.

The Coast District has produced nearly three times as much gold as in the previous year, chiefly due to the output of Mount Sicker properties.

The Trout Lake and Lardeau Districts have each made increases in lode gold output which, while not as yet forming any great percentage of the total output of the Province, are still very good beginnings, and there is a belief that these sections of the Province are only at the commencement of their productiveness.

In the Rossland, the Boundary and the Coast Districts the gold is recovered chiefly by smelting from ores associated with copper, while in the Nelson and Lillooet and the Trout Lake and Lardeau Districts it is derived from stamp milling.

The lode gold has been derived approximately as follows:—

From direct smelting of copper gold ores	$4,327,206
From combined amalgamation and concentration	485,410
Total	$4,812,616

SILVER AND LEAD.

In British Columbia these two metals must be considered together, for, even in the present depressed condition of the market, about 70 % of our silver output is derived from silver-lead ores. The total output of silver for the past year has amounted to 2,996,204 ounces, valued at $1,521,472. Of this amount about 2,103,000 ounces, valued at $1,067,903, was found associated with lead.

In the Fort Steele Mining Division less than 1,000 tons of lead ore were mined in 1903, as compared with 87,000 tons in 1900.

In the Slocan Mining Division only about half the usual tonnage of ore was produced.

Ainsworth Mining Division mined much more ore than formerly and produced 30 % more lead than usual, which was, however, the result of the concentration of a very low grade ore of the Highland Mine.

Silver-lead mining in British Columbia, except for those ores carrying high silver values, has been at a very low ebb for the past two years; in fact, most of the lead mines carrying low silver values suspended operations, the owners claiming they could not be worked at a profit under existing circumstances.

Strong representations were made to the Dominion Government of these facts, and application made for a bounty on lead mined in Canada. This application was granted at the last session of the Dominion Parliament. The following is the bounty awarded:—

An Act to provide for the payment of Bounties on Lead contained in Lead-bearing Ores mined in Canada.

[*24th October, 1903.*]

1. The Governor in Council may authorise the payment of a bounty of 75 cents per 100 lbs. of lead contained in lead-bearing ores mined in Canada, such bounty to be paid to the producer or vendor of such ores: Provided that the sum to be paid as such bounty shall not exceed $500,000 in any fiscal year: Provided, also, that when it appears, to the satisfaction of the Minister charged with the administration of this Act, that the standard price of pig lead in London, Eng., exceeds £12 10*s.* sterling per ton of 2,240 lbs., such bounty shall be reduced by the amount of such excess.

2. (1.) Payment of the said bounty may be made from time to time to the extent of 60 % upon smelter returns showing that the ore has been delivered for smelting at a smelter in Canada. The remaining 40 % may be paid at the close of the fiscal year, upon evidence that all such ore has been smelted in Canada.

(2.) If at the close of any year it appears that during the year the quantity of lead produced, on which the bounty is authorised, exceeds 33,333 tons of 2,000 lbs., the rate of bounty shall be reduced to such sum as will bring the payments for the year within the limit mentioned in section 1.

3. If at any time it appears, to the satisfaction of the Governor in Council, that the charges for transportation and treatment of lead ores in Canada are excessive, or that there is any discrimination which prevents the smelting of such ores in Canada on fair and reasonable terms, the Governor in Council may authorise the payment of bounty, at such reduced rate as he deems just, on the lead contained in such ores mined in Canada and exported for treatment abroad.

4. If at any time it appears, to the satisfaction of the Governor in Council, that products of lead are manufactured in Canada direct from lead ores mined in Canada without the intervention of the smelting process, the Governor in Council may make such provisions as he deems equitable to extend the benefits of this Act to the producers of such ores.

5. The said bounties shall cease and determine on the 30th June, 1908.

6. The Governor in Council may make regulations for carrying out the intention of this Act.

7. Chapter 8 of the Statutes of 1901, intituled "An Act to provide for the payment of bounties on lead refined in Canada," is repealed.

This means, on a 30 % ore, a direct bounty of $4.50 per ton of ore mined, a fairly good profit in itself, which should revive any lead mine and enable it eventually to work unassisted when the bounty expires.

The anticipation of such bounty retarded, for the time being, immediate production, for the belief was prevalent that it would only apply to ores mined after the passing of the Act. When the bounty became an assured fact, it was too late in the season to admit of opening up

and developing the various properties in time to make any materially increased production in 1903. The effect this year was rather to stimulate development and equipment, the results of which should be apparent next season.

The lead production of the Province for 1903 was 18,089,283 lbs., valued at $689,744, the lowest it has been for seven years.

COPPER.

The copper ores being mined in British Columbia are very low grade in copper, but, fortunately, contain values in gold or silver, without which they could not be profitably worked.

The total output for the year, and the highest yet made by British Columbia, was 34,359,921 lbs., valued at $4,547,535, which was produced in the following Districts:—

Boundary District	18,485,542	lbs.
Rossland "	8,652,127	"
Coast "	6,861,171	"
Nelson "	346,218	"
Various other Districts	14,863	"
	34,359,921	"

In the Rossland camp the ores average about 1.2% copper, and in the Boundary about 1.5%, while on the Coast they averaged 3½% copper.

OTHER MINERALS.

Iron Ore. Very little iron ore has been mined in the Province this past year. The consumption of iron ore as flux was practically nothing, as the lead smelters have required little, and this little they were able to obtain carrying copper or gold values sufficient to at least assist with the cost of mining.

Zinc. Zinc has scarcely, as yet, become a factor in the mineral output of the Province. Some of the Slocan mines containing zinc as an impurity in their galena have sorted out a certain amount of ore higher in the former and sold it as zinc ore to certain smelters in the United States. Attempts are being made to make a cleaner separation, which, when successful, will enable these zinc ores to be marketed to better advantage.

Platinum Group of Metals. There is no record of any platinum having been produced this last year in the Similkameen District, where it has formerly been obtained as a by-product in placer mining. Reports are current that platinum in place has been found in the Boundary District, but it has been impossible to get any of the ore to confirm such occurrence by assay in the Government Assay Office. In the Thibert Creek Hydraulic Mines platinum is known to be present, and its occurrence has been mentioned in former issues of this Report. None has been saved this year, as undercurrents were not employed.

It may be worthy of mention that a small sample of gold from near Dawson, Yukon Territory, tested in the Provincial Government Assay Office, yielded 390 milligrams of osmiridium to one ounce of gold.

Tin. The finding of tin near Barkerville, mentioned in last year's Report, has been further investigated and proves to have been misleading, the metal having apparently been melted off cans by a fire.

Building Materials. The mineral products entering into building construction include brick —both red and fire—cement, lime, stone, drainpipes, tile, etc. As yet many of these materials are produced only in a small way in the localities

where they are to be used, and difficulty has been found in obtaining reliable figures. Those given are approximate estimates, as carefully made as has been possible.

Oil Shales. Oil-bearing shales have been discovered in the vicinity of Harper's Camp, in the Cariboo District, and will, it is understood, be more thoroughly investigated this coming season. From present indications there appears to be a large deposit of these shales, and, as far as can be determined at present, they do not appear to get their oil from any seepage from below. A sample of the shale tested in the Government Assay Office at Victoria, yielded $\frac{6}{10}$ of 1 % by weight of a dark, heavy oil, and about 4.8 % water. The oil so obtained by retorting the shale appeared to begin to distil over at from 130° to 140° Centigrade, or from 266° to 284° Fahrenheit, and had a specific gravity of 0.95. It might be here noted that California crude oil has an average specific gravity of about .94, while the oils from East Kootenay have a specific gravity of from .82 to .83. This shale oil is inflammable and has a strong petroleum odour.

As was noted in last year's Report, coal has been discovered a few miles further up Horsefly river, to the east of Harper's Camp, but, as far as can be learned, no further work has been done here.

Well authenticated reports are received of the discovery of coal to the east of Quesnel lake, which will be more thoroughly investigated during the coming season.

The occurrences of oil in the Fort Steele Mining Division were visited by the Provincial Mineralogist during the year and are described in the body of this Report.

GENERAL DEVELOPMENTS OF THE YEAR.

Perhaps the most noteworthy feature of the development work of the past year, and the one thing which promises more than any other to promote the well-being of the mining industry, has been a general recognition of the fact that the margin of profit, as a rule, lies in the large masses of low grade material which occur sometimes alone and sometimes associated with ore which, by comparison, might be called "bonanza." As included in this term "low grade material," might be taken certain by-products which heretofore have not been a source of revenue. With the general recognition of this fact came rational attempts to remedy the difficulties in the way of mining and treating these low grade ores at a profit. These attempts, in many instances, have as yet only progressed as far as the experimental stage, but, in several cases, with fair prospects of ultimate success.

In the Boundary District matters are most advanced in this respect. The smelting in that vicinity of very low grade ores must be considered as merely a "concentration" by a fusion method, which is considered the most applicable to such ores. This has been accomplished with most modern plants, the ore being taken from several mines and, by a judicious admixture of other ores as fluxes, the latter carrying values but not sufficient to be treated independently, concentration on a large scale has been possible, with a reduction in the costs of smelting greater than had at first been hoped for.

With this cheaper cost of fire concentration, less discrimination had to be used in the mining of the great bodies of ore, much of which latter was of an assay value very near the line dividing profit from loss. As less discrimination had to be used in selecting the portions of the ore bodies to be mined, cheaper mining resulted, and it became possible to use steam shovels, together with power transportation in and about the mines and a number of other economies. In these respects the Granby Co. has probably been in the lead, and has not by any means reached its limit, but seems to have been so far successful, inasmuch as the company has this year declared a dividend.

Other companies in the Boundary District owning mines the ores of which, from a smelting point of view, may be described as complementary one of the other, have arranged an amalgamation which should convert two profitless companies into one profitable one.

In the Rossland Camp, while much has been done towards lessening the costs of smelting, it has been recognised that certain of the constituents of the ore placed a limit upon the economies to be made in that direction, and hence steps have been taken to eliminate these constituents, so that not only might smelting be done more cheaply, but also on ore in more concentrated form. Among the methods referred to are included a water concentration, or separation of certain portions of the ore, and a separation by oil of certain values more effectually to be recovered with this medium. So far the experiments made—for the plants are only so considered, although on a large scale—have given promise of satisfactory results. The Rossland Power Co. has a mill practically completed, situated between Rossland and Trail, at which it is expected to concentrate ores from the Centre Star and War Eagle mines.

A small mill has been erected near Nelson for experimentation with a "grease" process, of which Messrs. H. E. T. Haultain and H. B. Stovel are the patentees. The details of the process are not as yet made public, but it may be said that the ore pulp flows over an endless belt covered with vaseline, which retains certain minerals, according to angle of adjustment, flow of pulp, washwater, etc.

Experimental tests have been made which lead to the belief that much of the zinc, which now is regarded as merely a contamination of the lead ores of the Slocan, may be separated by a magnetic process and rendered available as an ore of zinc.

An experimental "Wetherell Separator" has been installed in the Province, with which many ores have been tested, while other British Columbia ores have been sent East for experimentation. Magnetic concentration is as yet in its infancy, and from experiments which the writer has had the pleasure of recently witnessing when in the East, he is convinced of the wonderful possibilities of the process as applied to a number of British Columbia ores, the concentration of which by any water method was impossible.

That certain strongly magnetic minerals were separable by magnetic concentration is a fact so well known as scarcely to need comment, but that many minerals which are not acted upon by an ordinary magnet may be eliminated by higher magnetic powers is not so fully realised and is worthy the serious consideration of mine owners. To quote from Ingall's "Production and Properties of Zinc" (p. 268):—"It has been shown by Farady, Plucker, Wiedeman and others that magnetism is an inherent property of all substances, which are either attracted or repelled by the poles of a magnet, though in most substances the manifestation of this property is exceedingly feeble."

At the works of the Wetherell Separator Co., at Newark, N. J., the writer saw certain samples of zinc blende magnetically "picked up" out of a mixture of gangue, galena, pyrite, etc., making a clean separation, while a similar separation of tetrahedrite (gray copper) was made from gangue and pyrite.

Upon inquiry as to what minerals had been found separable by the process, it was said that no rule could be laid down, but that each special ore required to be determined by experiment, since, for example, of two samples of zinc blende, one could be easily attracted by the magnet of high power, while the other sample was so feebly attracted as to preclude any practical separation; similarly with tetrahedrite, although the sample of this mineral experimented upon, an ore from British Columbia, was strongly magnetic. This lack of uniformity is accounted for by the fact that in few ores does the mineral conform strictly to its theoretic

composition, but contains usually associated minerals which materially affect the magnetic action. Certain minerals which naturally are practically non-magnetic may be rendered so by a partial or complete roasting.

In the Atlin District the past year has been a very successful one, both as regards the production of the season and the prospects of the future. The old higher channel on Pine and Spruce creeks has been further worked with satisfactory results. This channel has been drifted upon for some distance from either of the creeks mentioned and proved to extend well under the gravel hill between them. It provides winter work at drifting for a number of men, and is also the basis of a number of hydraulic operations now under way. Dredging enterprises have also been started here and one very completely equipped dredging plant has been installed; it was, however, completed too late in the season to begin operations in 1903.

The Bennett and Chilkat Mining Divisions have been done away with and this territory included in that of the Atlin Division. No new developments are recorded.

Samples of coal have been received from the Atlin District and, upon examination, proved to be a good lignitic coal, such as might prove of value for steam or heating purposes.

No new developments have been recorded in the Teslin Division. There are reports of successful prospecting, but no producing placer mines have as yet been heard of. The same may be said of the Stikine Division.

In the Liard Division of Cassiar District the year has been successful for the one hydraulic company as yet operating, while the certainty of other companies putting in plants is assured, so that there is every prospect of the old Thibert Creek District, so well known as a placer mining camp in the 60's, again becoming a producer of gold, though now by modern hydraulic methods.

In the Skeena Division there has been the usual prospecting development going on, but there is nothing of especial interest to record. On Lorne creek hydraulic operations were carried on by one company, and it is said that two others are being organised and will shortly commence work. The defining of the Alaska-Canada boundary line will help the district, for there are a number of promising properties located near such line, and the uncertainty as to which country they were in has had a retarding influence on their development.

On the Princess Royal island properties some 20 men have been employed and some small shipments of rich copper-gold ore have been made.

Nothing has been heard this year of the operations on Bornite mountain on the Skeena river, nor have any shipments been made from the sulphur properties on the Ecstall river.

There have been a great many inquiries as to coal lands on the Queen Charlotte islands, and it is reported that there is a probability of boring operations being started there this coming summer to determine the position and character of the beds on the more undisturbed lands at some distance from the outcrops. No attempt has been made to prove the extent or value of the so-called "mineral tar deposits" on these islands, which have been already referred to in previous Reports (1901).

Several copper prospects have been located on the southern portions of these islands, and have a development sufficiently promising to have induced several engineers to go and examine them, although no serious work has as yet been done.

On Texada island the smelter has not been in blast. The Cornell and Copper Queen mines have been under bond to persons who are prospecting these properties but shipping little. A surface tramway has been built from the mines to the dock, together with other similar improvements. The Marble Bay mine has also built a surface tramway; this property

has shipped ore both from the mine and from the second class dump, which latter was sold to the Crofton smelter as flux at a flat rate per ton. The *Loyal Group*, a little to the north of the last mentioned, has been further developed and has made small shipments.

On the West Coast of Vancouver Island there are no new developments to report on the iron properties of Barkley Sound. The recent death by drowning on the SS. Clallam of Mr. Homer Swaney, the most enthusiastic and energetic of the advocates of these occurrences of iron ore, is a great loss to these properties and must retard their development.

The copper mines of this vicinity, the Nahmint and Monitor, have lain idle with only a watchman in charge

On Quatsino sound the copper properties have not proved, on development, to be as high grade as had been hoped, but, nevertheless, made shipments of between 2,000 and 3,000 tons of ore to the Crofton smelter. Near the south arm of this inlet a very promising exposure of nearly pure zinc blende has been discovered, which will be found described in the body of this Report.

At Sidney inlet the *Prince Group* has been Crown-granted; good showings of copper ore have been developed, but the property has lain dormant the past year. On the *Indian Chief Group*, the Dewdney Syndicate's property, development work has been continued, it is reported, with satisfactory results.

The most satisfactory developments of the year in the Coast District have been at Mount Sicker, on Vancouver Island. Here the Tyee Mining Co., which started active operations about the beginning of 1903, has, during the year, produced and sold mineral containing values amounting to over half a million dollars. The Lenora mine, which has shipped for some years, has been in litigation; this has retarded work somewhat, but the property has still managed to make shipments about as usual. The *Richard III.*, lying just above the *Tyee*, has been most satisfactorily developed from a promising prospect into a producing mine. Extensions of the *Tyee* ore bodies have been proven in this property. Other properties in the vicinity have been under development, with encouraging results, but as yet have not passed out of the prospecting stage.

The importance of the Coast District as a copper producer is being realised, about 20% of the output of the Province for the past year having been derived from here.

Of the New Westminster Mining Division there is nothing special to report. The Howe sound copper properties, previously described, have been dormant. Development has been done on a number of claims and a find of very pure zinc blende is reported, from which fine samples have been obtained, but, so far as can be learned, the extent of the deposit has not been determined.

In the East Kootenay District there has been a good deal of successful prospecting going on in the Windermere Division, and considerable bodies of lead ore have been developed which are described in the report on that section.

In the Fort Steele Division the lead mines have been practically all shut down, but, stimulated by the "lead bounty," preparations are being made to renew operations, which had, however, not been commenced at the close of the year. In this Division the coal mines are the important factor in mining; of these the producing mines speak for themselves by their actual output, which is noticed elsewhere.

As to development of new properties, the Crow's Nest Pass Coal Company has opened a number of previously undeveloped seams of coal and has done a commensurate amount of construction work, which has created very little comment, as the Company already had opened up and was operating such extensive deposits; yet these new developments of this Company

alone are sufficient to constitute a large coal mining centre. In this particular coal field the Dominion Government has made its selection of the large area of coal lands which it had reserved to be selected from the lands to be turned over to the B. C. Southern Railway.

Prospecting for coal lands further to the north has resulted in the discovery of a number of important deposits of coal, both in and without the land granted to the B. C. Southern Railway. Of these latter locations, important and probably valuable deposits have been developed on the North Fork of Michel creek, and on the Upper Elk river and its tributary, Fording river. The development has progressed so far as to prove that there are beds of good workable coal, which have yet to be further proven as to extent, and the many other features which are essential to the commercial production of this commodity.

In the Nelson Division the most important mine, the Ymir, has maintained its usual tonnage, but the values per ton have materially diminished, the workings at present being apparently in a lower grade zone. Several other "free milling" properties in this vicinity have been under development, but have not as yet been equipped or opened out.

The Silver King mine (Hall Mines Co.) is still being worked under lease, and is producing on a comparatively small scale. As far as can be learned, no new extensive bodies of rich ore have been developed.

One of the most interesting developments in this section is that of the *Hunter V.*, the ore from which is limestone carrying good gold and silver values.

In the Rossland camp the yearly increase in tonnage has again been made by the big mines, and is noted elsewhere, as is also the fact that these properties are making serious and apparently successful efforts tending to the utilisation of the ores too low grade to admit of smelting direct.

Other new properties have been opened up, encouraged by lower rates of treatment now obtainable, and there is a strong probability that by next year this camp will have one or two additional producing mines of importance.

In the Giant mine, molybdenum in considerable quantity has been found in the ore, attempts to save which have been made, but with what practical results has not yet been learned.

The Boundary has again been the centre of interest with its increasing tonnage of ore, mined largely from open quarries, loaded by steam shovels and smelted on a very large scale in equally large furnaces, and at a cost which will bear comparison with similar work anywhere. The rise in the market price of copper during the year, approximately 1.62 cents per pound, or equal to an increase of 14 %, has done much for this District, making probably just the difference between a profit and a loss.

At Camp McKinney, the Cariboo McKinney Co. mined and milled about 15,000 tons of ore, quartz carrying free gold, having a gross assay value of $5.50 per ton. The development of this property, however, has not of late been such as to give encouragement; consequently, at the last annual meeting of the company, on the report of the superintendent, dated December 31st, 1903, the directors gave instructions to clean up all ore and suspend operations indefinitely.

In the vicinity of Fairview, in the Osoyoos Mining Division, the very large quartz veins, carrying low values in gold, which for some years have not been worked, have again been opened up and some tons milled by the Stemwinder Company.

Near the town of Hedley, on the Similkameen river, very extensive and satisfactory development has been made by the Nickel Plate Company on its property, the ore in which is

chiefly iron sulphides carrying gold. Extensive preparations have been made for the treatment of the ores by the erection of a milling plant at Hedley, to be followed by a smelter when required.

In the Lillooet District two companies have been treating free milling quartz, while other promising prospects in that vicinity are under development.

A 10-stamp mill is being erected on Siwash creek, in the Yale Division, to work a large deposit of gold-bearing material.

In the Slocan the "lead bounty" has stimulated the development of existing mines and the more thorough investigation of properties which may, under such bounty, become producers, but the full effect of this measure will not be seen before the coming season.

In the Trout Lake Division extensive plants for the transportation and treatment of the ores have been erected but are not yet under way. In the southern end of this Division, gold-bearing quartz ledges have attracted much attention, and it is expected that a stamp-mill will be shortly erected there.

In the Lardeau Division two stamp mills have been erected near Camborne, and operations were started up near the close of the year.

BUREAU OF MINES.

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WORK OF THE YEAR.

The routine office work of the Bureau is confined practically to technical matters, replying to questions both verbal and written as to same, answering prospectors and others as to markets and market values of minerals, examining reports of Inspectors, the collection of statistics and information regarding the mineral deposits of the Province, and the supplying of information to inquirers. In connection with this work, about 1,680 letters, etc., were written and sent out, in reply to about a corresponding number of letters inward.

Provincial Mineralogist.

The Provincial Mineralogist left Victoria on June 23rd for East Kootenay, where he was occupied in the vicinity of the Crow's Nest Pass coal mines until July 11th. A trip was then made to Perry creek, the recent developments there were inspected and afterwards the mines in the vicinity of Kimberley were visited.

On returning to Cranbrook instructions were received to inspect the oil lands in the south-east corner of the Province. Arrangements were consequently made for a pack train, and while it was being prepared a trip was made to the Windermere District, and the producing mines of that section were examined.

Returning to Fort Steele, a start was made for the oil lands, travelling by pack-train and taking in *en route* Bull river and the recent mining developments there.

Proceeding via Elko to Tobacco Plains, the Elk river had to be crossed. As the bridge was out and the water still high, some delay was experienced, so that Tobacco Plains was only reached on the 12th August.

From Tobacco Plains the trail usually taken to the Flathead river runs through the State of Montana, but it was considered better to attempt to find a feasible trail through Canadian territory, which was done, the Flathead river being reached on the 20th. There being no maps of this section, some small amount of surveying had to be done, and the various "oil springs" were then examined. Some difficulty was experienced in finding these, as the information received concerning their location was very misleading. Delays from various causes having consumed more time than was expected, food supplies gave out and a quick trip had to be made into Alberta, the nearest supply point for these essentials. An examination was made of the occurrence of oil at the points where boring was being done on the east side of the Rocky mountains.

Returning to the main Flathead river, the latter was followed up to its headwaters. There being no trail, the bed of the stream had to be followed for a considerable portion of the distance, the river valley and the beds of the tributary creeks being examined on the way. The summit between the Flathead and the Lodgepole rivers was crossed in a blinding snowstorm on the evening of September 19th, and Morrissey and Elko were reached next day. On the 25th all matters connected with the pack-train were disposed of at Fort Steele, and at Cranbrook instructions were received to visit Poplar Creek, which point was reached on September 28th, and the principal claims in the vicinity examined. Proceeding thence to Trout Lake and Ferguson, which point was reached on October 1st, the producing mines of that section were also examined. From here a trip was made to Camborne, in the Lardeau Mining Division, to examine the properties about to begin producing in that vicinity.

Return was made to Victoria on the 10th October, where a week was lost through sickness contracted in the field, after which a report on the Flathead District was prepared and submitted to the Government.

On the 30th October, leave of absence of six weeks having been obtained, the first in five years, a trip to certain Eastern points was made, much of the time being spent in examining various Eastern smelters and investigating recent improvements in metallurgical operations, return being made to Victoria on December 10th, when the work of collecting and preparing the statistics for 1903 was begun, and occupied the remainder of the year.

In the collection of these statistics, it is found that willing and prompt compliance is given with the Act calling for yearly returns of output, and that every assistance is afforded by all but a few mines; these few, however, either through intent or negligence in making returns, unduly delay the publication of the final figures. It is felt that it is not fair to make the many wait for the few, and that in future, with whatever reluctance, decided steps will have to be taken to enforce the penalties of the Act against delinquent mines.

ASSAY OFFICE.

The following is a summary of the work of the Assay Office, as reported by the Provincial Assayer:—During the year some 720 assays or quantitative determinations were made; these included a number for the Department of Mines, for which no fees are shown. The receipts were as follows:—

Fee for ordinary assays	$186 00
Fees for gold bullion assays	340 00
Fees from Assayers' Examination	270 00
Value of work done for other Departments and not charged for	250 00
Total	$1,046 00

Free Determinations. In addition to the above, a large number of qualitative determinations were made of minerals and rocks sent into the Department for identification and classification. For this latter work no fees were charged, in accordance with the established custom of the Department, such qualitative determinations being made free with the idea of assisting prospectors and others in the search for new minerals or new mineral districts.

Gold Melting and Assaying. The value of gold melted, and for which Provincial Government Assay Certificates were issued during the year 1903 was $152,675, representing 164 lots. The Provincial Government at Victoria pays in cash the full mint value of all gold dust brought in within 24 hours of its receipt, enabling the miner to continue his journey, if he so desires, with very little delay, and, furthermore, men arriving from the Yukon without ready money are enabled, by producing their receipt showing that they have deposited a certain amount of gold dust with the Provincial Government for assay, to obtain an immediate advance from any of the local banks. All gold bars are assayed independently by two assayers who check one another, so that the depositor is assured that he will obtain the highest possible value for his gold dust.

Water Analyses. A considerable number of samples of water were analysed during the year; some of these were found to be very bad indeed, particularly certain well waters which were found to be entirely unfit for drinking purposes.

Platinum.

Samples of black sand were analysed as usual for the platinum group of metals. This work led to the search for some better methods of separation than those used hitherto for this group, and a series of experiments were accordingly made with the object of separating gold, silver, platinum and osmiridium. As the results of these experiments are of interest to the Assayers of the Province they are here given.

Osmiridium.

The separation of the osmiridium group from the noble metals does not present any special difficulty if little silver be present. The ore or black sand is fluxed in a crucible in suitable manner and the lead button cupelled; the resulting bead is rolled out and boiled with dilute sulphuric acid (1 to 10), letting the acid gradually grow stronger; then, after washing, by boiling with nitric acid, again washing and dissolving in *aqua regia*, the osmiridium group alone remains, with perhaps a trace of silver chloride, which may be removed by solution in ammonia. The separation of gold, silver and platinum presents some difficulty, as the following experiments will show :—

Separation of Platinum from Gold

Alloys of the composition shown in Table I. were made by wrapping the metals in sheet lead and cupelling. As the experiments gave negative results as far as method of separation was concerned, a series of alloys were made as shown in Table II., gradually decreasing the proportion of platinum to gold. A number of experiments were made with the alloy, with the same result as that given. After finding that platinum would separate out with this low ratio of platinum to gold, a number of experiments were conducted to ascertain how a higher ratio would separate. The result of one of these experiments is given in Table III.

With 10 mgrms. to the same amount of gold some of the platinum was left in the cornet, so that 7 per cent. of platinum to gold seems to be the highest ratio that can be successfully parted.

400 mgrms. of added silver were found to part as successfully as 500 mgrms., and at the same time to give a more compact cornet, not so liable to break up.

The action of mass seems to play a part in this separation, as 7 mgrms. of platinum, added to 100 mgrms. of gold, parted successfully, but when double the quantity of both metals was taken, as in the alloy of 14 mgrms. of platinum to 200 mgrms. of gold, the cornet did not part; but by increasing the gold to 300 mgrms. it did part. A number of experiments were then made with a view of separating the silver from alloys of gold, platinum and silver. The results are given in Table V.

A series of alloys of silver and platinum without any gold were also parted, both in nitric and sulphuric acids, but no satisfactory results could be obtained. A separation of platinum from gold and silver alloy was also attempted by precipitation as potassium chloro-platinite. This, however, presents many difficulties; the alloy is for practical purposes insoluble in *aqua regia* owing to silver chloride being precipitated on the cornet and preventing further action. This difficulty may, to a certain extent, be overcome by first parting in sulphuric acid and then taking out the last of the silver with nitric acid, washing and dissolving in *aqua regia*. To precipitate platinum with potassium chloride requires that the solution be fairly concentrated; in doing this it is difficult to prevent the gold chloride from decomposing and precipitating metallic gold. Potassium chloride is to be preferred to ammonium chloride in precipitating platinum, owing to its being slightly less soluble in alcohol.

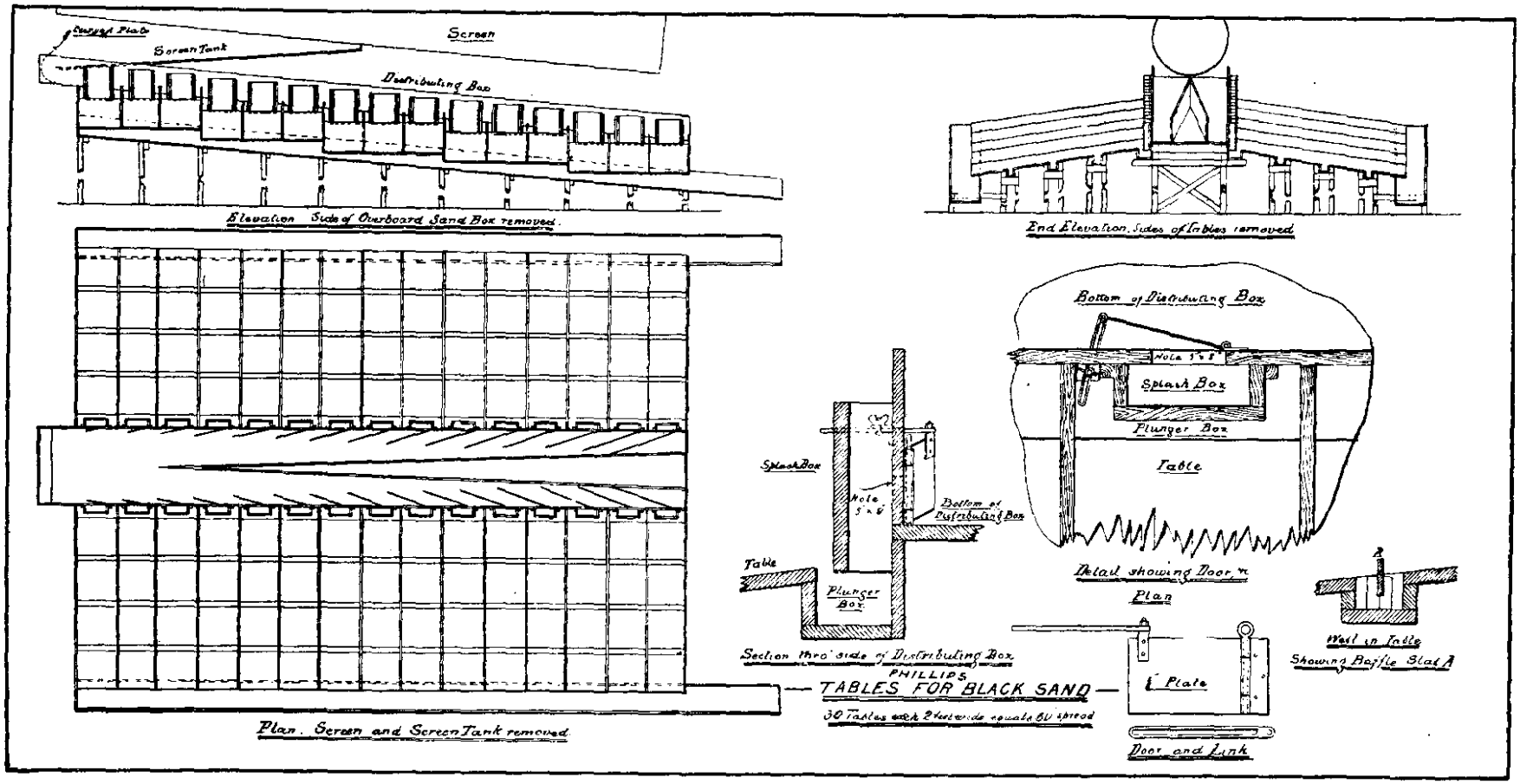


TABLE FOR SAVING FINE GOLD FROM DREDGING.

(Reproduced from Report of Minister of Mines, 1902, New Zealand.)

Table I.

Alloy.	Result.
Mgrms. Gold 100, Platinum 100, Silver 1,000	Cupelled, rolled, and boiled in strong HNO_3. Platinum did not part properly.
Gold 100, Platinum 100, Silver 1,200	Cupelled, and parted in strong HNO_3: resulting cornet weighed 113.5 mgrms., showing 13.5 mgrms. of platinum retained by cornet. Duplicate, same result.
Gold 100, Platinum 100, Silver 1,500	Cupelled, and parted in strong HNO_3: cornet weighed 113.5, showing 13.5 mgrms., of platinum retained by cornet. Duplicate, same result.
Gold 100, Platinum 100, Silver 2,000	Cupelled, and parted in strong HNO_3: cornet weighed 112.5 mgrms., showing 12.5 mgrms. of platinum retained by cornet. Duplicate, same result.
Gold 100, Platinum 100, Silver 5,000	Cupelled, and parted in strong HNO_3: cornet weighed 95 mgrms., showing that a loss had occurred.

Note.—In the last experiment the platinum had not all parted out, giving a dull grey colour to the gold cornet; the cornet was also partly broken up and the particles floated as a fine powder on the parting acid. A loss was occasioned in this manner, and also perhaps by the amount of nitrous oxide evolved in the solution of the large amount of silver.

Table II.

Alloy.	Result.
Mgrms. Gold 100, Platinum 20, Silver 300	Cupelled and parted first in 21° B. and then in 32° B. HNO_3: resulting cornet weighed 102.7 mgrms., showing 2.7 mgrms. of platinum left in cornet. Duplicate, same result.
Gold 100, Platinum 15, Silver 400	Cupelled, and parted twice in 32° B. HNO_3: resulting cornet weighed 101.2 mgrms. Duplicate weighed 100.2 mgrms.
Gold 100, Platinum 10, Silver 300	Cupelled, and parted in first 21° B., second in 32° B. HNO_3: resulting cornet weighed 100.8 mgrms. Duplicate weighed 100.4 mgrms.
Gold 100, Platinum 10, Silver 500	Cupelled, and parted first in 21° B., second in 32° B., HNO_3: resulting cornet weighed 100.2 mgrms. Duplicate, same result.
Gold 100, Platinum 5, Silver 500	Cupelled, and parted in first 21° B., second in 32° B. HNO_3: resulting cornet weighed 100 mgrms., showing that the platinum had all been removed, except perhaps an unweighable trace.

Table III.

Alloy.	Result.
Mgrms. Gold 100, Platinum 7, Silver 400	Cupelled, and parted in first 21° B., second in 32° B. HNO_3: resulting cornet weighed 100.2 mgrms.

TABLE IV.

Alloy.		Result.
	Mgrms.	
Gold.....	200	Cupelled, and parted in 21° B. and 32° B. HNO_3: resulting cornet weighed 200.3 mgrms., showing 0.3 mgrm. of platinum retained; cornet broke up in parting. Duplicate was parted in 21° B., still more diluted and did not break, and weighed 200.3 mgrms.
Platinum	14	
Silver.....	800	
Gold.....	300	Cupelled, and parted in 21° B. and 32° B. HNO_3: resulting cornet weighed 300 mgrms. This would show that as a larger quantity of platinum has to be parted, gold must be added in increasing ratio.
Platinum	14	
Silver.....	900	
Gold.....	200	Cupelled, and parted in 21° B. and 32° B. HNO_3: resulting cornet weighed 200 mgrms.
Platinum	10	
Silver.....	600	

TABLE V.

Alloy.		Result.
	Mgrms.	
Gold.....	100	Cupelled, and parted in strong H_2SO_4: resulting cornet weighed 204.7 mgrms., showing 4.7 mgrms. of silver left behind. Duplicate, same result.
Platinum	100	
Silver.....	500	
Gold.....	100	Cupelled, and parted in strong H_2SO_4: then in strong HNO_3: resulting cornet weighed 204 mgrms. Duplicate weighed 200.6 mgrms.
Platinum	100	
Silver.....	500	
Gold.....	100	Cupelled, and parted in dilute H_2SO_4: resulting cornet weighed 105.5 mgrms. Duplicate weighed 105.4 mgrms.
Platinum	5	
Silver.....	300	
Gold.....	100	Cupelled, and parted in dilute H_2SO_4: resulting cornet weighed 105.3 mgrms. Duplicate weighed 105.2 mgrms.
Platinum..	5	
Silver.....	300	
Gold.....	50	Cupelled, and parted in dilute H_2SO_4, washed and parted in strong HNO_3: resulting cornet weighed 55.3 mgrms. Duplicate weighed 55.2 mgrms.
Platinum	5	
Silver.....	300	
Gold.	25	Cupelled, and parted in dilute H_2SO_4, washed and parted in strong HNO_3: resulting cornet weighed 30.3 mgrms. Duplicate cornet weighed same.
Platinum	5	
Silver.....	300	

NOTE.—This last experiment showed 0.3 mgrm. of silver retained or 0.1 per cent., which was the best result obtainable, while it is not entirely satisfactory; a close assay could probably be made by running through a proof alloy under similar conditions and deducting the surcharge of silver found from the regular assay.

Oil Analyses. Analyses of oil from springs in South-East Kootenay will be found in the Provincial Mineralogist's report on that District. Shale from Ward's Camp, Cariboo District, was examined and found to contain oil; special mention of it will be found in the report on Cariboo District.

Mineral Museum. New signs were erected to better direct people to the Museum, with the result that the number of visitors was at least double that of any previous year. The cases are being gradually filled with specimens and are kept up to date.

In addition to his usual duties, the Provincial Assayer visited all the principal properties situated on or near Quatsino sound, at the north end of Vancouver Island.

ASSAYERS' EXAMINATION.

Report of the Secretary of the Board of Examiners.

Sir,—I have the honour to submit my Annual Report as Secretary 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 referred to requires that at least two examinations shall be held in each year, and these duly took place, one at Nelson on the 27th of April and following days in the laboratory of the Hall Mines Smelter, and the other in the Government Laboratory at Victoria on the 7th of December and following days. At the Nelson examination two candidates entered and two passed; at the Victoria examination seven candidates entered and six passed.

The Board recommended the granting of three certificates under sub-section (2) during the year.

List of Assayers holding Provincial Certificates of Efficiency under the "Bureau of Mines Act Amendment Act, 1899," on January 1st, 1904.

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

Under section 2, sub-section (1)—

Austin, John W	Vancouver.
Ayres, D. A	Mexico.
Baker, C. S	Victoria.
Barke, A	Crofton.
Bishop, Walter	Vancouver.
Campbell, Colin	Nelson.
Carmichael, Norman	Nelson.
Church, George B	Nelson.
Clarke, Roy H	Rossland.
Cobeldick, Wm. M	
Comrie, Geo. H	Vancouver.
Collinson, H	Ladysmith.
Crerar, Geo	
Cruickshank, G	Rossland.
Davis, A. B. C	Greenwood.
Day, Athelstan	Vancouver.
Dedolph, Ed	Kaslo.
Dockrill, Walter R	Crofton.
Farquhar, J. B	Vancouver.
Gooding, L. E	
Haseltine, R. S	Rossland.
Hawkins, Francis	Nelson.
Hurter, Ch. S	Ladysmith.
John, D	Ferguson.
Kitto, G. B	Victoria.
Lang, J. G	Greenwood.
Ley, Rich. N	Nelson.
Marsh, Richard	Rossland.
Marshall, Wm. Stone	Ladysmith.
Nicholson, Ch. F	
O'Sullivan, John	Vancouver.
Perkins, Walter G	Grand Forks.
Pickard, T. D	Fairview.
Robertson, Thomas R	
Rombauer, A. B	Crofton.
Segsworth, Walter	Greenwood.
Sim, Charles John	Victoria.
Snyder, Blanchard M	Spokane, Wash.
*Snyder, Wm. D	
Sundberg, Gustave	Greenwood.
Tally, Robert E	Trail.
Thomas, Percival W	Van Anda.
Tretheway, John H	Vancouver.
Turner, H. A	Kamloops.
Vance, John F. C. B	Vancouver.
Vans Agnew, Frank	London, Eng.
Wales, Roland T	Trail.
Watson, Wm. J	Ladysmith.
Welch, J. Cuthbert	Northport.
Whittaker, Delbert E	Victoria.
Widdowson, E. Walter	Trail.
Williams, W. A	Grand Forks.
Wilson, C. M	Sandon.

* Dead.

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

Under section 2, sub-section (2)—

Archer, Allan	Ymir.	Merrit, Charles P	Grand Forks.
Bryant, Cecil M	Vancouver.	McArthur, Reginald E	Rossland.
Blaylock, Selwyn G	Fernie.	McFarlane, James	Vancouver.
Clothier, Geo. A		McLellan, John	Rossland.
Cole, Arthur A	Rossland.	Maclennan, F. W	Rossland.
Coulthard, R. W	Fernie.	McVicar, John	Ymir.
Cowans, Fred	Silverton.	McNab, J. A	Trail.
Dixon, Howard A	Toronto, Ont.	Musgrave, Wm. N	Crofton.
Galbraith, M. T	Greenwood.	Mussen, Horace W	
Gilman, Ellis Philip	Vancouver.	Noble, David T	Trail.
Green, J. T. Raoul	Nelson.	Outhett, Christopher	Kamloops.
Guess, Geo. A	Greenwood.	Shannon, S	Ferguson.
Gwillim, J. C	Kingston, Ont.	Stevens, F. G	Rossland.
Heal, John H	Nelson.	Thomson, H. Nellis	Trail.
Hilliary, G. M	Phœnix.	Turnbull, J. M	Rossland.
Holdich, Augustus H	Camborne.	Watson, A. A	Vernon.
Johnson, William Steele	Slocan.	Watson, Henry	
Kaye, Alex	Atlin.	*West, Howard	New Denver.
Lay, Douglas		Wright, Rich. L	Rossland.
Lewis, Francis B	Grand Forks.	Wynne, Llewellyn C	Rossland.

Under section 2, sub-section (3)—

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

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

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

* Dead.

EXAMINATION FOR COAL MINE MANAGERS.

Under the provisions of the "Coal Mines Regulation Act," the manager having control and daily supervision over any coal mine in the Province of British Columbia, must hold a certificate of competency issued under such Act.

At the meeting of the Board of Examiners duly held on October 31st, 1902, it was unanimously decided to hold examinations simultaneously at Nanaimo and Fernie, on January 19th, 20th and 21st, 1904. As the results of these examinations are to hand before the publication of this year's Report they are published herein, although, strictly speaking, they appertain to the year 1904.

The papers were, as usual, prepared in advance, and identical examinations were held at the two centres mentioned. The general scope and character of the examination have been fully set out in previous Reports. Eleven candidates presented themselves for examination, and the following seven were successful:—

Donald McLean, Ladysmith.	R. W. Coulthard, Fernie.
Geo. Wilkinson, Nanaimo.	J. Richardson Roaf, Fernie.
H. B. Wright, Fernie.	John John, Fernie.

H. L. Manley, Fernie.

Registered List of Colliery Managers' Service Certificates Issued Under Section 39, "Coal Mines Regulation Act, 1897."

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

"Coal Mines Regulation Act, 1877," Registered List of Certificates of Competency

Name.	Address.	Date.
Shepherd, Francis H.	Nanaimo	5th March, 1881.
Gibson, Richard	"	" "
*McGregor, William		" "
Honobin, William	not-known	1st May, 1882.
*Muir, Archibald		" "
Little, Francis D	Ladysmith	" "
Martell, Joshua	Nanaimo	" "
*Scott, Robert		" "
Chandler, William	not known	21st December, 1883.
Priest, Elijah	Extension	" "
McGregor, James	Inspector of Mines, Nelson	18th January, 1888.
Randle, Joseph		" "
*Dickinson, Urick Evan		8th January, 1889.
Matthews, John	Union	" "
*Jones, John Bunyan Louis		" "
Norton, Richard Henry		26th August, "
Bryden, Andrew	Extension	30th December, "
Russell, Thomas	Nanaimo	20th April, 1891.
Sharp, Alexander	not known	27th October, "
*Lindsay, William Alfred		4th March, 1892.
Kesley, John	Union	" "
Wall, William H	Nanaimo	30th May, 1896.
Morgan, Thomas	Inspector of Mines, Nanaimo	" "
Wilson, David	Extension	" "
Smith, Frank B	Inspector of Mines, N. W. T., Calgary	" "
*Jamieson, Robert		" "
Bradshaw, George B	Nanaimo	12th June, 1899.
Simpson, William G	Extension	" "
*Fisher, Robert		5th November, "
Hargreaves, James		5th February, 1901.
Drinnan, Robert G	Crow's Nest, Fernie	" "
Browitt, Benjamin	Nanaimo	3rd August, "
Stockett, Thomas, Jr	Fernie	" "
Pearson, Robert	"	" "
Cunliffe, John	Extension	" "
*Lamb, Robert B	Fernie	" "
Evans, Daniel		" "
McEvoy, James	Fernie	17th October, 1902.
Wilson, A. R.	Michel	" "
Simister, Charles	Fernie	" "
Colville, Andrew	"	" "
Budge, Thomas	Nanaimo	" "
Mills, Thomas	"	" "
Faulds, Alexander	"	" "
Richards, James A		" "
McLean, Donald	Ladysmith	21st January, 1904.
Wilkinson, Geo	Nanaimo	" "
Wright, H. B	Fernie	" "
Coulthard, R. W	"	" "
Roaf, J. Richardson	"	" "
John, John	"	" "
Manley, H. L.	"	" "

*Dead.

Examinations of coal miners, &c., have been duly held in accordance with the "Coal Mines Regulation Act Amendment Act, 1901."

CASSIAR DISTRICT.

REPORT OF J. A. FRASER, GOLD COMMISSIONER.

I have the honour to enclose herewith my annual report on mining operations carried on in the Atlin, Bennett and Chilkat Mining Divisions of Cassiar District during the year ending 31st December, 1903.

ATLIN MINING DIVISION.

The local conditions are continually changing here, but I might still reiterate some of the observations of my last report as being applicable at the present time, particularly those as to the necessity, or at least desirability, for some form of survey of holdings on the Creeks and as to the difficulties arising from water (or scarcity of water) and the disposition of "tailings" and débris.

The cancellation of a large number of unworked leases has encouraged re-location and the ground has in many cases passed into the possession of companies from which more active development may be expected. The drifting operations of the last two winters have encouraged still further efforts of that nature, and with satisfactory returns to the operators.

From 800 to 900 men were actually employed in mining last season, and whilst a great amount of "dead work" was being done, it will be noted that a considerable increase in revenue has been obtained.

The abolition of the offices of Mining Recorder at Bennett and Wells will materially lessen the gross expense of administering the District, without imposing any material increase of labour upon the officials still remaining.

Pine Creek.

Individual operations on this creek were lighter this season than heretofore, which was to be expected, for the reasons given in previous reports, but the results obtained by those who did operate were fairly satisfactory. The probabilities are, however, that much less will be done in the way of individual operation upon this creek for the future, as the British-American Dredging Company, Limited, has acquired by purchase (at a very fair figure) a large portion of what was being most successfully operated by individual methods, and what with its holdings and those of the various hydraulic companies, little room is left for individual operation.

Last winter a large number of men were drifting on both Pine creek and Gold Run, but owing to the acquisition just mentioned of so much of the ground by the various companies, very little is being done in this direction this winter. About 25 men are drifting on Gold Run and about 20 on Pine creek.

THE BRITISH-AMERICAN DREDGING CO., LIMITED.

O. T. Switzer, General Manager.

This company has acquired a large number of hydraulic leases, comprising a considerable extent of alluvial ground, and is still acquiring more, so that already it controls a very large aggregate area, some portions of which are known to be rich. Among other properties acquired are the leases on Gold Run and Pine creeks known as the *Ophir*, *Earth* and *Cosmopolitan Groups*.

The company brought in a Keystone drill, with which it operated for upwards of three months, prospecting its various properties, at an aggregate expenditure of about $20,000, with unqualified success and satisfaction. A Bucyrus dredge and an electrical power plant capable of producing 500 h. p. were also brought in. The dredge was placed upon one of the *Ophir Group* of leases on Gold Run creek and the power plant a short distance below the "Falls" on Pine creek. In conjunction with the construction and installation of the dredge and power plant, this company excavated over one and a half miles of ditch, laid 1,800 feet of 30-inch steel pipe, built 400 feet of wooden flume, erected 6 miles of pole line equipped with 5 wires, using over 25 miles of copper wire, built a transformer house near the dredge site, together with dams, pressure box and the camp buildings, etc., necessary for the work and to accommodate its employees, at an aggregate expenditure of about $300,000.

Notwithstanding that the utmost diligence was manifested and a large force of men employed, the delays consequent upon the transportation of the heavy plant and timber, upwards of 700 tons of which had to be imported, in addition to such local timber and lumber as could be utilised, besides other causes, retarded the completion of the dredge and power plant until about the close of the season, and the management had to reluctantly content themselves with having everything ready for commencing operations with the opening of the season of 1904. The progress of this work was watched with unusual interest and its non-completion in time for operation this season was disappointing to more than the management, for if its operation proves as successful as similar plants have done elsewhere, it will mark an epoch in the history of mining in this District and in British Columbia, and with the values known to exist in some of the ground, will surely prove remunerative to the owners.

The company contemplates the construction of several dredges upon its various properties in this District. As many as 100 men were employed by the company, the average during the season being 60.

The Pine Creek Power Company, Limited.

The Pine Creek Power Company, Limited—F. T. Blunck, President; M. W. Loveridge, hydraulic superintendent and foreman, L. H. Griffith, general manager—as anticipated in last year's report, opened up new pits, installed hydraulic derricks, and with other improved methods made a much better showing than during any previous season. The high benches on the south side of Pine creek were attacked with excellent results, and the existence of an old river channel away to the south of the present channel has apparently been proved. Piping was in progress from June 23rd to October 17th, over 108,000 cubic yards of gravel being moved, at a cost of nearly $21,000, and a very handsome profit realised over and above all expenses. The best evidence of the confidence of the management in the property is that they have spent over $27,000 in further equipment and disposition of plant, etc., employing an average of 30 men during the season.

The Atlin and Willow Creek Gold Mining Company, Limited.

This company, not having succeeded in securing the settlement of its litigious and other difficulties, did not do much work during the season but still had quite a number of men employed on "lays" and otherwise. The Manager, Mr. Frank H. Brackett, went out without responding to my request for a statement, and I cannot, therefore, give any more extended notice of its operations.

The Eastern Hydraulic Mining Company.

John F. Deeks, Manager.

This company, operating on the south side of Pine creek above Discovery, built a considerable length of ditch and had, I understand, a successful season, but as the Manager also failed to respond to my request for particulars, I cannot give details of operations.

THE NORTH COLUMBIA GOLD MINING CO., LTD.

J. M. Ruffner, Manager.

This is a new company which has been operating this season in both placer and quartz mining, with, I believe, encouraging results. In placer mining it worked a number of claims on Gold Run with very fair returns; but assuming that the methods in vogue were rather crude and expensive, the management has decided to instal a plant with a view to more economical operation, being well satisfied, apparently, with the values obtainable. The company has also bonded the property of the Stephendyke Hydraulic Mining Partnership, Limited, and in order to prospect the same satisfactorily has constructed about 1½ miles of flume, etc. About $9,000 was expended in prospect and development work in connection with this property and demonstrated to the satisfaction of the management the presence thereupon of the same rich pay streak or gravel found on Gold Run and down along Pine creek through the Pine Creek Power Company's property. Good results are anticipated from next year's operations.

Spruce Creek.

On this creek a large number of individual miners worked during the season, with excellent results, and had it not been for the scarcity of water, which increased the cost of operation and eventually compelled many to cease sluicing earlier than heretofore, together with the damage done by the spring floods, the showing per capita would have been very good indeed. This was the best creek this season from the individual miner's standpoint. Last year I reported from one to two ozs. per diem per man, but this year many realised better pay even than that. Nearly $100,000 was reported for royalty by the individual miners on the creek this year, being nearly $35,000 better than last year. The lower portion of the creek, for perhaps two or three miles, is pretty well worked out, as far as the creek bed and open work is concerned, but much of the upper portion is practically virgin ground and is being opened up as the lower parts are being worked out. The benches have been but little worked, but sufficiently so to show that there is very good pay to be had by drifting, and from 100 to 150 men are so employed this winter. I might say that the spring freshet in May and the early part of June did much damage in tearing out wing-dams and sluice-boxes and filling up pits, and materially affected the output as above mentioned.

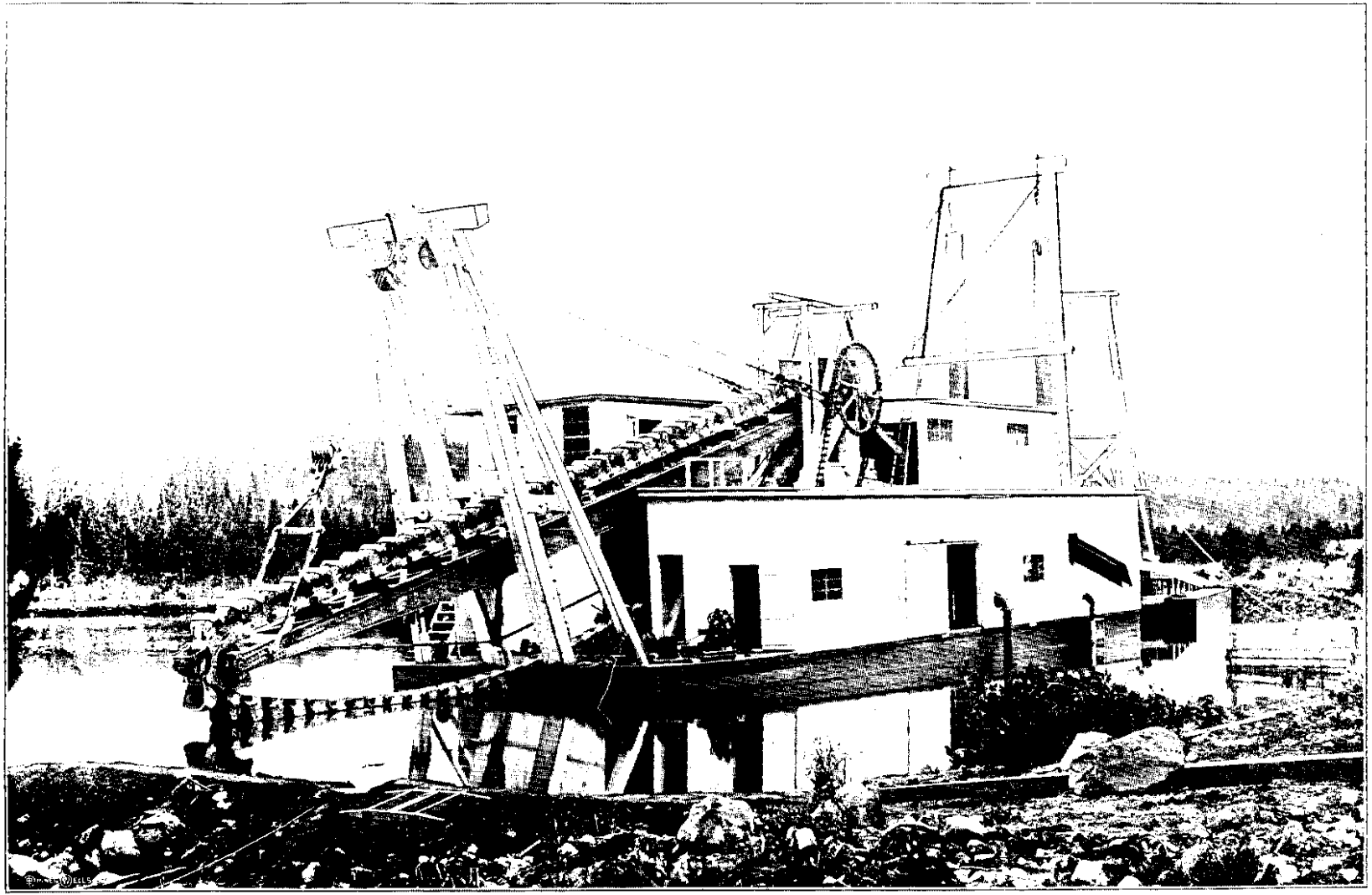
THE CONSOLIDATED SPRUCE CREEK PLACERS, LIMITED.

C. B. Gaddis, Manager; H. Haslitt, Hydraulic Superintendent.

Of the hydraulic companies operating on Spruce Creek the Consolidated Spruce Creek Placers, Limited, is located nearest the mouth, and a good deal of preliminary work has been done this year in building ditches, flumes, &c., and installing plant preparatory to an early start next season. An average of 27 men was employed from June 19th to October 10th, with a maximum number of 43, and about $40,000 was expended.

The Gladstone Hydraulic Mining Partnership, S. O. Wheelock, manager, being hampered for want of water and room to dispose of tailings, has been prospecting and putting in a ditch line, on which work it had from 2 to 11 men employed, and expended nearly $3,000,000.

The Columbia Hydraulic Mining Company, under the management of Mr. E. F. Meisner, had to repair much damage done to its flume and plant by the high water, and between this and rebuilding retaining dams for the débris, &c., did very little piping. It built or rebuilt nearly 1,000 feet of flume and two retaining dams. An average of 15 men was employed for about three and one-half months, and about $7,500 expended.



B. A. DREDGING COMPANY'S DREDGE—GOLD RUN, ATLIN MINING DIVISION.

The property owned by the Camp Hammell Mining Partnership, although in lease form, was operated by individual methods, with about such results as are usually so obtained. Four men were employed during the season, and $2,500 is said to have been expended.

The Blue Canyon Partnership, R. A. Jackson, manager, John Letherdale, foreman, put on a friction hoist and derrick, and with an average of five men expended about $4,000, with fair results.

Next season I expect to find other companies operating on Spruce creek on an extensive scale, and much more work done than during any previous year. It should be added that several outfits of individual miners have derricks and hoists, most of them run by water and a few by steam, and these men have expended in certain instances far more than some of the companies; as, however, I have no details of the work done I cannot report upon it.

The Atlin Lake Company, Limited.

Birch Creek. The local management of this company again changed hands during the winter, and this season's operations were carried on under the management of A. Bryan Williams, with R. A. Lambert as foreman. The water supply on this creek being limited at best, the company was peculiarly and unfortunately embarrassed by the exceptional scarcity of water this season, and consequently did not accomplish as much as it otherwise might have done. However, the results of the season's operations were fairly satisfactory.

Birch creek, although completely abandoned by the individual miners for the last two years, has this season again attracted their attention, quite a number of claims have been located upon the upper portion of the stream, and if sufficient water can be obtained no doubt there will be much more activity exhibited next season than at any time since 1899.

Boulder Creek. On this creek the individual miners again made a very good showing, although there were not quite so many as in 1902, besides which, the scarcity of water in the autumn caused most of them to close down earlier than in the year preceding; for these reasons, principally, the aggregate output was not quite as large as in 1902. Quite a large number of men were drifting on this creek last winter, and this winter (1903-04) from 75 to 100 men are drifting there, with very encouraging results. The ground on the lower part of Boulder creek is very deep, one crew of individual operators having sunk nearly 60 feet to reach bedrock, but once down they are finding exceptionally rich gravel, and the indications are that they will be exceedingly well repaid for their outlay of time and money. Steam hoists, &c., are used in this ground, the depth of which is beyond the capacity of ordinary appliances.

Société Minière.

Of the companies operating on this creek "La Société Minière de la Colombie Britannique," of Paris, France, local manager, Mr. Henry Maluin, takes first place. Although this company owns a number of hydraulic leases, it is still confining its operations to the working out of individual claims which were acquired by purchase. Its ground is very rich, but owing to damage to its flumes, etc., from freshets and the débris from the operators above, it has, unfortunately, been subjected each year to a heavy loss of both money and time, which has prevented it thus far from realising the profits which, barring these reasons, would have undoubtedly been secured. This season with an average of 23 men and a maximum of 28, piping was in progress for 60 days, something over 20,000 cubic yards of gravel being moved and about $19,000 in gold cleaned up. Last spring the manager rebuilt the bedrock flume, at an expense of $5,000, making it 48″ wide and 40″ deep, and had it "riffled" with steel rails (railroad), but the water fell away so that he had to put in a partition, reducing the width to

30 inches. As the individual claims above become worked out the creek bottom grows wider and the facilities for retaining or avoiding the débris will be improved, and I then confidently expect to see this company realise good returns for all its dead work and lost time. I may say here that as yet no effort has been made by any of the operators to conserve or store water on this creek and this must be done by somebody before the best results and returns are secured.

On the *Non-Union* Lease, above Discovery, a small hydraulic plant was being installed, but the scarcity of water and other matters prevented the doing of much actual mining. It is intended, however, to make an early start next season.

The Boulder Creek Hydraulic Mining Company also expects to instal a plant on its ground and secure such returns as, from the development and prospecting already done, the management feel confident will be obtained.

Ruby Creek. As anticipated in last year's Report, there were active operations on Ruby creek this year by a number of miners. Early in the year the leases that were held on the creek were cancelled, and the ground being thrown open for re-location quite a number of claims were immediately staked. One lot of about ten claims was grouped and called the "Ruby Creek Mining Partnership." This company spent about $3,000 putting in a bedrock flume and prospecting for bedrock. A depth of 30 feet was reached without finding bedrock but a considerable depth of pay gravel was passed through and the owners are well satisfied with their prospects, although they realised practically no returns for their labour. Other syndicates spent some time and money in like manner, but it remains for the coming season to demonstrate just what values, if any, are on the creek.

Wright Creek. A small number of individual miners continue to operate on the upper portion of this creek, with fair success. The English Counties Hydraulic Syndicate, C. Dubois Mason, Manager, operated its leases during the season and installed a small hydraulic plant thereon, expending altogether about $7,000 with only indifferent success. The management is, however, still sanguine of good returns next season, when a better supply of water may be available.

On Otter creek, the Otter Creek Hydraulic Company, Limited, under the management of Mr. J. H. Brownlee, P. L. S., installed a hydraulic plant and did considerable deadwork, but owing to the supply of water failing early in the season no large returns were secured. I regret to say that the manager neglected to supply me with data from which to give a more extended notice of the property and operations.

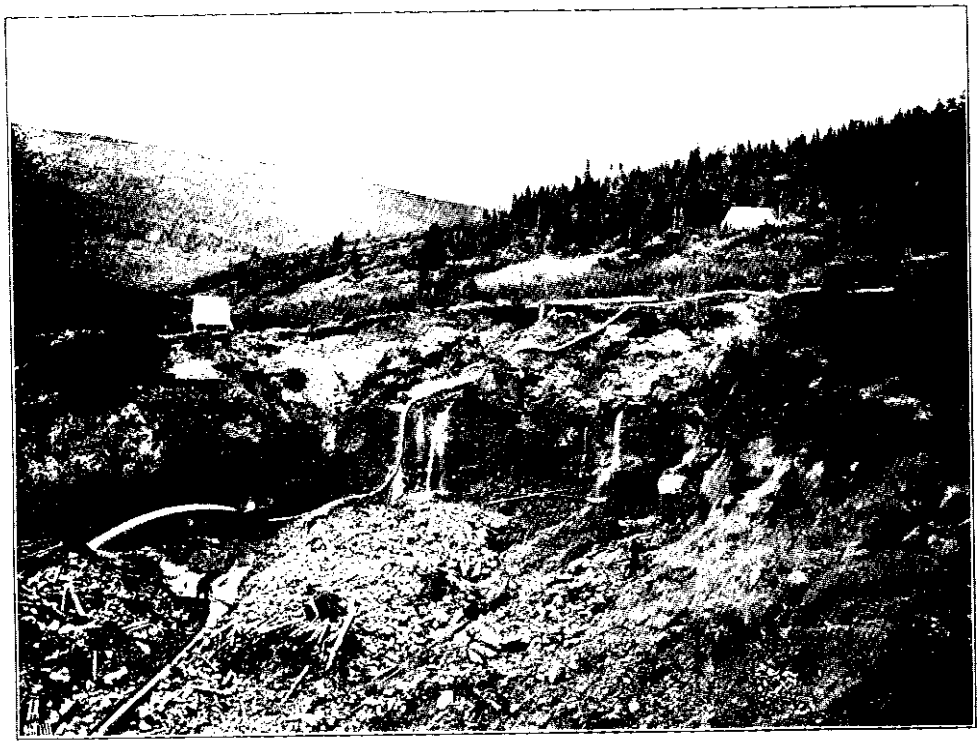
NOTE BY PROVINCIAL MINERALOGIST.—Since the receipt of the report of the Gold Commissioner, Mr. Brownlee has been seen and has kindly loaned his official report as Managing Director, from which the following extracts have been made:—

OTTER CREEK HYDRAULIC MINING COMPANY.

From Report of J. H. Brownlee, Managing Director.

"This company has acquired Messrs. Carmichael & Moran's lease on Otter creek, consisting of three miles of the upper portion of the creek and the contiguous benches. The property has been successfully prospected by the former owners with excellent results, No. 1 and 2 pits being opened up. The plant installed by the present company during 1903 may be summarised briefly as follows:—

"Five thousand five hundred feet of supply flume, carrying a maximum flow of 1,000 inches of water, the supply pipe consisting of 2,000 feet of 12, 14 and 16-inch double rivetted No. 14 gauge; intake pipe, 28 inches, connecting with pressure box with sand tank, etc., all



OTTER CREEK HYDRAULIC MINE, ATLIN—GENERAL VIEW.

OTTER CREEK HYDRAULIC MINE—SHOWING PIT.

on solid gravel foundation, 246 feet above present workings; three No. 4 monitors with Hoskins deflectors; bywash consisting of 1,500 feet of ditch and 400 feet of double 12-inch pipe-line. The bedrock flume, 30 inches wide and 40 feet long, has been extended 150 feet. There is a full equipment of tools, blacksmith's supplies, etc., and a commodious dining-room, bunk-house, cook-house, foreman's cabin, blacksmith shop, tool-house, powder-house, stable and other buildings have been erected.

"Development began on July 1st, 1903, an opening being made 1,000 feet below No. 1 Pit; the rim was blasted out and the old channel, prospected by the former owners, was reached just as water gave out. A tunnel was also driven across the channel, which is 80 feet wide with a 4-foot pay-streak and a splendid bedrock grade up stream, with satisfactory results, and everything is in readiness for beginning work in 1904. Surveys have also been made for conserving dams.

"The company has also acquired 160 acres of bench ground below the present workings, which it is intended to prospect with Keystone drill. The principal owners (Mr. Switzer and associates) also have a lease of three miles of Flat creek ground which it is proposed to dredge.

"The company is in good financial condition and the outlook is most encouraging."

McKee Creek.

From 15 to 20 individual miners operated on McKee creek this year, with about the usual results, which have always been exceedingly good.

Atlin Mining Company.

R. D. Fetherstonhaugh, Manager; M. Brophy, Hydraulic Superintendent.

This company commenced mining on May 22nd, and operated 131 days, but owing to damage caused by spring freshets and scarcity of water in the autumn, only 54½ days' actual piping was done. In this time 9,500 square yards of gravel were uncovered, from which about $30,000 was recovered, while the manager estimates that about $8,000 is locked up in 700 feet of the sluice-boxes which, through an early attack of frost, they were unable to clean up, and another $8,000 was stolen when the sluice-boxes were robbed on the night of August 23rd last. This company was peculiarly unfortunate this season, (1) through damage done by spring floods, (2) by the robbery of its sluice-boxes, and (3) by being unable to clean up all its boxes and being thus denied the use of the gold locked up therein. About 40 men were employed, viz.:—25 labourers and 15 laymen working on percentage, the expenditure being about $22,000 for labour and $18,000 in building dam, flume and plant of various kinds.

On the McKee Consolidation, C. Christopher, Manager, not much work was done beyond getting the lumber on the ground for the flume and the partial construction of the same. Some drifting is being done on the ground this winter. I believe the owners intend to bring in a hydraulic plant over the ice and instal it early in the spring.

The McKee Consolidated Hydraulic, Limited, F. T. Hamshaw, Manager, has done considerable work in the way of laying flume, building retaining dams and dwellings and getting everything possible in readiness for active piping next spring. A good deal of prospecting has been done, with very satisfactory results to the management. I fully expect to see a large amount of work done on this property next season.

On Snake creek a number of leases have been taken up, but not much work has been done, although here also I expect there will be a hydraulic plant in operation before the close of the next season.

On Dixie creek and O'Donnell river, to which Dixie is tributary, a number of leases have been located, but no systematic prospecting has been done except in two places. In one place on

O'Donnell river a crew of four men worked for several months prospecting, with encouraging results, but they had to suspend operations for lack of funds to continue during the winter.

In another place on Bull creek, a tributary of Dixie creek, some leases were located last spring and the Bull Creek Hydraulic Syndicate expended about $1,600 in development, with results which promise active operations on a large scale next season. This property lies a considerable distance from Atlin, and roads and trails must be built for several miles to permit plant, etc., being brought in, but once in operation a large area of auriferous ground will be laid under contribution.

Graham Creek. This creek having been abandoned by the individual miners, a small syndicate located a number of leases thereon, expended quite a sum of money in roads, surveys, prospecting, &c., and claims to have secured very encouraging prospects. The company expects to instal a plant next season.

A large number of mining and hydraulic leases have been located this season, and many that were ostensibly in good standing, but were delinquent in the matter of both rental and assessment, have been cancelled and the ground thrown open.

The actual operating portion of this season has, unfortunately, been very short, for two reasons. In the first place, the high water in May and early in June did much damage on all the creeks, by carrying away the water-wheels, sluice-boxes, wing-dams, etc., and in many instances it took three and four weeks of valuable time to restore the ground and appliances to the condition in which they were before the freshet; and, secondly, the snowfall being light last winter with not much rain during the summer, the water supply in all the creeks except Pine became so scarce that it was impossible to operate either wheels or sluices fully, and many had to suspend operations two or three weeks earlier than in the previous year, notwithstanding which, the acknowledged output is considerably in excess of that of 1902.

As already mentioned, men are drifting this winter on Boulder, Pine, Gold Run, Spruce and McKee creeks, and almost all of them are apparently satisfied with their prospects.

The supply of labour has not been equal to the demand during the season.

Mineral Claims.

Not much beyond the necessary assessment to keep them in good standing has been done on any mineral claims in this District this year, with the exception of the *Yellow Jacket* and adjacent properties operated by the North Columbia Gold Mining Company, Limited, the *Beavis Group*, the *Imperial Group*, the *Gleaner Group*, the *Engineer Group*, and the *White Moose*, on Taku arm.

On the *Yellow Jacket* and extensions Mr. Ruffner, for the North Columbia Gold Mining Company, Limited, has done considerable prospecting and sinking, having sunk one shaft 85 feet and intersected the ore body at that depth, finding very high values. There is a five-stamp mill on the property, and from 5 to 15 men were continuously employed.

On the *Beavis Group* little has been done this year, but sample shipments sent out to the smelter have given returns that have made the bondholders feel very well pleased with their property, and I understand they contemplate putting on a force of men at an early date with a view to permanent development and operation.

Little has been done on either the *Imperial Group* (Munro mountain), or on the *Gleaner* and *Engineer Groups* (Taku arm), since last report.

Considerable work has been and is now being done on *White Moose Group*, and the owners are very well satisfied with the extent and values of the ore body as already shown up. Until there is a reduction in the cost of supplies, and consequently in the price of labour and

material, the development of quartz properties in this Division will be slow, especially while the returns from placer mining are so encouraging. Many locations on which only assessment work has been done are showing up very well as far as developed.

OFFICE STATISTICS—ATLIN MINING DIVISION.

Records issued, 225, representing	256	claims.
Re-records issued, 506, representing	540	"
Bills of sale recorded	375	
Grouping permits issued	17	
Permits to move stakes issued	15	
Abandonments filed	31	
Leave of absence granted, representing	509	claims.
Free miners' certificates issued (individual)	819	
" " (companies)	11	
" " (special)	4	
" " (substitute)	1	
Mineral records issued	57	
Certificates of work issued	112	
Notices filed under "Mineral Act"	5	
Bills of sale recorded under "Mineral Act"	28	
Bills of sale recorded, "hydraulic"	108	
Applications for hydraulic leases cancelled	164	
" " declined	15	
Hydraulic leases cancelled	49	
" " applied for	191	
" " issued	37	
Water records applied for	27	
" issued	15	
" abandoned	2	
" cancelled	16	
" in force	59	
Investigations held by the Gold Commissioner under Part IX. of "Placer Mining Act"	44	

REVENUE COLLECTED.

Free miners' certificates, individual		$ 3,700 25
" " company		1,100 00
Mining receipts, lease rentals		9,345 00
" lease deposits		3,820 00
" water rentals		3,450 00
" bedrock flumes		225 00
" leave of absence		1,290 00
" other sources		5,053 65
		$27,983 90
Royalty on mines and minerals	$5,381 00	
Less amounts refunded	1,173 85	
		$4,207 15
		$32,191 05
Collection of revenue from all sources other than mining		$8,715 81
Total revenue of Atlin office for 1903		$40,906 86

GOLD PRODUCED UPON WHICH ROYALTY WAS PAID.

CREEK.	INDIVIDUAL MINERS.			COMPANIES.		
	Ounces.	Value.	Royalty.	Ounces.	Value.	Royalty.
Pine Creek	4,458	$ 69,090 00	$ 1,328 45	2,488	$ 38,565 00	$ 585 20
Spruce Creek	6,219	99,500 00	1,681 80	12	195 00	3 90
Boulder Creek	3,528	54,676 50	948 20	2,015	31,240 00	624 80
McKee Creek	432	6,696 00	60 70	258	4,060 00	80 00
Birch Creek	95	1,475 00	.....	333	5,160 00	63 20
Wright Creek	100	1,550 00	6 00	.....	.....	.....
Otter Creek	.....	.....	.....	28	437 50	8 75
Total	14,832	$232,995 50	$4,015 15	5,134	$79,597 50	$1,365 85

SUMMARY.

	Ounces.	Amount.	Royalty paid.
Individual miners	14,832	$232,995 50	$4,015 15
Companies	5,134	79,597 50	1,365 85
Total	19,966	$312,593 00	$5,381 00

BENNETT LAKE MINING DIVISION.

Considerable activity has obtained in the Bennett Lake Division in the development of quartz claims, and the indications are that some of the properties will develop into valuable mines. Although the various mine or prospect owners were asked for information regarding their properties, but few have responded, so that I am unable to report in detail.

OFFICE STATISTICS—BENNETT LAKE MINING DIVISION.

I find that 13 locations and 26 certificates of work were recorded at Bennett.

REVENUE COLLECTED.

Free miners' certificates	$158 75	
Mining receipts	191 25	
		$350 00
Other receipts were :—		
Trade licences	$30 00	
Revenue tax	192 00	
		$222 00
Miscellaneous		85 00
Total		$657 00

This office was closed and the Division included in Atlin Division on and from December 1st, 1903.

CHILKAT MINING DIVISION.

Report of W. J. Rant, Mining Recorder.

I have the honour to submit the following report of mining operations in the Chilkat Mining Division for the year ending December 31st, 1903.

I regret to be compelled to report the decadence of mining in all its forms in this Division for the last two years, the cause of which may be attributed principally to the lack of transportation facilities and the discomforts to be endured by persons visiting the district, so that capitalists, so far, have not been induced to come in and look at the properties, no sales have been made, and consequently no work but that required by the Act to hold the claims has been done, while prospectors owning more claims than they can carry have been compelled to abandon from year to year, until only about one-third of the claims originally staked in the Division are at present in good standing.. I more particularly refer to the Rainy Hollow district, which by the recent decision of the Alaska Boundary Commission appears to be the only discovered mineral ground remaining to British Columbia in the Chilkat Mining Division.

Placer Mining.

Placer mining by individuals is practically dead in this division, the whole of the once promising Bear creek having been abandoned. Difficulties of working caused by high water and quicksands discouraged the prospectors, so after two years' work they gave it up. During this summer a party of four from Juneau have been thoroughly inspecting the creeks, and seemed hopeful when they came out in the latter part of September that something might be done. Subsequently their leader, Mr. R. Saunders, returned with two experts and again looked over the creek; they decided that the only way of working to advantage would be by hydraulics, and with this object in view Mr. Saunders is applying for a lease and proposes putting in a plant next spring.

A dredging lease of five miles of the Klehini river, from the mouth of Porcupine creek towards Wells, has been applied for by Mr. Clarence Berry, of Dawson, who has had an expert in here prospecting the bed of the river. This should prove a successful venture, Porcupine creek having turned out gold in paying quantities for the last four years. I regret to add that we lose this ground also by the Alaskan Boundary Award.

Office Statistics.

Free miners' certificates issued	52
Locations recorded	19
Certificates of work recorded	20
Placer lease applied for	1
Groupings filed	4

Revenue.

Collections have been falling off continually in this district since 1890, in consequence of which the Government has decided to abolish Wells as a Recorder's Office from this date. In any case the office will have to be moved, as Wells falls to the United States.

NORTHERN PORTION OF CASSIAR DISTRICT.

(INCLUDING TESLIN, LIARD AND STIKINE MINING DIVISIONS.)

Under date of the 30th December, 1903, the Gold Commissioner of the District, Mr. James Porter, reports as follows:—

I am not able to report a very marked improvement in the mining industry, although when comparing the season's operations with those of the past year (1902) an advance is perceptible, as shown by the yield of gold, which may safely be placed at $35,000 for 1903, an increase over last season's output of nearly $20,000.

In the early part of the summer two miners from Atlin outfitted at Telegraph Creek, and with the aid of pack-horses proceeded over what is known as the Ashcroft trail to the Second South Fork of the Stikine river, spending some time there in prospecting for gold. When they returned in the fall they did not record anything, but they seemed to be very well satisfied with the country, for they assurred me that they intended returning there better equipped as soon as it is possible to travel next spring. The locality is one that has so far received but little attention, and it is to be hoped that it will in time prove to be of some worth. Other than this, but little outside prospecting has been undertaken here this season, the prospectors, as a rule, having confined their labours to the already discovered localities.

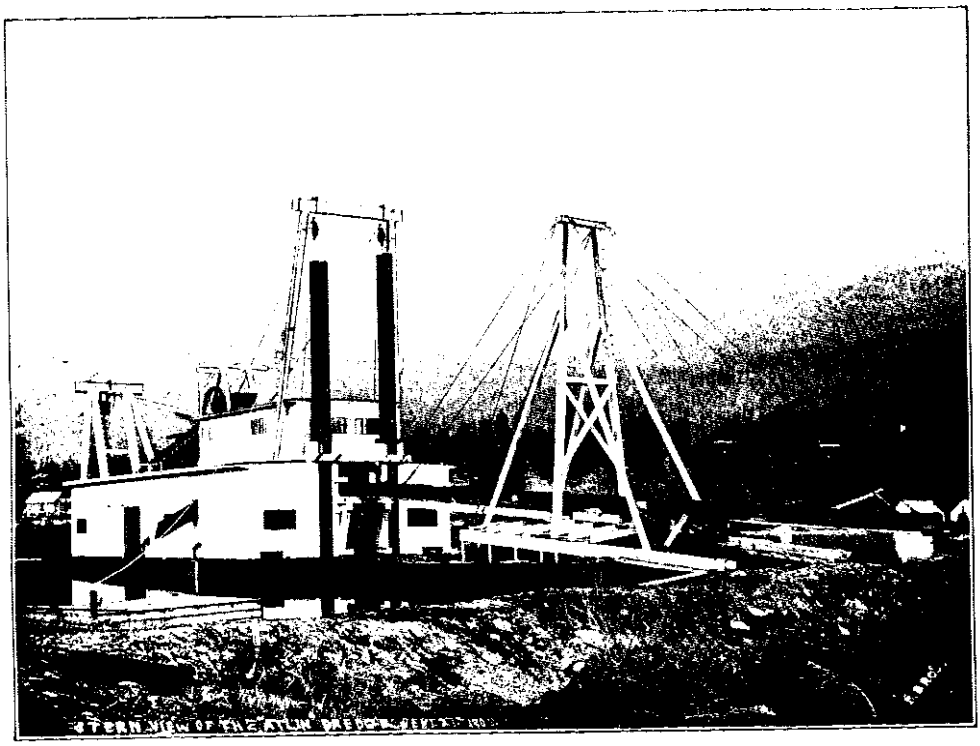
One creek and five hydraulic leases have been granted during the season, but not yet executed. They are situate on Dease creek, near its entrance to Dease lake. The ground covered has since early days been considered rich, but owing to the many obstacles standing in the way, such as drainage, the excessive expense that would necessarily have to be incurred in reaching the locality with suitable machinery, &c., &c., it has remained idle all this time. I feel confident that when machinery can be put on the ground for anything like reasonable cost there will be a large amount of gold taken from the hills that now hide the old channels of Dease, Thibert and McDame creeks.

THIBERT CREEK HYDRAULIC MINE.

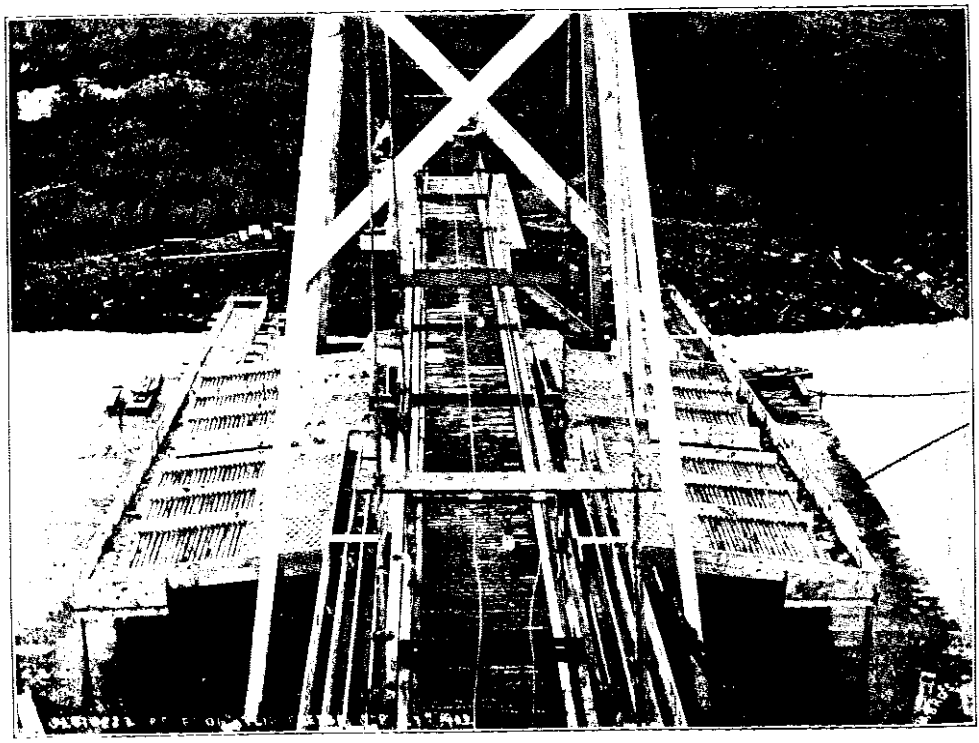
NOTE BY PROVINCIAL MINERALOGIST.—Mr. Alex. Hamfield, the Manager of the Thibert Creek Hydraulic Mine, has kindly placed his official report of the season's work at the disposal of the Provincial Mineralogist, and by permission the following extracts have been made therefrom:—

"The Thibert Creek Mine is on an old river channel on the south side of the modern creek, following the same general direction west to east. From the junction of Berry creek for about two miles it has not been touched by the present stream, but remains intact, and here are situated the seven claims, each 1,500 feet long, or a total of 10,500 feet, which comprise the mine. It is hard to give any exact measurements of its width and height, but judging from where we have worked at the upper end, and where the channel has been exposed in two places at its lowest portion I should estimate it to have an average width of 400 feet, and a height, which of course varies greatly in places, of something over 100 feet. Our work has been done on one of the most difficult portions of the channel, the banks now being 150 feet, where a large part of the overlie was composed of mud and boulder clay. This latter does not show anywhere else, gravel taking its place.

"The present water supply comes from Berry creek, which carries from 2,000 inches during the spring freshet and as little as 500 inches in extreme low water. Besides these there are four more—but smaller—water rights granted by the Government, not yet utilised. The water is carried to the mine from Berry creek, by a flume 1¼ miles long. Its size is 30 inches



ATLIN DREDGE—STERN VIEW, SHOWING TAILINGS STACKER.



ATLIN DREDGE—SHOWING DETAILS OF GOLD-SAVING TABLES.

by 30 inches, on a grade of 40 feet to the mile, with a capacity of 1,000 miner's inches in 24 hours, giving a head of about 300 feet from intake of pipe-line to the bedrock in the mine.

"The height of bedrock in the old channel to the modern creek is 85 feet at the upper end of the mine, and increasing down stream. The valley of the present Thibert creek is from 400 to 600 feet wide, and as the mine is opened up by cuts into the side of the old channel, there is always plenty of dump for tailings and grade for cuts. The cuts through which the gravel is washed are at present three, in which the sluices for the saving of gold are set. The latter are 5 feet by 3 feet, paved with wooden blocks 12 inches high, and run on a grade from 9 to 11 inches.

"The equipment consists of: 2,000 feet of No. 13 B. W. G. pipe graduated from 14 to 10 inches, with necessary elbows and Y branches; two No. 2 monitors; two No. 4 monitors (ball-bearing); two valves for 12-inch pipe; two valves for 10-inch pipe; five rock cars; one saw-mill, capacity 6,000 feet per day; one 20 horse-power boiler; one 15 horse-power engine; one blacksmith outfit; a certain quantity of lumber, hardware and supplies, and a few buildings. *One miner's inch = about 1.5 cubic feet of water per minute. One working day means* 24 hours.

"During the two previous years washing was carried on for about 100 days, with from 200 to 500 inches of water—450 inches can probably be set down as a fair average per day—and during this time $13,500 worth of gold was recovered, or 30 cents per miner's inch. This is less per inch than recovered this season, but when we remember that during a great part of this time the water was used for opening up the mine, it can readily be accounted for. When starting on a side hill, as we did, where no previous work of any kind had been done, it will be easily understood that water can not be utilised to its best advantage, and that when as small a head as 200 inches is used, the efficiency of the inch is immensely reduced. It is almost impossible to give a correct estimate of the cost of production during this time, as it was so much mixed up with the cost of construction and other work. However, the running expenditures were about covered by the $13,500 gold taken out.

"Statement of operations for the year 1903: Number of days worked (1 day = 24 hours), 98; amount of water used per 24 hours, 475 miner's inches; total of water used during season, 46,550 miner's inches; amount of gold recovered during season, $*; working cost for one year, $17,400; profit per one year, $*; working cost for $1 of gold recovered, $0.83; profit for $1 of gold recovered, $0.17; amount of gold recovered per miner's inch, $0.45; working cost per miner's inch, $0.37; profit per miner's inch, $0.08; approximate amount of gravel moved, cubic yards, 162,925; approximate amount of gravel per miner's inch, cubic yards, 3.5; approximate value of gravel per cubic yard, $0.13.

"The shortness of the season's run—98 days—is accounted for by two facts. First, because the pipe-line not being laid, machines or valves not set, washing operations could not commence until June 13th. Second, because after the last clean-up, which took place the first days of October, we did not desire to incur any more expense for this season, from which profits could not have been derived until next year, and therefore we closed down earlier than necessary.

"If the mine were put into proper working shape, it would be quite possible, when pipe-line and machines are in place, to commence washing not later than May 20th. It will always be necessary to have the final clean-up about October 1st, as, on account of cold weather,

*Note by Provincial Mineralogist.—The amount of gold recovered and the profit made are withheld, inasmuch as the property is worked by a private syndicate to which alone this information belongs. I am enabled to say, however, that a material profit was made, which, considering the conditions, was a very handsome one.

bedrock and cuts cannot be picked or cleaned to advantage after this date, but there is nothing to prevent the washing of gravel to continue until the 20th of November. The best plan to adopt would be to so arrange it that the first two weeks in the season were devoted to washing off the top dirt. This would only require a few men, who could be picked up in the country. When the bulk of the working crew came in, which would be in the commencement of June, the heavy ground (bottom with boulders), should be attacked. After the last clean-up, this crew could then be sent out, and only the original men retained, when the last two weeks would again be devoted to running top gravels. It would thus be possible to get a working season of 150 days with the smallest amount of expense.

"The small amount of water used (475 miner's inches per 24 hours) was caused partly because half the time we were obliged to work with only one of the small monitors, and partly from the fact that the season's water supply was very short. We have two large monitors, capacity 600 inches each, and two small ones, each 400 inches. By being compelled to work the small ones half the time, we, of course, lost a great deal of water during the time when the supply was good. In my five years' experience in the country I must admit that this has certainly been the worst one for water, and even old inhabitants, who have been here for 25 years, say that it has been the driest they have known. This is very unusual for this country, as the watershed here can really be considered very good. It is to be remembered that so far we have done almost nothing to improve the water supply in Berry creek, either by leading other creeks into it, or by building dams so as to preserve what water there is, but are entirely dependent on the natural flow. Therefore, a great deal, from two to three times as much as we can use, goes to waste during the first two months of high water, and even later in the season when we have rains we can, of course, only use a 'head,' and the balance has again to run down the creek. Our present supply (475 miner's inches) is now altogether inadequate, when we have to wash banks as high as 150 feet. For this purpose we ought to have not less than 1,000 inches and as much more as can be got. There are three different propositions for supplying the mine with water, each one quite feasible from a topographical standpoint and within the limits of a reasonable expenditure of money. By having longer sluices and perhaps a series of undercurrents a closer saving of the gold could be effected.

"No saving was attempted of the osmiridium of which there is a certain amount present. This should and could easily be remedied if the mine were put in a better working shape, for it is often in the close saving of gold that profit becomes possible.

"Although operating with an entirely insufficient supply of water during a very short season, and labouring under other disadvantages, such as bad grades, we have still managed to make a small profit. If the mine was worked on a scale commensurate to its size there would be effected a very large saving in the expenses for each dollar of gold produced, so much so, that this saving would in itself be a very good profit, even if none had been made under present conditions. The body of gravel is quite large enough to ensure the life of the mine for a lengthy period, even when worked on a large scale."

A very large portion of the Cassiar District is but little known, and there exist new fields for the prospector that have never yet been entered by white men. The great necessity of the district is the advent of railways and transportation facilities.

Nothing other than the usual amount of assessment work necessary to hold them has been done on any of the mineral claims in this district during the season, and no new locations have been recorded.

SKEENA RIVER MINING DIVISION.

(A Division of Cassiar District under the jurisdiction of the Victoria Gold Commissioner.)

Report by John Flewin, Mining Recorder.

I have the honour to submit herewith my report on mining matters in the Skeena Mining Division during the year 1903:—

Development work has been confined chiefly to Princess Royal island, Gribbell island and the Kitimat and Portland canal camps. Considerable prospecting was done at a number of different points in the district, several very promising locations having been made in the Bulkley river, Portland canal and Kitimat camps. On the whole, there has been less activity than during the previous season.

Princess Royal Island.

Under the management of Mr. Tweedie, extensive development work is being prosecuted on the *Princess Royal Group*, shipments of ore being made from time to time to the Crofton smelter, Vancouver Island. The values continue to range high, the net smelter returns being very gratifying. About 20 miners have been steadily employed during the season, the ore being packed from the mine to Surf inlet on horses, and thence shipped by C. P. R. steamers to the smelter.

The *Thistle*, *Rose* and *Norah* mineral claims have been surveyed during the year for the owners, preparatory to applying for Crown grants.

On the *Bay View*, *St. Patrick* and *Teddy* mineral claims, Mr. Geo. A. Kelly has run a tunnel 25 feet in length and increased the depth of the shaft 15 feet.

A shaft 30 feet in depth, with a cross-cut of 10 feet at the bottom, has been sunk on the *War Eagle Group* by Mr. W. B. Morse.

Gribbell Island.

On the Gribbell Island Copper Co.'s property nine miners have been continuously employed since last May. Two small prospect shafts were sunk on the vein and the manager, Mr. Steel, then concluded to drive a 5x7 foot tunnel at a depth of 250 feet to tap the ledge. This tunnel is now in 260 feet, and it is expected that the ledge will be struck in a short time, a cross lead carrying gold values having already been encountered. Six thousand dollars have been expended to date on this property.

The Canadian-American Development Company has accomplished a large amount of work on its property during the season. It is now engaged in putting in wharf and tramway facilities, and expects to be shipping ore in a very short time.

Kitiamat Arm.

On the *Golden Crown Group* Messrs. Steele and Dunn have recorded the following work: One open cut 16 feet long, 32 feet deep and 19 feet wide, in rock and earth; one tunnel, 4 by 6½ feet, a distance of 10 feet in rock; one open cut 25 feet long, 12 feet wide and 12 feet deep, in rock and dirt.

On the *Paragon* and *Pioneer* mineral claims, the same owners have run one open cut 35 feet long, 7 feet wide and 8 feet deep, in rock and dirt.

On the *Peerless* claim the same owners have run one open cut 7 feet long, 8 feet wide and 5 feet deep, and one open cut 14 feet long, 20 feet wide and 12 feet deep, both in rock and dirt, and have also stripped the ledge 50 by 15 feet.

On the *Alabama Group*, consisting of the *Alabama, Arizona, Virginia* and *Kentucky* mineral claims, Messrs. Mooney and Pettigrew have performed the following work:—Run one open cut 20 feet long, 10 feet deep and 5 feet wide; one open cut 20 by 12 by 5 feet; one open cut 15 by 5 by 4½ feet; stripped the ledge 30 feet long, 20 feet wide and 5 feet deep at one point, and 15 feet long, 5 feet wide and 5 feet deep in another place, all in rock and dirt.

On the *Arkansas* and *Florida* mineral claims, same owners, the work consists of the following:—One open cut 29 feet long, 10 feet wide and 4 feet deep, and one 10 feet long, 5 feet wide and 8 feet deep, both in rock and dirt.

At Iron mountain, about 15 miles up the Kitiamat valley, the Lindeborg Brothers have done the following work on the *Bullion* and *Bimetallic* mineral claims:—Run one open cut 20 feet long and 10 feet deep, in rock; one tunnel 10 feet; one cut 8 feet; one tunnel 24 feet, and one open cut 8 feet.

On the *Mountain Goat, Lucy* and *Sarah Jane* mineral claims, situated on Gardiner's inlet, the owners, Messrs. C. A. Conlee and Jos. Hilton have run one tunnel in solid rock 4 by 6½ by 20 feet long.

QUEEN CHARLOTTE ISLANDS.

On the *Margaret* mineral claim, on Moresby island, owned by Mr. James Raper, the following work was done:—One open cut 24 feet long, 4½ feet wide and 11 feet deep at the face, and one 5 by 8 shaft 10 feet deep.

The *Skincuttle Entrance, Golden Gate* and *Trust* mineral claims, also on Moresby island, owned by Messrs. Heino & Hendrickson, of Extension, B. C., are now under bond to Seattle parties, who intend, if possible, to ship ore early in the coming season. The following work has been performed on these claims:—One shaft sunk 30 feet; one shaft 17 feet; one tunnel run 30 feet and one tunnel 7 feet.

The *McGuire, London* and *Morning Star* mineral claims were located early in the season on Gumshewa inlet by Mr. David Yule, on a ledge showing values in copper and zinc blende.

KITSILAS CANYON.

In this camp only statutory assessment work has been done during the season, on the following claims:—*Great West, Northland, Helma, Monte Christo, Ruby, Golden Crown, Strathcona, Granite, Toulon, Bull Dog* and *Montezuma.*

LORNE CREEK.

In this camp very extensive work has been done on the property of the Dry Hill Hydraulic Company, under the management of Mr. F. E. Holt. The company has completed its large flume from the dam at the falls on Lorne creek to the claim, which should give all the water required to work the property. A short run was made and a very gratifying clean-up secured. Everything is now in splendid shape for the coming season's work, and the company is looking forward to a handsome return on its investment.

The Hardscrabble Company, organised by F. R. Blochberger, of Rossland, has also commenced work on its hydraulic proposition, but most of the season was consumed in organising, prospecting the ground and making estimates for work for the coming year.

It is anticipated that another hydraulic company, now in process of formation by Mr. Jno. P. Fults, Jr., of Fairhaven, will also shortly commence operations on the creek. Taken altogether, the future looks very bright for this old abandoned placer camp.

BULKLEY RIVER.

In this camp statutory assessment work has been performed on the following claims:—*Telkwa, Naiad, Daisy, Oread, Discovery, Eldorado, Big Blue*, and *Surprise.*

A new discovery of high grade copper ore was made during the season by two Montana prospectors, Messrs. Hunter & Estib, who recorded seven claims on Goat creek and an unnamed tributary of the Telkwa river. The locators (who are old prospectors) say they never saw finer prospects in any camp they had previously worked in, and they have returned to the United States to interest capital in their discoveries.

Portland Canal.

The past season has seen a large number of prospectors in this camp and considerable development work done, besides some 40 miles of trails cut, and houses built on various properties. Still, with all the prospecting done, there is a large extent of this vicinity which has never yet been entered by a white man. It is expected that this will develop into an important camp before many years, the geological formation and general conditions being reported as exceptionally favourable. From the *Stewart* ledge, at the head of the canal, to the placers and valuable mineral locations, situated on the tributaries of the Unuk river, the distance in a straight line is only about 40 miles, a large glacier separating the two camps. The general impression is that the mineral belt extends from the *Unuk* ore body, under the glacier, to the head of Portland canal.

The Portland Consolidated Company's property consists of 18 claims, divided into three groups. They are located near Maple bay on the Burniston range of mountains. At this point on the canal the distance across to Observatory inlet is only about 7 miles, the *Bonanza Group* of mineral claims being situated on the latter directly across the range. In addition to trails cut and houses built, the following work was done:—One open cut 20 feet long, 7 feet wide and 6 feet deep, in rock and slide; stripping 20 feet; No. 2 tunnel, faced up; No. 1 tunnel, driven 25 feet. The assays on this property range from $20 to $80, an average sample across the ledge at the end of the tunnel giving a return of $30 per ton, principally in copper. The main ledge is very distinct, standing almost vertical in the centre of Mount Alexandra.

The *Roosevelt Group*, consisting of the *Roosevelt No. 1* and *No. 2*, *Pontiac Miller* and *Northern Belle* mineral claims, the property of Messrs. G. Chambers, J. E. Stark and D. J. Rainey, is situated on Bitter creek, fifteen miles from the head of the canal. Although the surface showing of the ledge is small, it gives good values in gold and copper. The owners have had a gang of men working all the winter driving a 200-foot tunnel on the main ledge. This property is under bond to Mr. M. K. Rodgers.

The *American Girl*, *Mountain Boy*, *Northern Belle* and *Hard Money* mineral claims are situated on American creek, a tributary of Bear river, 20 miles from salt water, and are owned by Messrs. F. P. Stewart, M. I. Stewart, Jno. Conway and H. W. Brightwell. This property has a very large showing of high grade galena and copper ore, assays going as high as $600 to the ton. Nearly every sample shown me on my visit to the camp contained free silver in considerable quantities. This ore also assays well in gold. The owners were occupied most of the season in cutting a trail from the head of the Canal. The following work was also done:—One open cut 35 feet to tap the ledge, the width of the cut being 12 feet at the mouth and 25 feet along the ledge, with a depth of 25 feet at the ledge.

Observatory Inlet.

In this camp statutory assessment work was performed on the *Bonanza* and *Hidden Creek Groups* of claims.

A new location was made on Alice arm in October last by Messrs. Roundy & Nicholson on a ledge carrying galena and zinc blende.

UNUK RIVER.

The Unuk River Syndicate, consisting of Messrs. Ketchum, H. T. Ceperley, F. W. Rounsefell, Thos. E. Atkins, Gordon Drysdale and the British American Development Co., deserves great credit for the persistent manner in which it has been developing this camp, in the face of the great difficulties and large expense of getting in supplies. In describing this camp, I cannot do better than quote from a letter written me by Mr. D'Arcy Macdonald, Deputy Mining Recorder for Unuk river, during the past season:—

"On the 5th day of April, 1903, we left Ketchikan, there being a party of five of us, who were all in the employ of the syndicate. On the morning of the 6th we reached the mouth of the Unuk river, which empties into Burroughs bay, on the Alaskan coast, about 70 miles north of Ketchikan. The outfit consisted of the usual supplies for such a trip, our means of transportation being two 30-foot boats, each boat having about a ton of supplies. Our means of getting up the river was by two men towing the boat with a line and another man at the boat's bow keeping her into the deepest water. After getting up the river some 35 or 40 miles in this manner to the mouth of the South Fork, we sledded the supplies some 10 or 12 miles up the latter stream to what is known as the South Fork property of this syndicate, where we spent 16 days surveying the group for Crown-granting. It took us 15 days to reach this point from the mouth of Unuk river. We then returned down the South Fork by sled and went on to Sulphurets creek, where the syndicate's *Cumberland* group of claims is situated; this group we also surveyed.

"After ascending the Unuk for a distance of 30 miles from its mouth, we crossed the granite formation, and it is about here that the International Boundary Line runs between Alaska and British Columbia.

"Leaving the granite, the next formation we encounter is a green stone or serpentine, which extends up the river for some miles, where it forms a contact with a dolomite. At the contact, which has a south-easterly trend, the ledges of the different ores occur, having in nearly all instances a quartz gangue, except where the solid lead of galena ores occur. There are also some irony dykes running parallel with the contact, which give fair assays in gold. Along the South Fork we found some splended float specimens of stephanite and other high grade silver ores, which apparently did not come from very far, and no doubt, with prospecting, ledges of these minerals will be found. Already some chutes of this ore have been encountered on the *Cumberland Group.*

"Above the latter group, on Sulphurets creek, there has been considerable placer mining done, with varying success. Mr. Ketchum, who has been making annual trips in here for the past eight years, assures me there is a coarse gold in this creek, he having got nuggets which were worth as high as $8.50, but the great difficulty is the water, which is so high in the summer months that it is impossible for an ordinary prospector to work the ground. Apparently, the only feasible way would be to outfit in October and go in and work during the late fall, winter and early spring, which would be a very trying experiment for two or three men. The country abounds in game and furs. Both grizzly and black bear are plentiful, and I have seen as many as five in one herd.

"If there were a trail or road into this vicinity there are unquestionably mineral leads which are worthy of development, in addition to the very favourable expectations of good placer or hydraulic ground, and it is believed that the prospects of the district would be assured was the transportation problem solved.

"The following are some of the assays made by Mr. Ketchum from the South Fork claims:

"No. 1.—Pyritic ore—silver, 13 oz.; gold, $40 per ton.

"No. 2.—Steel galena—silver, 12 oz.; gold, $20 per ton; lead, 23 per cent.

"No. 3.—Complex ore—silver, 17 oz.; gold, $18 per ton.

"No. 4.—Galena—silver, 36 oz.; gold, $20 per ton; lead, 59 per cent.

"Picked samples from the camp have assayed:—

"Chalcopyrite—Copper, 32 per cent.; silver, 68 oz.; gold, $122 per ton.

"Gray copper—Copper, 16 per cent.; silver, 5,000 oz.; gold, $1.75."

Mr. John W. Daily, of Danville, Ill., has a bond on the *Cumberland Group* of claims, and is now constructing a waggon road from tide water up the river to this property.

The following work has been done in this camp:—On the *Cumberland Group* one tunnel has been run, dimensions, 5 by 6 feet, 50 feet long, timbered; one 5 by 6-foot tunnel, 37 feet long; one open cut, 5 feet wide, 5 feet long and 3½ feet deep; six open cuts, 5 feet wide, 7 feet long and 4 feet deep, all in solid rock. On the *South Fork Group*:—One cross-tunnel, 5 feet by 6 feet 2 inches, 60 feet long; seven open cuts which will average 7 feet wide, 6 feet long and 4 feet deep, faced up for tunnels. There is a portable stamp-mill, run by water power, on this property, with canvas concentrating tables for practical sampling. In addition, there are several miles of trail cut by Mr. Ketchum; also good cabins, blacksmith shops and ore bins built on both properties.

Office Statistics—Skeena Mining Division.

Number of free miners' certificates	142
" mining claims recorded	100
" certificates of work	131
" conveyances	49
" certificates of improvements	13

Revenue Collected.

Free miners' certificates	$ 663 50
Other mining sources	738 65
Total	$1,402 15

CARIBOO DISTRICT.

CARIBOO AND QUESNEL MINING DIVISIONS.

REPORT BY JOHN BOWRON, GOLD COMMISSIONER.

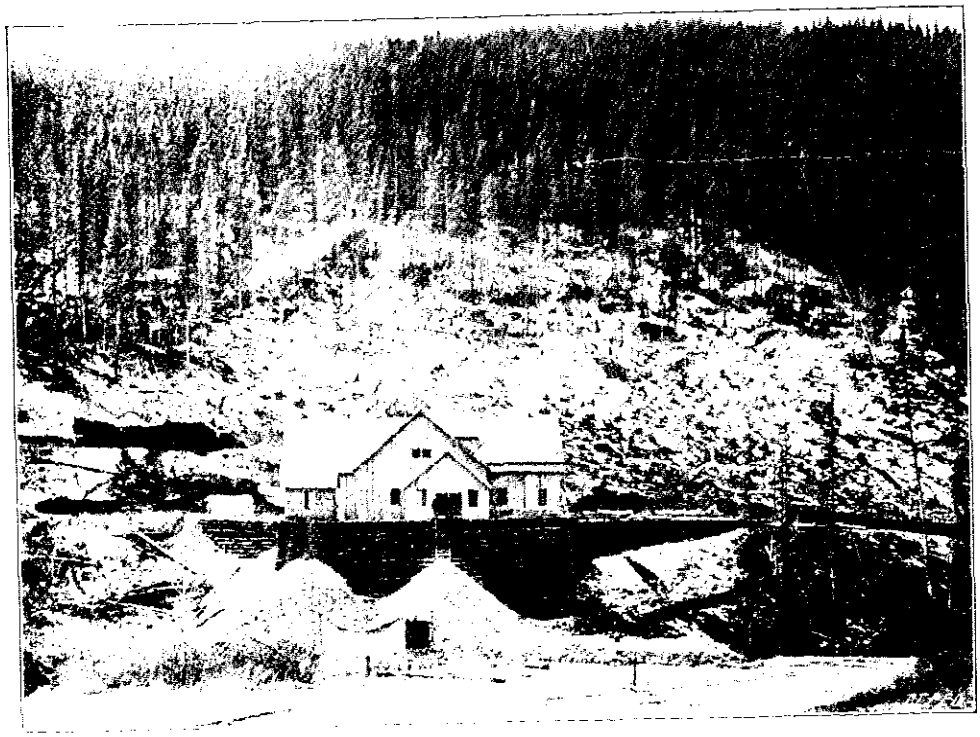
In submitting my twenty-ninth annual report upon the mining industry of Cariboo, I have the honour to say that, in so far as the result of the season's operations are concerned, it has been one of disappointment. The heavy rain which commenced about the end of June and continued nearly the whole balance of the season, had a most deleterious effect upon mining operations, as, while it did not come soon enough in the spring to be of any material benefit to most of our hydraulic companies in their piping operations, they being chiefly situated so near the source of the water supply that they are dependent, in a great measure, upon the winter's snowfall to obtain a pipe-head under the requisite pressure, yet, on the other hand, this incessant rain had the effect of so saturating the ground that companies working the deep diggings were in some instances compelled to suspend operations. From this cause the extensive works at Willow river were closed down, as were the *Point* and *Van Winkle* claims on Lightning creek, which contributed so largely to the previous season's output, while all deep diggings were more or less prejudicially affected. True, a few of the hydraulic mines are so situated as to be benefited by these incessant rains, and had consequently a longer run than usual, but by far the greater number were obliged to shut down after an exceedingly short working season, sometimes not exceeding 20 piping days.

The season's experience has consequently revived the question as to the importance of going more generally into the construction of dams, to create reservoirs in which to store surplus rain water at a sufficient altitude for piping purposes, and this question is the more important from the fact that there are vast areas of auriferous gravels which cannot be worked profitably until the claims now holding first rights to the water are either worked out or abandoned.

In reviewing the past and present conditions of mining in this Province, one is impressed with the idea that the Cariboo District has yet a great future. Upwards of 40 years ago the district was annually making a large output of the precious metal, and has since, each year, continued to produce largely, yet to-day her transportation facilities are scarcely better than shortly after the first discovery of gold, while new mining camps have sprung into existence elsewhere and have been provided with either railway or steamboat communication.

Owing to our isolated position, much interest is manifested in regard to the construction of a second transcontinental railway, and even though the Peace or Pine River pass be adopted by the Grand Trunk Pacific Railway causing that company's proposed line to pass several hundred miles to the north of the present settled portion of this District, it is felt that this northern portion of the Province will shortly receive that recognition its undoubted latent resources merit, by the construction of a line from north to south, connecting the two transcontinental roads. At the same time hopes are entertained that, upon a more thorough survey and a better knowledge of its natural advantages becoming known, the more southerly Yellow Head pass of the Rocky mountains may yet be selected, which would bring the main line within measurable distance of these extensive gold fields, as also near the pastoral and agricultural lands of the District.

LAFONTAINE CAMP, LIGHTNING CREEK CARIBOO MINING DIVISION.



CARIBOO CONSOLIDATED CO'S SHAFT HOUSE LAFONTAINE CARIBOO M. D.

The recent discovery of an excellent pass through the Cariboo Mountains, between Tête Jaune Cache, *via* Goat river to Barkerville, which was unknown at the time the Canadian Pacific Railway surveys were being made, will, it is thought, have a very potent influence in deciding the company to adopt this line.

Fewer persons, perhaps, than for several years past have been actually engaged in mining in Cariboo this season, especially in productive mining. Many of those men who left the district in the fall to winter at the Coast cities, instead of returning in the spring, as is their wont, were attracted by the flattering reports of new discoveries elsewhere on the Coast, and followed the rush to the new fields, though doubtless with the intention of returning shortly. The closing down of the Cariboo Gold Fields, Limited, after some 10 days' run, owing to the wearing of the bearings on the bucket elevator, threw quite a number of men out of employment.

Notwithstanding these drawbacks, which although of a temporary nature, have had the effect of materially reducing the season's output of gold, I feel warranted from present indications in saying that, unless all signs fail, next season should witness a very large increase in the gold product of the District.

Cariboo Consolidated, Limited.

M. Bailey, Manager.

The introduction and instalment of the large plant and equipment of the Cariboo Consolidated, Limited, at La Fontaine, on Lightning creek, is of such a nature and is apparently so well calculated to meet its requirements, that, provided no unforeseen contingency arises, it should mark an era in the working of our deep gravel mines.

Hitherto the total cost of taking out, washing and disposing of the gravel of a 10-foot set of timbers under ordinary conditions would cost from one to two ounces of gold, while with the improved appliances and under the system proposed by this company, it is believed that $10 to the set can be made to yield a profit, and should the company's expectations be verified upon a working test, it will be the means of rendering large areas of ground valuable which have hitherto been regarded as worthless. Descriptive of this company's works, the manager, Mr. Bailey, writes me as follows:—

"In accordance with your request, I herewith send you the desired information in regard to the operations of this company in developing its Lightning creek property by means of a bedrock shaft and tunnel to tap the deep gravels.

"Early last spring a complete system of bore-holes was put down, in order to ascertain the cross-section of the Lightning creek valley at a point about the centre of the *West of England* claim, one and one-half miles below Stanley. An American 'Well Works' jetting machine was used for this purpose. It was found that the greatest depth to bedrock from the present surface of the creek was 126 feet. Most encouraging prospects of gold were recovered from the bedrock gravels in putting down these bore-holes, and as soon as reliable data were obtained as to the location and depth of the channel, work was immediately started upon the necessary plant to open up and develop this property.

"The main shaft-house has been erected on the south side of the Lightning Creek valley, the floor of which building is about 35 feet above the creek level. It was necessary to construct a large cribwork of timbers and excavate well into the rim rock in order to secure foundations for this shaft-house. The building is a frame structure, 40 by 80 feet, with three wings, two 24 by 40 feet, containing the boiler room, machine shop, store room, employees' changing room and bath-room, and one wing 18 by 24 feet, in which is placed the dump boxes and sluice flume approach.

"A working shaft, consisting of pumping compartments 6 by 8 feet, and two hoisting compartments 4 by 6 feet each, has been sunk to a depth of 175 feet from the shaft-house floor level, leaving 10 feet for a sump. The main tunnel breaks out from the shaft at a depth of 165 feet. The size of this tunnel is 8 feet in width by 8 feet in height. The top of the sills in the tunnel are 1½ feet above the floor level, in order to allow drainage under same. Upon these sills are placed the rails for the double car track. The total length of this tunnel will be about 325 feet. Over 100 feet have now been run and good progress is being made.

"The machinery for operating the plant consists of the following:—Two 80 h.-p. return tubular boilers; one 30-h.p. loco. boiler; 8 by 10 inch double drum Hendrie & Bolthoff hoisting engine; 10 by 10½ by 12 inch Hendy air compressor; 36 inch by 12 feet air receiver; two 3⅛ inch "Giant" air drills; 15 h.-p. high speed engine; Buffalo exhaust fan, 12-inch discharge; electric lighting plant; 100 h.-p. feed water heater; two feed pumps (boilers); 12 by 22 by 30 inch Ingles cross compound Corliss engine; two 18 inch diameter Cornish pumps; two steel cages with safety clutches.

"The camp buildings finished and in course of construction consist of the following:—Mess-house, two bunk-houses, foreman's cabin, company's office building, manager's house, four cabins for employees, stable and root cellar.

"The shaft-house, tunnel and camp buildings will be lighted throughout by electricity. The dynamo is at present furnishing light for the shaft-house and the work of wiring the buildings is now under way.

"All the machinery has been installed with the exception of the pumping plant, which is now being put in place. This plant consists of two Cornish pumps of 18 inch diameter each, with an 8-foot stroke running at a maximum of 12 strokes per minute. The pumps are driven by an Ingles 12 by 22 by 30 inch cross compound Corliss engine. This pumping plant was furnished by the Vancouver Engineering Works, of Vancouver, B. C., and reflects great credit upon the makers, both as to design and workmanship. These pumps will have a lift of about 140 feet, discharging into a drain tunnel that intersects the shaft 30 feet below the floor level of the shaft-house.

"A ditch 3,600 feet in length has been constructed from Lightning and Anderson creeks to bring water to the shaft-house, for the purpose of washing the gravels when mined. The dump box and sluice flumes are placed immediately in front of the main shaft, so that minimum haulage from the shaft to the dump box is obtained.

"A reservoir 16 by 12 by 4 feet has been excavated in a small water-course on the side-hill back of the shaft-house, at an elevation of 140 feet above the shaft-house floor, and from this reservoir a 3 inch pipe-line has been laid, supplying water to the boilers, bath-room for fire protection, etc. All camp buildings are supplied with water brought in pipes from a small ditch constructed on the side-hill on the north side of the valley.

"A large force of men has been employed on this work since June 1st, when active construction was begun. At present the force consists of 40 men, under the supervision of Mr. Joseph Wendle, the superintendent of the mine.

"Unless unforeseen difficulties are met with in driving the tunnel, we should be in touch with the gravel in the deep channel of Lightning creek by the early part of February next.

"As soon as the first line of bore-holes was completed, the work was immediately commenced of taking another section of borings at a point on Lightning creek two miles below the present shaft, with a view to putting in another plant to develop the property. Six bore-holes were put down to bedrock, when the work had to be closed down on account of the winter season. The greatest depth to bedrock from the surface so far ascertained in these

borings was 205 feet. Good prospects in gold were recovered, and the continuation of the gold lead of Lightning creek was proved beyond doubt. Active work will be resumed on these borings as soon as the weather permits next spring, and additional cross sections of the valley will be taken still further down Lightning creek."

During the past season this same company has also operated the *Lowhee* claim on Lowhee creek. Additional progress has been made in opening up the channel of Lowhee creek from rim to rim for 200 feet. The main sluice flumes have been continued 180 feet, making the same a total of 1,320 feet in length. Very little gravel "in place" was moved during the season's hydraulicing, as the material moved consisted mostly of headings and tailings from the old workings. These headings have now been practically worked through, and from now on the prospects for good returns are much better.

The Bear Hydraulic Company, Cunningham Creek.

B. A. Lasell, Manager.

This is a new hydraulic claim of much promise which has been opened during the past season. Mr. Lasell says:—

"This property, which is situated on Cunningham creek, was purchased by an American syndicate some six years ago. After working it a part of one season with a small plant using about 400 inches of water, and not being able to make it pay dividends from the start, as had been anticipated by the shareholders, the Company decided that it had been swindled, so refused to continue operations longer, and let the mine lie idle until last season, when it was purchased by two of its present owners, who prospected it by putting on a small hydraulic plant (the old one having been previously removed) and found, after making a clean-up, that the property was worthy of more than passing attention. During the early spring of the present year arrangements were completed for the installation of a moderately large hydraulic plant, which would be capable of handling 1,500 cubic yards and upwards of material per day.

"The old ditch which brought in water from Cunningham creek was, after a careful examination, considered to be too costly to maintain as a ditch capable of supplying the water required. Therefore, to insure a sufficient and steady supply of water for the entire season, it was decided to dig a ditch, with a carrying capacity of at least 1,500 miner's inches of water, from Antler creek, running down and through Cunningham pass, and thence across Cunningham creek by pipe-line to the mine, being a total distance of a little over four miles from the ditch-head to the pit. This work was started on June 18th, and included the erection of suitable camp buildings, the construction of 4-foot sluice flumes, and the laying of a 20-inch steel pipe-line 1,300 feet long, as well as the digging of the ditch, all of which work was completed on August 15th, the water turned through the ditches and pipe-line on that date, and the actual work of hydraulicing commenced in less than two months from the time of starting, which, for the equipment and installation of a plant of this size, is considered exceptionally quick time. Continuous piping was carried on until October 12th, when the season's clean-up was made, the result of which shows another dividend-paying mine to Cariboo's credit. As the gravel deposit is a very extensive one, this mine has a long working life ahead of it."

China Creek Hydraulic Company.

B. A. Lasell, Manager.

I am favoured with the following report from Mr. Lasell:—

"As the result of a cold, backward spring and the snow not commencing to melt, hydraulicing was not begun at this mine until May 24th, thus cutting off about 14 days of an

average season. Good progress was made throughout the season's run, which ended July 6th, or a total of 44 days of an actual water season, of which three days were lost in shifting pipes and monitor, making an actual run of 41 days for the mine, in which time 76,000 cubic yards of material were moved. The clean-up was a satisfactory one, and showed increased values in the gravel over the previous season's average.

"An exceptionally wet summer and fall made it possible to commence active operations again in the early part of September, and these were continued until the close of the season on October 25th. During this fall run about the same yardage of material was moved as was handled during the spring, which, when totalled up, makes the season's work a very creditable showing. The continuous rains made it impracticable to clean any of the bedrock piped off during the fall run; all of it, however, will be available for the coming season's clean-up, which will undoubtedly be a most satisfactory one to the company.

"As this property has all the natural advantages of an ideal hydraulic mine, as regards water supply, dump, and sluice grade, it makes it possible to work it at a very low cost per cubic yard of material moved, thereby cutting down operating expenses to a minimum, which greatly enhances the value of the property."

CARIBOO GOLD FIELDS, LIMITED.

W. Bromfield Brough, Manager.

I am indebted to the manager for the following brief but comprehensive statement, showing the present situation and purposes of this company:—

"In reply to your letter asking for information as to the operations of this company during the past season and its prospects, for use in your Annual Report to the Minister of Mines, I regret to have to say that, from no fault of any one connected with the company or in the construction of the elevating plant, other than the fact that the manufacturing engineers used soft metal for the bearings, which had no wearing power whatever, it was found necessary to shut down the mine after the elevator had worked 363 hours, owing to the rapid wear. It was impossible to clean up even from bedrock. Except as regards the material employed in the wearing parts, a fault which it is proposed to remedy, the present elevating plant seemed capable of doing the work that the company expect from it. The mine in every other detail is in the most excellent condition for working successfully. A new chain, comprising all the wearing parts, which have to be taken out, is now being manufactured, and the wearing power indefinitely multiplied by having removable and renewable bushings, made of hard manganese steel, inserted at the different bearings. If this precaution proves sufficient, there is no reason to be other than hopeful in regard to the future of the company, more especially as the further the work is carried up the creek, the better values will the gravel to be handled yield.

"This company holds also a large portion of ground on the creek which has not previously been drifted, and which may prove as valuable as that part which gave such large returns in the 'sixties.'

"The development of the property has been delayed, in the first place, owing to the initial advice from experts that it should be worked by an hydraulic elevator. Such an elevator is capable of good work where the supply of water is large, but where limitations exist, as in this instance, it does not make the best use of the water power available. It was on this account that, after a trial, the directors decided to erect a bucket elevator. The first elevator erected was destroyed by faulty design of the makers; the fault was apparently a trifling one, the fixing of a series of small set screws where they should not have been, and where they could do damage without attracting attention. These screws ruined the whole machinery,

but in all other ways the elevator was a success and proves that the system is right, the details only wrong. It was unfortunate that the chain erected this season, to replace that so destroyed by the screws, should not have been made of proper material. We trust, however, that, these faults having been eliminated, good work will be done next season.

"I have to say that this company regrets the loss of the services of Mr. Melbourne Bailey who was resident engineer, and practically manager last year. Owing to his departure, the services of Mr. R. S. Robinson were secured as engineer, and the secretary of the company, Mr. W. Bromfield Brough, F. C. I. S., was appointed manager, and came out from London to take charge."

Forest Rose Company.

W. C. Fry, Foreman.

This property, which is now owned by Messrs. Fry & Innes, has not been working for the past two years, owing, I understand, to some unsettled question regarding ownership. This matter having been adjusted, the company has resumed work this season. Regarding these operations, as also in relation to the Mucho Oro Company, of Stouts gulch, belonging to the same company, Mr. W. C. Fry writes:—

"During the past season this company operated two properties, one on Williams creek, and one on Stouts gulch. The Williams creek property is a hill claim known as the *Forest Rose*, consisting of 174 acres of real estate. This property has been continuously worked since the early sixties by drifting and hydraulicing in a small way, until three years ago, when work was suspended for a period of two years. Last season the claim was equipped with a new sluice flume 24 by 24 inches, 1,100 feet long and 1½ miles of ditch was enlarged to a carrying capacity of 500 miner's inches of water, with 500 feet of new flume 24 by 36 inches. Hydraulicing was carried on for ten weeks; about 70,000 cubic yards of material was moved, but, owing to the irregular bottom, only a very small piece of bedrock was uncovered, which, however, gave satisfactory returns.

"The Mucho Oro Company's property, situated on Stouts gulch, consists of 900 feet of the bed of the stream, 300 to 400 feet wide, together with 300 square feet at the mouth of Emory gulch. This claim was partly drifted with the most encouraging returns, in the early days, as high as 22½ ounces of gold being obtained from four feet square of bedrock. Last season a complete hydraulic plant was installed, but owing to the amount of work to be accomplished before the water could be turned on, only 17 days piping was obtained, the result of which more than reimbursed the outlay for the season."

The Wyoming Company, Stouts Gulch, making use of an artificial reservoir, was enabled to continue piping the whole season, and, consequently, did exceedingly well.

First of May Company, Williams Creek.

A. McPherson, Manager.

Of this company Mr. A. McPherson says:—

"The first wash-up for the season proved very satisfactory, so much so that the company decided to enlarge its ditch to four feet wide on the bottom, at a heavy cost, and a loss of nearly two months' work in the mine, there being such a heavy wash to contend that it cannot be moved without a large quantity of water. It is expected that during the coming season the claim will pay a very handsome dividend, and from all appearances it will continue to do so for many years to come."

MOUNT COMPANY, WILLIAMS CREEK.

F. J. Tregillus, Secretary.

Regarding this company's work the secretary says :—

"Work on the flume commenced in April, when the old 18-inch flume was made into a 2-foot one, and relaid, with a uniform grade of 7 inches to the 12-foot box. The Spring's water was not quite up to the average on account of the light snowfall, but with the aid of a reservoir built last year, and an exceptionally wet summer and fall, about twice the usual amount of ground was run off, and intermittent piping was kept up until the 4th of November. About 150 feet of the channel was exposed from rim to rim and cleaned. The average number of men employed was five. Most of the ground worked off this season had been drifted from a shaft by the original locators, which robbed the season's output of about $2,000, and this, with the extra expense entailed in altering the flume, had the effect of bringing the claim out a little behind financially. The ground to be worked next summer, however, is solid and, as everything is in good shape, good results are looked for."

SLOUGH CREEK, LIMITED.

John Hopp, Manager.

Mr. John Hopp, manager of the Slough Creek, Limited, and the Cariboo Exploration Company, Limited, of Burns creek, kindly furnishes me with the following particulars of these companies' operations :—

"Since the report of last year the workings from the end of the upraise, which was then being driven, consisting of small cross-cut drives, were extended as far as possible. This was accomplished by repeatedly changing from one place to another as the water would change its draining, allowing work to be pushed ahead in a comparatively dry face for short intervals until at last a full face of gravel was obtained. After encountering a great amount of water and heavy pressure about the first of February, the timbers in the tunnel and some of the cross-cuts were crushed so badly that it was impossible at this time to continue further operations at this point. It was then decided to drive the main tunnel from the shaft another 150 feet beyond the point at which the first upraise was made, and there commence a second upraise to tap the gravel in a second place, some distance away from the first opening. The grade of this second upraise was much lighter than the first, and gravel was reached at a distance of 170 feet from the main tunnel. Additional water was tapped at this point, pressure setting in which crushed the timbers, necessitating the temporary abandonment of the face. A small cross-cut was started back of this crushed face and gravel was reached through boreholes in the roof. It was then decided to discontinue further work until the water had been drained.

"In February, 1903, an air test was made, with the object of ascertaining the probable pressure of the water flowing from the workings of the first upraise. The air locks were closed and an air pressure was put into the tunnel beyond the locks of 44 lbs. per square inch. This pressure had no effect in holding back the water. The pressure was then slowly increased, and it was noted that the flow of water was gradually lessened until at 61 lbs. per square inch the flow had been reduced over one-half. On November 3rd, after the work had been suspended in the second upraise, a further air test was made. At 46 lbs. per square inch the flow of water was reduced over one-half, thus proving conclusively that the water pressure had been reduced about 15 lbs. during the interval between these air tests. The water level in the deep channel has therefore been lowered by the steady pumping. It was then decided to dis-

continue all further attempts to extend the workings until the water had been drained. All the gravel so far obtained from the various openings and bore holes is a splendid wash, containing high gold values."

Cariboo Exploration Co., Limited.

Regarding this company Mr. Hopp continues:—

"The snow was shovelled from the ditches and the plant put in readiness to commence hydraulicing as soon as the water started, which ordinarily is about the first of May. This year, however, the season was very backward, the work did not commence until near the end of May, and after an unusually light snowfall there was a correspondingly small amount of water. The very warm and dry weather in June brought on a freshet and materially shortened the season. This was one of the shortest seasons in the history of the country. We only had 17 days of actual piping, and had barely time to clean up the pit. A fair amount of dirt was moved for the short time of working, carrying good values. As soon as the water ceased the mine was closed down. Later in the season there was considerable water from summer rains, but as there was no certainty of continuing for more than a few days work was not resumed.

"The mine is equipped with four miles of ditch from Jack of Clubs creek, and carries 1,600 miner's inches of water. The pipe-line is 2,400 feet long and of 30-inch, 22-inch and 15-inch diameter, with 280 feet head, using one No. 6 and one No. 2 monitor. Fifteen men were employed during the hydraulic season.

"The work carried on during the past four years has conclusively proved the value of the ground, and it is the intention of the company to enlarge the plant during the coming season, to render it possible to move a greater quantity of gravel during the time of active operation."

Willow River Mining Company, Limited.

F. C. Laird, Manager.

Regarding the operations of this company for the season Mr. Laird writes me:—

"In June the spring freshets came on with a rush and provided more water than the pumps could handle. Work was accordingly discontinued until the freshet was over. It was expected that operations would be resumed about the middle of July. However, the season proved to be such an abnormal one that no effort was made to resume work until December. Contrary to all precedent the highest water of the season was in September.

"The shaft (6 feet x 16 feet) has been sunk to bedrock. The work remaining to be done is to continue the shaft for about 15 feet and break out into the channel. As the gravel lying on bedrock is very hard, no further difficulty is expected. It is probable that this proposition will be a heavy pumping one at all times; however, the company seems to be well provided in this respect, as the pumping facilities consist of three 18-inch Cornish pumps, two working on an 8 and one on a 10-foot stroke. Two of these pumps are actuated by a 28-foot overshot water-wheel, having a 7½-foot breast, the third by a steam plant. Barring accidents, it should be but a short time until it is known whether all the time and labour has been spent for naught or whether the expectation will be realised and this will prove to be a paying mine."

Alabama and Williams Companies, Mosquito Creek.

The Alabama and Williams Companies, of Mosquito creek, which have for so many years contributed largely to the gold product of the district, although having but a short working season, nevertheless gave promise of even better results in the future. The Flynn Brothers & Co. say briefly regarding these properties:—

"In regard to the work done on Mosquito creek claims, as you are aware, the season has been short, owing to the small quantity of snow, upon which we are dependent for our water supply, in consequence of which we only piped 21 days of two 10-hour shifts on the *Alabama* claim, with, however, very satisfactory results. Nine men were employed. This claim is now well opened and with a favourable season should give greatly increased returns. The *Williams* claim employed six men, and piping was carried on for 28 days of two 10-hour shifts, the expenses being $1,800. This claim, which we started to develop two years ago, is now well opened; it possesses the advantages of having plenty of grade and dump, and can be rapidly worked while the water is on, and with the advantage of a reservoir which we contemplate building next season, our piping season should be easily doubled on this claim."

PLEASANT VALLEY, LIMITED.

L. A. Bonner, Manager.

Regarding this company's property, Mr. Bonner briefly informs me as follows:—

"Last spring a shaft was sunk to a depth of about 50 feet, when the water increased beyond the capacity of the pump. A Cornish pumping plant, with three times the capacity of the old plant, has now been installed, and the work of sinking will be resumed about the first of January. On account of the flooded state of the country around Barkerville it was deemed advisable to suspend operations until after frost set in."

DISCOVERY GOLD MINING COMPANY.

With regard to this company, Mr. Bonner continues:—

"A tunnel has been driven 900 feet to tap a hill channel on the right bench of Jack of Clubs creek. This bedrock drive will reach bore-holes, made last year, by the first of January. A shaft-house is now under construction, and a shaft will be sunk to the tunnel when completed."

THISTLE GOLD COMPANY, LIMITED.

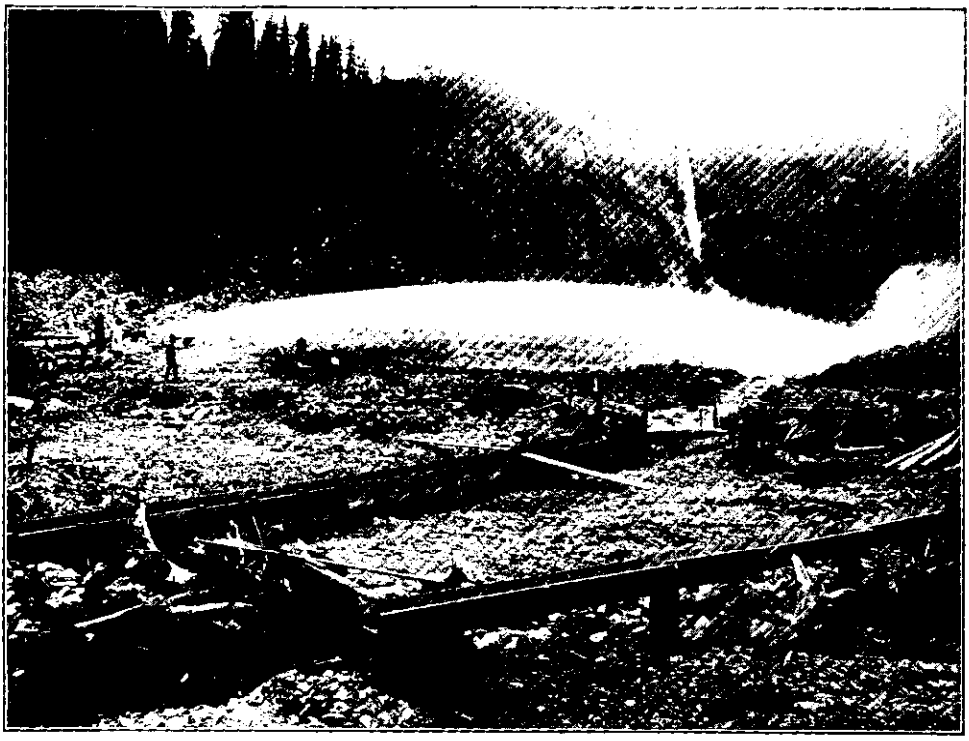
James Ross, Manager.

This has been one of the best paying mines of the district this present season. Mr. Burgess, the assistant manager, in response to my inquiry, writes me as follows:—

"The Thistle Gold Company, Limited, under the management of James Ross, is this year able to report a very successful season for its property at Eight-Mile lake. Piping with a No. 2 monitor was commenced on the 13th day of May, and continued without interruption until October 29th. Owing to the exceedingly wet season, we were able to hydraulic day and night, except in the months of July and August. During the latter part of the season an extra line of pipe was laid, enabling two monitors to operate on the bank. A total of 44,600 cubic yards of material was moved, advancing the working face about 1,000 feet from the shore of the lake. Low pressure head and a limited dump made the use of powder absolutely necessary, both for bringing down the bank and for breaking up the boulders for handling. For this reason the amount of dirt moved was not as great as it otherwise would have been. The average number of men employed throughout the season was 15. In the fore part of the season the limestone bedrock was struck; it showed a dip toward the lake of about one foot in three. The hardpan heretofore serving as bedrock is barren of gold, in so far as working it under existing conditions is concerned. I do not wish to make any specific statement regarding the amount of gold taken out this year. I will state, however, that the returns are considerably above our expectations. We look forward to an equally successful season for this property in 1904."

Coffee Creek.

Under the same management, the company operated its property on Coffee creek. This property, consisting of two leases of 100 acres each, is, as yet, in a state of development. The plant consists of one No. 2 monitor,



CHINA CREEK HYDRAULIC MINE--CARIBOO MINING DIVISION.

ALABAMA CLAIM, MOSQUITO CREEK, NEAR BARKERVILLE.

acting under a pressure of 180 feet. Piping was commenced on the 13th of May, and continued day and night until the 16th of June; about 10,000 cubic yards of material was moved. Development work on this property is slow, as all water owned by the company is necessary for the operation of the Eight-Mile Lake property, except during the spring season of the year.

The Waverly Hydraulic Company, Grouse Creek, J. Pomeroy, foreman, commenced operations about the middle of May and worked till the 1st of October, taking out 275 ounces of gold, six men being employed. The prospects for the future are excellent, and the claim should be profitable to its owners and last for many years.

McGregor, Thompson & Ross Claim, Cunningham Creek.

This is another claim on Cunningham creek upon which development work has been going on for several years and is now in so forward a state that in another year the property should be placed upon a paying basis. Mr. Thompson writes me:—

"Work progressed upon the rock flume during the winter and spring, being finally completed into the basin on June 1st, the force employed being 7 men. The remainder of the season was devoted to the opening of a pit at the mouth of the flume, the widening of ditches, and the grading of a rocky hillside for a foundation for a flume, as well as the erection of a cook-house and accommodation for ourselves. On November 1st work was suspended. Owing to a very wet season and our inability to handle the succesive high waters, no 'bottoming up' was done, and as the rim-rock was not of sufficient value to justify cleaning, the returns for the season were small. The work contemplated for the coming year is the erection of a bunk-house, the installing of a hydraulic plant, and the building of 1,000 feet of 3-foot flume. The mine will then be in perfect working order, and we trust that it will amply repay us for our years of labour and expense."

The National Hydraulic Mining Company, Quesnel River.

A. McPherson, Superintendent.

The superintendent says:—"This property is owned by a syndicate of Pittsburg capitalists having four leases on Quesnel river below the mouth of Beaver river. They have expended nearly $100,000 on the property, the largest item of expense being the building of five miles of flume, 4 feet wide by 3 feet deep, at a cost of $60,000; the lumber cost, laid on the ground, $50 per M, there being no timber in the vicinity for lumber or trestle work. There are 3,000 feet of pipe-line. Active operations in the pit were commenced on the 10th of July, 1902, and continued for 40 days, when it was found there was a reef of high rock along the river bank. As it was known that there was deeper ground further under the bench, the company decided to run a flume grade tunnel through the rock, 7 feet wide and 8 feet high; this tunnel was run 400 feet through very hard rock, all hand work. An incline was raised on a grade of 4 feet in 12. This was run 50 feet before breaking through into gravel. A shaft was sunk 80 feet deep to connect with the end of the upraise. Hydraulic operations commenced on the 2nd August, 1903, and in 50 days piping there was moved 100,000 cubic yards of gravel. The water used was 800 miner's inches. It was found that the back channel is still some 14 feet deeper than the head of the upraise, and the main tunnel run on its present grade will be 5 feet below the channel, as far as known. The gold in the gravel is very fine and hard to save, with a heavy head of water; there is gold all through the gravel, some strata carrying high values. Should there be found a fair per cent. of values in the bedrock gravel in the channel, the company will have a paying mine for many years to come. Sixteen men were employed during the past season."

COAL AND PETROLEUM.

Several licences to prospect for coal and petroleum have been issued during the year, but little has been done to exploit the ground so held.

RIVER DREDGING.

Nothing has been done during the year to further prove that this means of recovering the auriferous sands in our river beds can be pursued with advantage.

QUARTZ MINING.

Messrs. Baker and Atkins, backed, it is understood, by English capital, have devoted the season to an examination of the numerous quartz ledges in the vicinity of Barkerville. Having installed a complete assaying plant and laboratory at Barkerville, they have been engaged in making tests of the ore taken from a number of the most promising ledges, with a view to their future workings. It is believed that some of these tests made have proved most encouraging. On application, Mr. Atkins furnishes me with the following:—

"The working season of 1903 was chiefly spent in further investigation of the quartz properties on Burns and Island mountains. A great deal of work was done on Island mountain clearing out old tunnels, with a view to finding out why work was not more vigorously prosecuted. It is to be regretted that, after having such encouraging prospects as the oxidised surface ores afforded, no effort was made to sink on these reefs. Although tunnels were driven in every direction, some of them 400 feet long, not one proves the reefs below 50 feet.

"The phenomenal wetness of the season hindered the work of investigating these workings, and prevented much attention being given to the numerous outcrops known to exist on this mountain, which I suspect to have been the source of the rich placers of Mosquito creek below. Much valuable information was obtained under difficult circumstances, and while the results go to show lower grade ores than must have been obtained when the surface was worked, they were of a sufficiently encouraging nature to merit further investigation. Several of the old miners reported that tellurides had been found in the reefs, and to settle the matter definitely, a number of exhaustive tests were made, but in no instance was tellurium found; so this rumor is to be attributed to a lack of understanding on the subject.

QUESNEL MINING DIVISION.

HORSEFLY GOLD MINING COMPANY.

R. T. Ward, Manager.

The property of the Horsefly Gold Mining Co., commonly known as "Ward's Hydraulic," comprises the old Harper lease, Horsefly river. This is the only company of importance working at present in this part of the district, so far as I can learn. Mr. Ward writes me regarding the operations:—

"This season we have not worked any ground to bedrock, confining our operations to the top gravels to determine the values for the purposes of dredging, and the result has been highly satisfactory. One thousand feet south of our old workings we discovered a tight, black gravel overlying the blue gravel, carrying good gold and dipping about one foot in eight, and from present indications it promises to be extensive. We have worked into it 100 feet south, and 400 feet east and west. The gold is heavy and assays $17 per ounce, whereas our blue gravel gold assays $17.60 per ounce. This gold carries over 1 per cent. platinum.

"Last winter, half a mile north of our old workings, we opened a shaft 70 feet to bedrock and drove a tunnel 30 feet west and 80 feet east on the bedrock, prospecting with rocker all gravel taken out. For three feet above bedrock the gravel yielded $3.25 per cubic yard; the next three feet yielded 60 cents per cubic yard. This should pay for drifting with suitable machinery for hoisting, and could be worked on an extensive scale. The amount of water percolating through the blue gravel is very trifling, not worth mentioning. All our work this year has been prospecting, during which time we have recovered about $6,000 in gold.

"I am not prepared to say at this time what our company will do next season. At our annual meeting I will more fully report to them the result of our prospecting. One thing is certain, we shall have to get some plan to handle more gravel. As it is now, our elevators work well, but the quantity of gravel washed is not in proportion to the amount of water used. We run 1,200 inches through the elevator nozzle, and 600 to 800 inches through the monitors. The monitor water with the seepage from the river, which has to be hoisted to the flumes on top, is equal to about 600 tons for each ton of gravel washed."

Consolidated Cariboo and Horsefly Hydraulic Mining Cos., Ltd.

J. B. Hobson, Manager.

I regret my inability to furnish reliable information respecting these two large enterprises, owing to the absence of the manager.

Note by Provincial Mineralogist.—A full description of the Consolidated Cariboo Company, which is unquestionably the most important hydraulic mining enterprise in British Columbia, will be found in the report of last year (1902). The following summary of the season's operations for 1903 is taken from the annual report of the company, recently issued:—

"The past season turned out a most disappointing one, for the reason that the 26 inches of well-settled snow that laid on the watershed at the end of March went off mainly by evaporation under the influence of the cold frosty weather, accompanied by the northerly winds that prevailed during the months of April and May; and afforded barely sufficient water to operate the mines 53 days and 7 hours, with a quantity of water varying from 2,000 to 2,500 miner's inches, being 12 days and 8 hours short of the time run during the season of 1902, 50 days and 18 hours short of the washing time reported for season of 1901, and 118 days and 6 hours short of the washing time reported for season of 1900.

"About half the washing time was applied to the excavation of the rocky cuts required to accommodate the right and left branches of Sluice No. 1, which were advanced 740 feet on the right and 704 feet on the left side of the excavation.

"The second run, commenced on the 21st day of July, included a period of 8 days, ending with the exhaustion of the water supply on the 1st day of August. During the progress of the run 16,000 miner's inches were used to wash out about 12,000 cubic yards of slide rock that came into the excavation from the south-west rim, and 44,000 cubic yards of gravel from the main bank, making a total of 56,000 cubic yards for the run, from which was recovered $523\frac{24}{100}$ ounces of gold, valued at $8,910.76, an average yield of $20\frac{25}{100}$ cents per cubic yard for the 44,000 cubic yards of gravel washed from the main bank. The right-hand branch of sluice No. 1 was advanced 45 feet, making the advancement of sluices amount to a total of 1,489 feet for the season.

"The result of the second run is encouraging, and indicates a continuation of the high-grade deposits that gave such satisfactory results prior to the season of 1901, when enormous deposits of slide rock from the rims were found replacing large areas of the high-grade strata composing the main body of the fill found between the rims of the ancient river.

"The light gold output may be laid to the short water supply, the working time lost in removing large masses of slide rock, encountered while carrying the workings up stream, and excavating cuts for advancement of sluice branches.

"SUMMARY OF THE SEASON'S MINING OPERATIONS.

"Total time occupied in washing in pit No. 1		53 days, 7 hours.
Total quantity of water used		127,083 miner's inches.
Quantity of gravel, clay and rock washed:		
Gravel from third bench	248,000	cubic yards.
Gravel from main bank	44,000	" "
Slides from rims of old workings and indurated volcanic mud	68,000	" "
Bedrock slide	12,000	" "
Total quantity washed	372,000	" "
Average duty of water per miner's inch	$2\frac{92}{100}$	" "
Gold product for season	2,639.09	troy ounces.
Value of gold		$44,943 70

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:—

"MINE OPERATING EXPENSES FOR 1903.

"EXPENDITURE.

"Mining Account:—		
Mining	$18,330 22	
Excavation for sluices	8,703 00	
		$27,033 22
"Explosives:—		
Mining	$7,418 15	
Excavation for sluices	7,120 00	
		14,538 15
Sluice maintenance and extension		9,449 80
Portable hydraulic plant maintenance		37 33
South Fork ditch maintenance		2,870 28
Morehead ditch maintenance		2,815 84
Camp maintenance		1,189 59
Mine and camp light maintenance		398 46
Waggons and harness maintenance		144 07
Telephone maintenance		77 57
Prospecting account		729 22
Stationery and printing		283 47
Postage and telegraph		134 34
Incidental expenses		11 40
Lands and leases (lease purchases, rentals, etc.)		5,267 30
Licence account (free miner's certificates)		110 00
Fire insurance		803 00
Travelling expenses (transportation of miners, etc.)		6,039 87
Mine office expenses		1,307 00
Bullion expenses (royalty, insurance, transportation, etc.)		1,633 24
Management		5,228 18
Stable expenses		628 85
Tools and implements—loss for season		288 70
Horses account " "		190 00
Quicksilver account " "		242 69
Total operating expenses for season		$81,451 57

"Receipts for Season 1903.

Gold product for season	$44,943 70
Profit on stores sold	2,123 19
Total receipts for season	$47,066 89

"Summary of Mining Operations From the Time of Completion of Water Supply System in 1898.

Year.	Precipitation in inches.	Water used in Miner's inches.	Time Run.	Cubic Yards Gravel Washed.	Product.
1899	28-65/100	353,056	144 days, 8 hours	1,952,535	$ 92,678 93
1900	30-67/100	460,878	171 " 13 "	1,843,938	350,085 77
1901	20-30/100	258,250	104 " 13 "	2,420,288	142,273 41
1902	23-40/100	179,520	65 " 15 "	690,442	61,395 19
1903	17-48/100	127,083	53 " 7 "	373,000	44,943 70"

Under date of November 30th, 1903, Mr. W. Stephenson, Mining Recorder at Quesnel Forks, reports as follows:—

"For the third consecutive year, water for hydraulic mining purposes has been very short, the present season of 1903 being especially bad, owing to the light snowfall last winter, the supply giving out very early. It is true that there was a great deal of rain in the latter part of the season, which enabled the small hydraulic claims on Keithley and Snowshoe creeks to resume work and continue it for nearly a month, but the larger companies did not recommence operations after once closing down. However, for the work done with the water obtainable, the returns have been quite as good as in previous years, and should the snowfall be heavy during the present winter the output during the coming season should be good.

"On Keithley creek, after several years' prospecting by both shafts and tunnels, and at considerable expense, Messrs. Veith & Borland have succeeded in finding and driving a tunnel into a hill channel, striking good pay. This promises to be a permanent and paying claim.

"On the South Fork of Quesnel river some gold was obtained by closing the Golden River Quesnel Company's dam and working the bed of the stream for a short period. As near as can be ascertained, however, little was made over working expenses. Little other work has been done in this vicinity.

"With regard to mineral claims, a company of Spokane men did a limited amount of prospecting and made several locations on Snowshoe mountain, on which some preliminary work was performed. It is their intention to thoroughly test their claims in the spring. Very little other prospecting for or development of mineral claims has been done."

OMINECA DISTRICT.

OMINECA MINING DIVISION.

REPORT BY FRED. W. VALLEAU, GOLD COMMISSIONER.

I have the honour to submit my sixth annual report upon the mining industry of the Omineca District.

The weather this past year has again been extremely wet and cold, heavy snow-storms occurring during the months of July, August and September. The creeks, in consequence of so much rain, have been abnormally high all the season and the trails throughout the district have suffered considerably, the traffic being heavy and the continual rain keeping them soft and wet.

This past season the Omineca District has begun to experience that activity in prospecting (both quartz and placer) which is bound to spread over the whole of this section now that the building of the Grand Trunk Pacific Railroad to the Pacific Coast is assured, as whatever Pass is chosen through the Rockies, the road will run through the district from east to west, opening up to the prospector and capitalist hundreds of square miles of new country which up to the present time has been forced to lie idle and unexplored, owing to its isolation and the prohibitive cost of getting in provisions and supplies. Once the difficulties and cost of transport are removed by the completion of this transcontinental road, large tracts of ground that to-day are known to contain gold, but which under the existing conditions cannot be worked at a profit, will be taken up and developed and will add to the prosperity of the district.

Until this season (1903) there had been little or no prospecting for quartz in the district, except in the vicinity of Mount Selwyn, on the Peace river, where a few claims have been located on what is supposed to be free-milling quartz. This season, however, there have been quite a number of men from the Kootenay in the district prospecting for quartz, and all speak in the highest terms of the country within a radius of 30 miles of Manson as being rich in silver, lead and gold. Several claims have been located by these parties on Boulder, Lost and Manson creeks. One average sample from Boulder creek, taken by myself, and on which an assay was made at the Government Assay Office in Victoria, gave 115 ounces of silver and 68 per cent. lead to the ton. Some free-milling gold quartz claims have also been taken up and samples therefrom brought out for assay, but up to the time of writing I have not heard what the returns were.

Coal has been located on the Parsnip river, in the vicinity of the mouth of the Nation. The seams are reported to be large and to be exposed on the surface over a large area; the quality, too, is said to be excellent, and I expect samples both for the Mineral Museum and for assay. Coal is also known to exist between Manson creek and the Omineca river, but, so far, no prospecting for it has been done in that direction.

The trail from Manson to the confluence of the Findlay and Parsnip rivers (the source of the Peace river), located and opened by me this season, under instructions from the Hon. the Chief Commissioner of Lands and Works, passes through an entirely new section of the district. Following, as it does, the valley of Manson creek it crosses and opens up several streams

which will probably repay well for being prospected, what little panning was done giving good results, although, of course, bedrock was not reached in any instance, the gravel only being tested. This trail is now cut out to within about 9 miles from the head of the Peace river, and will enable parties to go into the Peace and Findlay portion of the district, which has been hitherto practically closed to the prospector owing to the great difficulty of access.

Several men are wintering in the district, developing their properties. Following will be found described in detail what has been done this season :—

43rd Mining and Milling Company of Cariboo, Limited Liability.

This company, which was the first to start hydraulic mining upon a large scale in the Omineca District, having acquired its property in 1895, has not operated for the past two seasons, having been in financial difficulties during that time. Upwards of $240,000 has been expended in plant and development work and has proved that the company's Slate creek property is exceedingly rich.

May Flower Mining Company of Tom Creek.

Active operations have been carried on upon this property all the season, and very satisfactory returns were received. This ground is deep and has been difficult to open up, but the owners, after years of hard work, are now commencing to receive well-earned returns from their labour. The *May Flower* has paid all costs of working this season and has given a fair surplus. The bedrock has again risen some feet and the prospects for next season's work are better than at any time since the claim was opened.

The St. Anthony Exploration Company has retired from the district. The president, in writing me upon the subject, says that it is not that the directors have lost faith in the Omineca District or in the ground originally held by them, but simply on account of financial reasons.

The Omineca and Peace River Mining Company.

This company, formally known as the Arctic Slope Hydraulic Mining Company, has again been operating in a small way on one of its claims situate at the mouth of Black Jack gulch, on Manson creek. Ten men were employed until July 6th, when the mine was closed down. The manager's statement showed a return of $2,756. This company is holding 25 leases in the district, but is only conducting operations upon the one claim mentioned above.

The *Breadwinners Group*, consists of 6 leaseholds, situate on Manson at the mouth of Lost creek, and is owned by Mr. E G. Tilton. A layover was granted upon these claims again this season and nothing was done upon them.

The *Newitt* claim consists of a hill claim on the east bank of Lost creek at the canyon, and is owned by Messrs. Newitt & Mullin. These gentlemen carried on development work steadily all last winter and have now their tunnel in 360 feet, having driven 233 feet this past year, besides two air shafts to the surface. They hope to strike the old channel of Lost creek this winter, as they are again wintering in the district to continue development work.

The Rosenthal Claim, Lost Creek.

This is also a hill claim on the east bank of Lost creek, situate about 1,500 feet up stream from the canyon, and was worked last winter by Mr. Rosenthal, who ran a tunnel into the hill for 125 feet. This winter he is opening up another tunnel lower down the creek and expects, from the information gained from the tunnel run last winter, to strike the old channel within 100 feet. A good house is now built, provisions for the year laid in, and blacksmith's shop, etc., erected on the claim.

THE MCKINNON MINE, LOST CREEK.

This season Mr. McKinnon has, by means of a ditch, kept the creek turned on to the hill, and has been ground-sluicing the top dirt off so as to be able to get at the pay gravel. Some little mining was done on this claim during the fall, paying $4 per day to the man.

THE EUREKA MINE, BLACK JACK GULCH.

This property was prospected last winter by Mr. Munroe and partner, by running a tunnel into the hill in order to tap the old channel of Black Jack gulch. One hundred and twenty-five feet of tunnel was dug and some 30 feet of an incline run, when it was found that they were too high; this winter another tunnel will be run on a lower level, when they hope to reach bedrock on the old channel. Good prospects were had from the bottom of the incline, and fine looking pay gravel exposed.

TOM CREEK.

Besides the May Flower Company, two Chinamen worked a claim upon this creek this season, but did not take out anything more than wages.

VITAL CREEK.

Two companies have locations on this creek, viz., the Vital Creek Mining Syndicate and the Caledonia Gold and Silver Mining Company. Both companies were granted lay-overs again this season, so that nothing has been done by either.

Some Chinamen also mined here this season, but none of them made more than small wages, owing to the upper portion of the creek ground-sluicing out and a "jam" being formed at the upper canyon, the breaking of which caused a tremendous flood, which washed down the creek and swept everything before it. When I was at Vital creek in August I saw where the creek bed has been cut down by water fully 30 feet deeper than when I saw it last.

MANSON CREEK.

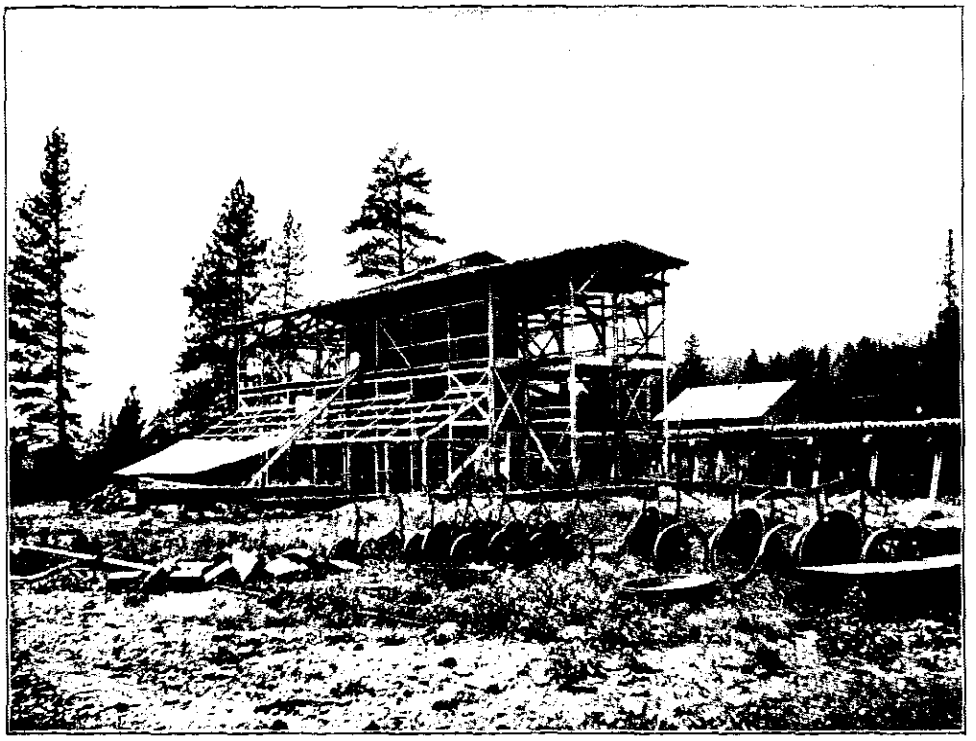
Mr. Evans, with two men, was employed this season in digging some hundreds of feet of ditch in order to get drainage on the upper portion of his claims, but he could not reach bedrock.

OFFICE STATISTICS—OMINECA DISTRICT.

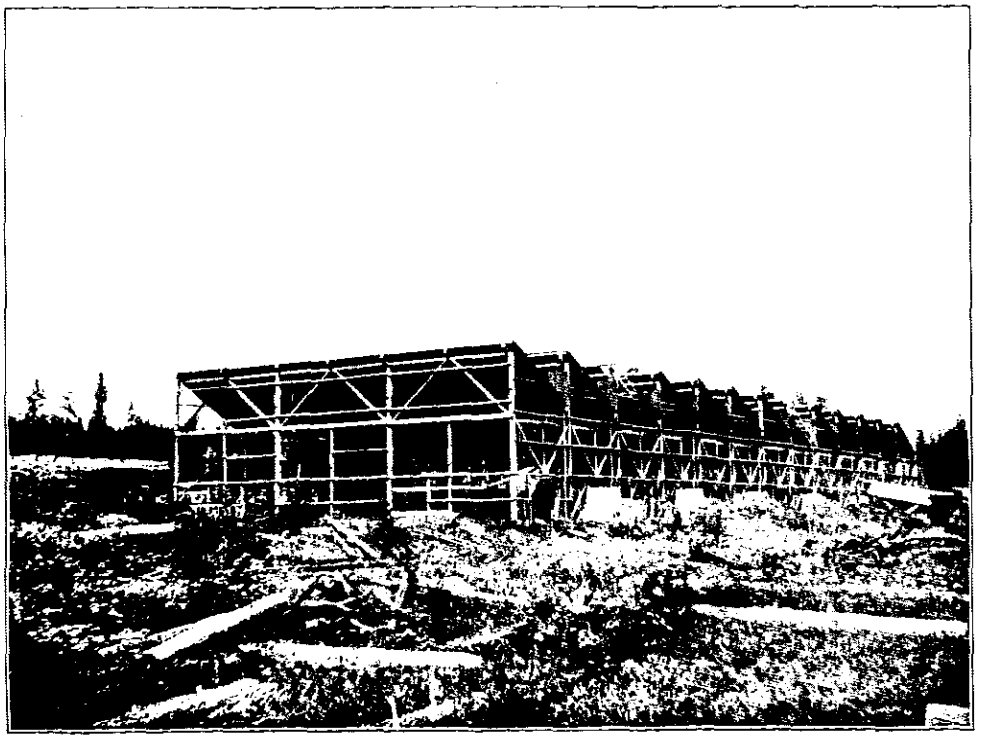
Leases in force	82
Leases issued	1
Placer claims recorded	26
Mineral claims recorded	8
Payments in lieu of work	8
Conveyances or other documents of title	2
Free miners' certificates	68

Revenue.

Free miners certificates	$ 314 50
Mining receipts, general	1,685 05
Mineral tax	209 46
Miscellaneous	439 90
	$ 2,648 91



MARYSVILLE SMELTER, FORT STEELE MINING DIVISION—FURNACE SHED.



MARYSVILLE SMELTER, FORT STEELE MINING DIVISION CALCINER SHEDS.

SOUTH-EAST KOOTENAY DISTRICT.

FORT STEELE MINING DIVISION.

Report of Provincial Mineralogist.

Fort Steele Division has in past years made very large outputs of silver lead ores, but these ores have always been low in silver, running from $\frac{1}{3}$ to $\frac{1}{2}$ ounce of the latter to the per cent. of lead.

Owing to the continued depression of the lead market, combined with the low price offered for silver, the production from this district has been almost entirely stopped, only two properties in the division having made any shipments, *i.e.*, the *North Star* and *Sullivan* mines, and these shipments are merely nominal. The *North Star* shipped a little over 600 tons of ore, chiefly from development and "clearing up" work, while the *Sullivan* has done no mining but shipped some 330 tons of low grade ore from a second class dump, running about 15 ozs. silver and 30 % lead.

North Star.

The *North Star* mine was visited on July 14th, when it was found that shipments had been suspended, but that a force of about 20 men was employed, chiefly on prospecting and development work. The large and exceptionally clean body of galena with its accompanying carbonates, from which the big shipments heretofore maintained from this mine have been made, has been mostly worked out, and the course of such working out has not led up to the discovery of any further bodies of important size. This original body has already produced over 40,000 tons of ore, which has been shipped, and there is undoubtedly some further ore remaining; but this is a small proportion of the original body and its bounds have been pretty thoroughly defined and limited. The original ore body might be described now, in the light of development, as a large basin filled with galena, lying almost flat and practically on the surface, being covered only by surface deposits.

The previous managements of the mine, in their endeavours to locate further ore bodies, have acted on the belief that such would be found near the surface and as extensions, so to speak, of the first body. Prospecting, consequently, took the form of shafts, diamond drill and bore holes put down at various points surrounding the main workings. Of these a large number have been sunk, but without discovering workable ore. The present manager, Mr. J. L. Parker, is proceeding on the belief that if further ore is to be developed it will be at a greater depth, and, although he has not entirely abandoned shallow testing holes, he is confining his efforts chiefly to sinking an inclined shaft, following down a distinct fissure in which there is a small stringer of quartz and iron sulphides with a little galena. This shaft was down 220 feet at the time the property was visited, and at 60 feet depth was connected by drifts with the old workings. Below this, at 100 feet from the surface, a drift had been made to the north for 96 feet, with a cross-cut of 50 feet. At 150 feet down a drift was off to the south for 50 feet, with a cross-cut of 25 feet, while at 200 feet down a drift was again off to the south for about 100 feet. Below this the shaft was being continued and was then down 20 feet further. Much encouragement had been received at times, from the general appearance of the fissure, in the belief that ore would be encountered, but when the property was seen by the writer no ore body had been met with in these workings.

The property has been previously described in these Reports, as has its equipment. The mine is connected by aerial tramway with a branch line of railway from Cranbrook, by which route the ore is shipped. The mine is fully equipped, has excellent cook and bunk-houses, store and office buildings, as well as comfortable houses for the manager and for the accountant.

Sullivan Group.

The *Sullivan Group* includes the *Hamlet*, *Shylock* and *Hope*, Crown-granted mineral claims, situated on Sullivan Hill, on Mark creek, and about two miles from the town of Kimberly. The property is held by the Sullivan Group Mining Company, of Spokane; President, Senator George Turner; Vice-President, Bernard Layton; Secretary, J. C. Williams, Spokane, with James Findlay in charge at the mine. The company, in addition to the mine, owns the partly constructed lead smelter at Marysville, for the building of which bonds were issued and secured by a mortgage on the mine.

The mine has been previously described in these Reports, since when considerable work has been done in the way of development, but as the ore is so exceedingly low in silver and the price of lead has also been low, very small shipments have been made, amounting to 3,000 tons in 1901, nothing in 1902, and about 330 tons from the dump in 1903.

The ore is a galena carrying an unusual amount of iron, the first-class ore assaying about 40 % lead and 20 oz. silver, and the second class about 25 % lead and 12 oz. silver, varying somewhat as it may have been sorted. The development work done has been rather irregular in character, consisting in small tunnels and drifts run into what appeared to be a great basin of ore, lying near the surface, the evident intent being rather exploratory than with a view to future working. These workings are so irregular as to defy any written description, so none will be attempted, but with all their irregularity and apparent lack of systematic planning, they have managed to develop a very large amount of ore which may fairly be classed as "in sight,' and which from rough calculations may be put down as from 300,000 to 400,000 tons, assaying, approximately, 30 to 35 % lead, and 15 to 18 oz. silver. The ore is of such a character, being chiefly metallic sulphides, as to preclude any method of water concentration, the only concentration possible being by smelting.

The development as it continued to the dip, down the hill, would seem to indicate the probability of a number of step faults in that direction. These faulted the ore body, giving to it the effect of a dip of about 60° to 70°. A shaft (No. 5) has recently been sunk to the dip, and has struck the ore body at a depth from the surface of 106 feet, giving about 150 feet below the upper portion of the ore body. From this point some very fine samples of galena have been taken, giving in the Government Assay Office: lead, 50 %, silver, 10 oz. per ton. This galena is of different character from that in the upper workings, being much freer from iron, and leading to the hope that underlying the very low grade surface ores a zone of richer and purer galena may be encountered. The ore is exceedingly hard, but the hanging wall is so sound and firm as to require little timbering, and mining should be done at low cost. The work done is most encouraging in the amount of ore developed, and, with the apparently higher assays obtained at the depth reached, the deposit should be further and fully tested. At present ore has to be hauled from the mine to Kimberley, a distance of two miles, over a waggon road, from which it is shipped by the branch line of the C. P. Railway. An aerial tramline has been planned, but not as yet constructed; this, with a length of about three-quarters of a mile, would convey ore to an extension of the railway.

The property is equipped with a good air compressor and boiler, small hoists, &c., and there are also bunk and cook houses, office and laboratory buildings, and two or three small houses for the foreman and staff.

Marysville. The little town of Marysville is situated on Mark creek, where it crosses the flat plateau or bench of the valley of the St. Mary's river, some five or six miles from the town of Kimberley, near which the *North Star* and *Sullivan* mines are located. A spur of the Cranbrook & Kimberly branch railway runs into the town, and recently a large saw-mill has been built, giving work to a number of men.

Smelter. Marysville is the site chosen by the Sullivan Mining Co., for the erection of a lead smelting plant for the treatment of ore from its mine, and probably in the expectation also of getting ores from the other mines in the locality. The depressed condition of the lead market and other causes have prevented the completion of the plant, which stands to-day in a half-finished condition, exposed to the weather and rapidly deteriorating, a fact much to be regretted, as a slight expenditure would protect the plant and machinery in place until such time as the work is completed. The smelter bears evidence of having been constructed on designs of different people, and is, consequently, not entirely consistent. To be completed and rendered economical to work, it would require to be largely remodelled, but this could be done at no great expense, as much of the material and plant are very good and suitable for the purpose intended.

Smelter Site. The site chosen for the smelter is a large flat or bench, from which the ground drops off on two sides to the river valley some 150 feet lower. The subsoil is gravel, giving an excellent opportunity for cheap but good foundations. The general scheme of the smelter, as apparently intended from the construction partly completed, is as follows:—The ore was to come in on railway cars, over a trestle about 4 to 5 feet high, the level of the car floor being that of the receiving floor of the sampling plant. From the sampling plant the ore was to be delivered by buggies to a series of bins slightly elevated, and from these bins it was to be wheeled on the ground level to the calciners standing on the same level, into which it was to be shovelled, presumably, as no provision for top charging was noted. The calciners were only equipped for drawing the ore into buggies, and it was afterwards to be sent to the charging floor of the furnace shed by wire rope aerial tramway, the charge being dumped and mixed on this floor. The fuel and fluxes were to be dumped from railway cars standing on a trestle 8 to 10 feet high into bins on the ground level, and thence taken to the furnace shed by aerial tramline. The plant, as far as completed, was erected under the supervision of Mr. L. S. Austin.

Office Buildings. The general office, the only structure completed, is a two-story wooden building, clapboarded and with shingle roof and containing, down stairs, a general office, private office, draughting room, etc., while up stairs are quarters for the superintendent and staff.

Assay Office. The assay office is a one-story wooden building, clapboarded and with shingle roof, and is divided into a furnace room, in which there is a brick, muffle furnace for two 10-inch muffles, fired with coal from the next room, and the sampling room, off which there is a coal bin. From the furnace room a door opens into the "wet" or analytical room, and from each of these a door opens into a small but compact balance room. Off the furnace room there is a supply room for assay supplies. The whole is a small but exceedingly convenient assay office, well designed and well built.

Sampling Plant. The sampling building is about 30 by 40 by 40 feet high, and is situated on the railway siding as it enters the smelter grounds. At present little of the sampling machinery is in place other than two elevators, each running the height of the building. The plant is arranged for a very complete system of automatic sampling, and it was reported that all machinery was on the ground for its equipment.

Main Furnace Building.

The main furnace building is 96 feet long by 32 feet wide, with a lean-to along one side in front of the furnaces. The construction is entirely of sawn lumber and is so very light that supplemental trusses and posts were afterwards put in to support the charging floor. The charging floor is 25 feet above ground and the eaves about 14 feet above this. The roof has a very flat pitch, and is covered with tar and gravel roofing. In this are already built two lead blast-furnaces 7 feet by 14 feet outside dimension, and 138 by 40 inches inside of jackets at the bosh. The bottoms of the furnaces are of standard type, cast-iron plates, with suitable attachments, lined with "Carr" Scotch firebrick. Above this are the sectional jackets, of cast-iron, 21 inches wide, and each having a 4-inch tuyere hole. They are provided with the usual and suitable water attachments. The upper part of the furnace is brick-work resting on iron girders supported by iron columns and independent of the lower construction. The charging openings are the length of the furnace on one side; they are level with the charging floor, and provided with counter balanced doors of wrought-iron. The stacks are vertical continuations of the furnaces and are of brick, iron bound, to above the roof, which is as far as they are built. No provision has been made for dust chambers. The furnaces are modern, well built and are provided with full equipment of settling pots, slag pots, moulds, etc., all made by the Union Iron Works, of Spokane. Whatever criticism the general arrangement may be open to, the furnaces, as such, are good and suitable to fit into any readjustment. In a small shed are two Connersville pressure blowers, in readiness to be put in place, also all necessary blast-pipe, etc.

Calciners and Shed.

The calciner building is of rather unique and original design (as shown in engraving) having a wooden frame covered with corrugated iron roof, and of such a form as to make a series of inclined steps, 13 in number and covering 6 calciners. The calciners are of the ordinary single hearth hand-worked type, 46 feet long and 16 feet wide, having 9 rabbling doors on each side and a double-doored fire box. These furnaces are built of red brick, with a second quality fire brick inside; they have a brick hearth laid on earth filled in between the walls, and are bound with iron rail buck-stays and 1 inch tie-rods. The furnaces were built when there was frost in the ground and also in the filling under the hearths, which has caused such settling as would necessitate the arches and hearths being all rebuilt.

Power.

Water sufficient to supply power for all requirements of the smelter is obtained from Mark creek, from which it is conducted in a flume 4 feet by 4 feet 6 inches in size and 700 yards long. The flume conducts the water into the smelter bench, from which it is led to a power-house in the river bottom by iron pipes, giving a head of about 175 feet. The power-house is to be fitted with water wheels, from which power is to be transmitted to the smelter by 3 rope drives, but all of this work is as yet uncompleted.

Water Supply.

A water supply for use about the smelter is provided from Mark creek, the water being conveyed from about half a mile up the creek by an 8-inch pipe-line.

PERRY CREEK.

Reports of renewed activity in placer mining and the installation of a couple of large plants on Perry creek led the Provincial Mineralogist to visit the scene of these operations on July 11th, 12th and 13th, 1903. In the early 60's Perry Creek attracted a good deal of attention as a placer mining camp, and unquestionably a considerable amount of placer gold was obtained there, exactly how much there are no records to prove, but the evidence of work done and the importance of the old camp of "Old Town," as indicated by the few remnants

that now exist, all go to show that it was the centre of rather extensive mining operations. In the early days the gold was principally obtained below the "Falls" on Perry creek, and near the bottom of the canyon. Attempts to follow up the gold have, in later days, been numerous, and some have been successful to a certain extent.

Perry Creek Hydraulic Mining Company.

The "Falls" occur in a canyon which cuts through a bluff of rock, the old channel of the stream apparently having passed on one side of this, and certainly on the right bank of the creek there is an old gravel channel on which, at the level of the creek, below the Falls, a tunnel (the old Montezuma tunnel) was driven in for from 1,000 to 2,000 feet, with certain workings in connection therewith of which no plan is known to exist. Whatever the course of this old channel may have been, it apparently emptied into the present creek below the Falls, as the old drifting proposition mentioned proved, and this work also proved that there is a paystreak which, according to "old time miners," was not down to bed or even rimrock, as bedrock was never reached by the tunnel. While there is unquestionably gold in such old channel, the paystreak was either not sufficiently defined or not rich enough to pay as a drifting proposition after it reached such considerable distance from the surface. That the gold in this old channel is not confined to bedrock, was demonstrated by the old tunnel workings in the first place, while later prospecting work has revealed two or three paystreaks in the overlying bank, not rich enough for drifting but sufficiently so to induce a company to attempt to hydraulic the whole bank. This company is the Perry Creek Hydraulic Mining Co., a syndicate formed of United States capital, and of which A. S. Trow, H. A. Bright, E. G. Brayton, and D. Halliway, of Merrillan, Wis., are the largest holders. Mr. Wm. Trow is local manager or agent, and Robert Jennings, superintendent in charge of the work. The company has secured water rights on Perry creek, taking water from the stream about four miles above the Falls, and having under construction a wooden flume, 4 feet wide by 3 feet high, built of 1¼ inch lumber. To cut this lumber the company had erected a saw-mill at Saw-mill creek, and had let a contract for 300 M. feet of logs at $4 per M.

The clearing of the surveyed flume line was well under way at the time the property was visited, as was also the flume construction, with every probability of being completed during 1903. The flume leads along the right or south side-hill, attaining a height above the creek of about 300 feet. At the lower end of the flume a "siphon" of rivetted iron pipe was to be constructed over a draw, narrow but having a depth of 175 feet. The siphon was to deliver its water to a short ditch, leading to a pressure box situated on the top of the hill, from which a pipe-line was to run down the face of the bank to the mouth of the Montezuma tunnel, where it should deliver water under a head of about 400 feet. The stream, from the tunnel down, is confined by steep banks and has a fall of about 3 per cent; this is not enough to carry off hydraulic tailings, and, consequently, they will have to be sluiced away in boxes for about half a mile below the Falls. This will necessitate the bottom of the hydraulic pit being some 50 or 60 feet above the creek at the mouth of the Montezuma tunnel. Consequently, while the upper part of the bank can be run off by straight sluicing methods, the lower 60 feet will have to be raised by an elevator of some sort.

The bank representing the face of this old channel has been cleared of timber to its summit. This bank is about 400 feet high and is composed of fine gravel, silt and some clay, which will wash cheaply and quickly, but will have to be handled very carefully as it has a tendency to "slide," a thing which, if it occurs, will choke the canyon and interrupt operations for some time. Hydraulicing operations should begin in the spring of 1904 and with judicious handling the property has a good chance of becoming a producing mine this next season.

Above the Falls the old channel is deep and several attempts have been made to test and work it by means of shafts sunk in the early 90's, but, while gold has been found, these operations have not been commercial successes. In the stream bed there is a clay or "false" bedrock, on which gold in paying quantities has been obtained at several points.

THE EAST KOOTENAY PLACER MINING COMPANY.

The East Kootenay Placer Mining Co., a local company, in which Dr. Bonnell, W. Ross and J. McDonnell, of Fernie, and others, are interested, has secured leases about 4½ miles above the Falls, and has established a steam shovel for lifting the gravel into the sluice boxes. At the point selected for operations the creek bed has a grade of about 2 to 3 per cent, and at a depth varying from 3 to 10 feet there occurs a "false bedrock," consisting of a sandy clay, on and above which gold in considerable quantities has been found. The true bedrock is believed to be at a depth of approximately 50 feet lower, since at this depth it was struck in both the old Ridgeway and Baker shafts, a short distance away. From the former of these shafts drifts were made, so it is reported, down stream for 150 feet and up for 25 feet. In the shaft $90 was said to have been found, and the drifts were stated to have paid $7 per day to the man for a time. The Baker shaft was also drifted from for some 100 feet, but was not profitable.

The original intention at the installation of the plant was to work the gravel on and above the false bedrock, and of this a patch 64 yards long, 8 yards wide and 2 yards deep, equal to about 1,000 cubic yards, has been taken and dumped into the rough sluice-boxes. From this small patch gold amounting to $260, as reported by the management, was obtained, being equivalent to 26 cents per cubic yard.

The shovel is a regular railway steam shovel (built by the Vulcan Iron Works, of Toledo, Ohio), mounted on a standard gauge car running on rails; it is self-propelling and has a bucket of 1½ cubic yards capacity. The motive power is supplied by steam from a vertical boiler forming a part of the equipment. The shovel, which weighs about 45 tons, was brought up from the railway as it stands and under its own steam, over the waggon road, on moveable sections of track, an exceedingly difficult undertaking considering the road travelled over. The shovel has a rigid bucket arm long enough to load railway cars from a gravel pit, a lift of say 10 to 12 feet, and at first worked very well, but as the cuts worked up stream the bedrock ran very flat, and the height therefrom to the sluice-boxes increased, so that eventually the dipper arm was found to be too short. Operations were accordingly stopped and the superintendent, Mr. Banks, was then sent East to have a longer arm prepared to enable the shovel to take a wider cut and to lift higher.

Some difficulty has also been found in disposing of the tailings, as the stream had not sufficient grade to carry them off, and it was, therefore, found to be necessary to "stack" them, an appliance for which was also being arranged for by Mr. Banks. These additions to the plant will not be ready until the season of 1904.

If the ground worked may be taken as a sample of the values to be found above the false bedrock, and there is no reason why it should not be, there is on the leases a large tonnage of material which, with the plant modified as proposed to suit the conditions, can be handled to a good profit. The plant, as it stands at present, is realised to have too small a range to be effective, and operations had been suspended until the requisite alterations were made. In the meantime the bucket arm had been unshipped and the winding engine of the shovel was employed to hoist the dirt from a shaft, which was being sunk to the bedrock proper to test it at this point. It is expected that, as work proceeds up stream, true bedrock will rise nearer the surface, and that towards the upper part of the leases it may be possible to reach it from the level.

stone cairns at important and convenient points, while arrangements have been made for the bringing in this winter over the snow and the placing in position of bronze monuments where the line crosses summits or important streams.

The boundary between British Columbia and Alberta is a sharply defined mountain range, on which the dividing line may be very approximately placed with little or no dispute, quite close enough for all practical purposes, as that particular section is destitute of timber or good land, and as far as can be judged from its geological formation, is unlikely to be of mineral value.

The western boundary has not been run out on the ground, and as there are no maps of the district based on surveys, but only sketch maps made from the descriptions given by prospectors and others, it is impossible for one examining the district to more than very approximately estimate the position on the ground of this theoretic line. This western boundary line, after leaving the initial point as described, passes into Alberta, only striking the eastern boundary of the Province of British Columbia at a point some 6 miles to the south of the Crow's Nest Pass, so that this point thus becomes the real point of commencement of the western boundary of the block in question.

The block in question may be practically described as that portion of the drainage area of the North Fork of the Flathead river lying in British Columbia, to which may be added certain parts of the headwaters of the East Fork of Lodgepole creek, although exactly what portion of this latter cannot be determined without an actual survey. In shape the district is an inverted V, having a width along the base, *i. e.*, east and west along the International Boundary, of approximately 35 miles, and a height, viz., north and south, of 35 miles.

The Flathead river flows from the northern corner of the district in a general S. E. by S. direction, almost along the centre line of the block, and crosses the International Boundary at about 114° 28′ west longitude, into the State of Montana. The watershed to the east and north is the main range of the Rocky Mountains, while that to the west is a spur from the main range which branches off, in a nearly south direction, at the head of Flathead, and is known as the Galton range, forming the divide between the Flathead and Wigwam rivers. The upper and northern portion of the drainage area of the Flathead has very little width from east to west, the mountains approaching close to the river and the channels of the tributary streams rising rapidly from the river bed.

Above Pass creek the river valley is from ½ mile to 2 miles in width, and is chiefly marsh or slough land, occasionally, towards the south, alternating with dry prairie. The elevation of the river bottom is here about 4,600 feet (barometric reading). The valley gradually narrows in as the canyon is approached (some 30 miles north of the boundary), and the limestone mountains almost hang over the channel of the river, forcing the trail to climb high up the side-hill. The elevation of the river just below the canyon is about 4,460 feet, and at the Boundary the elevation is 4,000 feet. (The United States geological survey bench mark is 3,986.) Between these points, a distance of about 30 miles, it is a gradual descent.

A few miles below the canyon the mountains to the east retire and the valley widens out, having evidently been an ancient lake bed which extended to the east and included the present channels of both Sage and Kish-e-neh-na creeks, the various gravel benches representing the different levels of the bottom of the ancient lake. The mountains to the east and north of the river are very rugged, with steep escarpments rising abruptly from low foot-hills. The average height of this range is from 7,000 to 9,000 feet above sea level, while the peaks rise to an elevation of about 12,000 feet. To the west of the river the mountains rise very much more gradually and are preceded by foothills, timbered to the summits with small black pine and spruce.

Water for sluices is taken out of the creek about half a mile above the shovel, and is brought down in a board sluice-box 32 inches wide and 15 inches deep.

These were the only two placer mining enterprises in actual operation on the creek in August last. Some little placer prospecting was being done with a view to locating ground suitable for shovels, dredges, or other mechanical arrangements; this work, as yet, has not developed into mining propositions. About half a mile below the Falls, on the right bank of the stream, a partnership of the old-time placer miners has sunk a shaft and is drifting for bedrock. This work is only carried on in the winter when water is not so troublesome. The results obtained are said to be satisfactory, yielding good wages to those employed.

Of the mineral claims located on Perry creek there is little to be said that is new; a general description of these will be found in the report for 1898, and, with the exception of a certain amount of additional development work, nothing of importance has transpired. A large number of the claims then mentioned have been allowed to lapse, though some new ones have been located. Sherwood's claims, there noted, are still held by him in good standing, and he has done considerable development work on them, proving the continuity of the ledges, with what results as to values has not been learned. It is understood, however, that the claims had this past summer been bonded to Eastern parties, after an examination by their representative.

Jay Usher and Billy Kid are reported to have located some claims some distance up the Creek, and on these there are said to be good surface showings, although nothing further has been proved as yet.

Messrs. Ross & Thompson, acting for American capital, have located some property about 12 miles above the "steam shovel." The showing is described as being in an almost inaccessible position on a steep bluff, the lead dipping at a steep angle into the hill, and from here some very good specimens showing copper sulphides were obtained. Operations are now under way to drive a tunnel into the hill, at the bottom of the bluff, to try and tap the lead at depth, but as yet have not gone far enough to give any results. Some four or five men are employed in driving this tunnel.

The waggon road up Perry creek from Cranbrook and Fort Steele has been extended up to the "steam shovel," and thus far is in very good condition. Should occasion require it, this road could be extended for four to six miles further up the flat valley at a small cost, as there is practically no timber, it having been burned off, and the grade is easy and uniform.

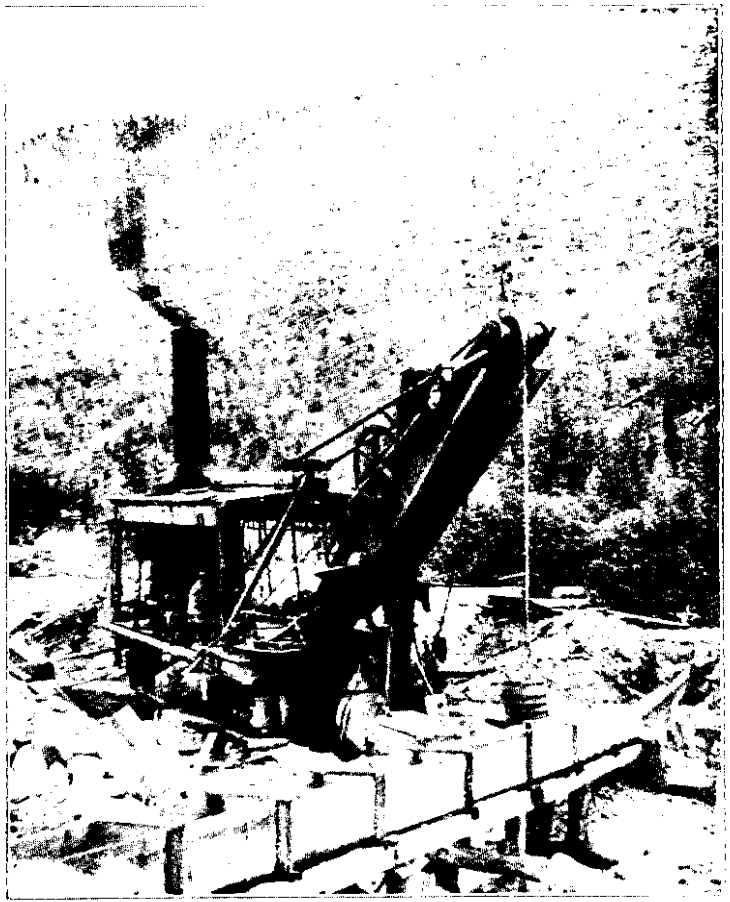
Summary Report on the Valley of the Flathead River.

General Geographic Features.

That area of land occupying the most south-east corner of the Province of British Columbia, and known on the official maps as Block 4,593, consists of a triangular piece of country, having as a base and boundary on the south the 49th parallel; on the north and east, the eastern boundary of the Province, *i. e.*, the summit of the watershed of the Rocky Mountain Range; while on the west it is bounded by Lot No. 4,589, the eastern boundary of which is described as a line starting at 0 on the B. C. Southern Railway in Crow's Nest Pass, viz.: the Provincial boundary in this Pass, and thence running due south to the International Boundary.

The first of these boundaries, the International Boundary, is distinctly marked on the ground, the line having been run out this past summer by the joint Canadian and United States Commission, the right of way cleared through the timber for a width of 100 feet, with

PERRY CREEK HYDRAULIC MINE—FORT STEELE M. D.



EAST KOOTENAY PLACER MINING CO'S STEAM SHOVEL, PERRY CREEK

The Flathead river at the Boundary has a width of from 100 to 125 feet, and a depth in spring of from 6 to 8 feet, while in the late summer the average depth at such points will not exceed 2 feet, with an estimated stream velocity of from 4 to 5 miles per hour. The volume of water at the canyon in summer is estimated as about half that at the Boundary.

Kish-e-neh-na creek rises at the Alberta summit, about 4 miles north of the Boundary, and flows a little north of east for 12 miles, thence southerly for 8 miles, where it enters the Flathead river from the N.E., about 4 miles south of the boundary.

Sage creek flows nearly parallel to Kish-e-neh-na, but about 3 miles further north, entering the Flathead about 2 miles south of Boundary. The last 10 miles of its course is through the wide Flathead depression, free from the mountains.

About 14 miles up the Flathead river from the Boundary there is an important creek entering from the east, evidently having its source at or near the summit of the Rockies.

Pass creek comes in from the N.E. at the Big Prairie. The river here takes an almost right angle bend, flowing from the west, and above the bend there are two important creeks flowing in from the north, which, as far as known, are still un-named. The first of these has a length of 12 to 15 miles, and it is reported to have its source near that of the South Fork of Michel creek, while it is said there is a low pass between the two creeks which might prove of value as a route of access for a railway.

Of the creeks flowing in from the west, Calder creek has its headwaters within a few miles of the Wigwam, about 6 miles north of the Boundary, and flows in a general easterly direction, entering the Flathead 3 miles north of the Boundary.

There is only one other creek of any importance flowing in from the west below the canyon, and this enters the Flathead about 10 miles north of the Boundary. This creek was not examined, as no trail could be found leading up it, and as it enters the river by a series of marshes and swamps, its course could not be easily followed with horses.

Routes of Access.

As already described, the valley of the Flathead, while opening out to the south, is surrounded on all other sides by mountain ranges. To the south of the International Boundary, in Montana, the valley gradually widens in a series of gravel benches rising above the river. Along these benches a fairly good waggon road has been constructed from the town of Belton, Montana, on the line of the Great Northern Railway, right up to the boundary. The distance is reported as being about 40 miles. Access to the district from British Columbia, or from Alberta, may only be had by trails passing over the mountain ranges mentioned. There are two well-known trails crossing through the valley of the Flathead, both connecting the valley of the Kootenay river, in British Columbia, with the plains of Alberta, the one passing through the northern part and the other through the southern part of the district. These are known as the North Kootenay Pass and the South Kootenay Pass trails and were used, since time unknown, by the Indians of Kootenay as a pathway to and from the great plains, where they frequently went on buffalo hunting expeditions. On both of these trails the old and deeply worn ruts, plainly visible to-day, bear mute evidence of their former importance as highways.

The South Kootenay Pass trail followed the valley of the Kootenay for some five or six miles south of the Boundary, to the mouth of Tobacco river or Grave creek, as it is known locally; thence, following this stream up, it crossed over a summit at an elevation of 5,280 feet (being here some 15 miles south of the Boundary) on to the headwaters of Yakinikak creek, which latter it followed down to its junction with the Flathead, at a point some five miles south of the Boundary. The trail then followed the valley of the Flathead northward to the mouth of Kish-e-neh-na creek, up which it led, re-crossing the Boundary about four miles

from the mouth of the latter stream and following it up to its headwaters. From these headwaters the trail crossed, at an elevation of 7,100 feet above the sea and 3,100 feet above the valley of the Flathead, over the summit of the Rockies to the headwaters of the South Fork of Kootanie river (this spelling is applied to a river in Alberta), and following this stream eastward for 15 miles, the open prairies of the foot-hills were reached near Watertown lake, Alberta.

This trail, in passing thus some miles to the south of the Boundary, circles south of the headwaters of the Wigwam (the southern tributary of the Lodgepole, having its headwaters some three or four miles south of the Boundary), and in so doing crosses only one summit between the Kootenay and Flathead.

The distances by this trail are approximately as follows :—

From Tobacco Plains to Grave Creek summit	29	miles.
From Grave Creek summit to Flathead river	13	"
From Flathead river to Kish-e-neh-na summit	20	"
From Kish-e-neh-na summit to plains near Watertown lake	15	"

The trail from Tobacco Plains to the Flathead is reported as being good, but was not travelled over by the writer.

From the Flathead up Kish-e-neh-na creek the trail was found to be good to within about five miles of the summit, where it became wet and muddy, but with a good bottom in all places. It was also here somewhat cumbered with fallen timber. This trail was used by both the first and second International Boundary surveys, and the district through which it passes has been described in the reports of these surveys.

The North Kootenay Pass trail left the valley of the Kootenay near the present town of Elko, crossed the Elk river on a pack bridge at the Elk River canyon, thence, following up the Lodgepole to the summit between that river and the Flathead, crossed over the divide at an elevation of 7,100 feet. It then followed the latter river down to Pass creek, a small stream coming in from the east, and followed this latter over a summit of 6,750 feet elevation to the headwaters of the south fork of Old Man river, which flows easterly into Alberta.

Snow remains deep on the North and South Kootenay passes from Alberta through the Rockies into British Columbia from November to July, but these trails have good hard bottoms, and as soon as the snow is gone are passable. The North Pass from the west along the Lodgepole is covered with snow at the summit for about the same length of time. The rise from the basin of the Lodgepole to the summit is very steep, and the trail bottom being clay renders it almost impassable in early summer until somewhat dried out, while from the summit to within five miles of Pass creek, on the Flathead, the trail is along a springy side-hill with a clay bottom, and can never be made a practical road, being a succession of bog-holes.

It has since been learned that a C. P. Railway prospecting survey cut a trail from Morrissey over a low divide to the basin of Lodgepole Creek, thence following up the East Fork of the Lodgepole across a low divide into the Flathead valley at a point a short distance above Pass creek, thus avoiding the bog-holes on the old trail. This trail is reported to be feasible, but rather soft in places.

The two trails first described are the time-honoured roads leading into and crossing the district. They were located originally by the Indians, and so are presumably the most available, though it must be claimed that, as viewed from a high peak, there appeared to be a much lower pass leading from an eastern tributary of the Wigwam, about half way between the two known passes, and which appeared to admit of a railroad grade being obtained from the Kootenay Valley into that of the Flathead.

The writer, wishing to reach the Flathead from Tobacco Plains, on the southern boundary of the Province, by an "all-Canadian route," followed up Phillipps creek, a small stream flowing into the Kootenay valley from the east at a point about two or three miles north of the Boundary. The trail leaves the main waggon road at Roosville, a small general store and post office situated where Phillipps creek flows out of the range of hills known as the Galton range, lying between the Kootenay and Wigwam rivers. The trail rises very steeply for about two miles, as the creek enters the Kootenay valley with a fall of 300 feet in about half a mile; thence, however, the grade to the summit is more gradual. The elevation of the Kootenay valley is about 2,300 feet, and that of the summit, at the head of Phillipps creek, 6,150, while the distance is about nine miles. From this summit a small unnamed tributary of the Wigwam was followed down to the main stream, a distance of ten miles, the Wigwam at this point having an elevation of 4,600 feet.

For this distance the trail was well cut out, having been recently used by a party of United States surveyors engaged in the demarcation of the Boundary Line. Both these creeks run nearly parallel to and about three miles to the north of the Boundary. From the Wigwam on there was no trail, but a blaze was followed which had been made last year by a prospector who had previously attempted to reach the Flathead by this course. It might be said that the prospector chose to return by another route.

Crossing the Wigwam about three miles north of the Boundary, a wide and heavily timbered valley was followed due east for about three miles, whence, following the blaze, the trail was taken by a series of zig-zags up a very steep and rocky range, running east and west, to the summit (elevation 7,100 feet), where good horse feed was found on the shore of a small snow-fed lake having no visible outlet. The distance from the crossing of the Wigwam to the summit is about eight miles, and is a good day's travel for a pack-train.

The northern side of this range was here found to be precipitous, limestone and slate bluffs, impossible to descend, and the summit was accordingly followed for about two miles to the east, to a point where descent to the basin on the north side was possible by going down a rock slide.

This basin (elevation 6,600 feet) drains into an important creek which flows nearly due east and is about five miles north of the Boundary at this point. The stream empties into the Flathead about three miles north of the Boundary and is the first tributary of the river from the west flowing in north of such line. This stream was unnamed and has been called Calder creek.

From the summit, at the head of Calder creek, to the Flathead is estimated at about 30 miles by trail, but represents three days' hard travelling by pack-train. The total distance by this route from Tobacco Plains to the Flathead river is about 50 miles, and is five days' journey by pack-train with light packs. The route, as at present laid out, is possible but not practicable as a permanent trail, although it is believed a much easier summit between the Wigwam and Flathead could be obtained about five miles further north, but at the cost of that extra distance.

The writer is informed that since he was over the ground the United States Survey party mentioned has continued the trail from the Wigwam to the Flathead, following closely the Boundary Line and crossing over two summits between these points.

Once the Flathead is reached good trails, or even waggon roads, could be built anywhere up the valley as far as the Canyon, and up the important creeks, at a comparatively small cost.

The present trails are Indian hunting trails, used only at low water; they lead in and out of the river, often following the river bars for miles. They would not be feasible in spring until high water is over, about the middle of July.

The trail to Sage creek leaves the main Flathead river trail about two miles north of the Boundary, running thence easterly for about three or four miles over the benches and low hills of the Flathead depression to a crossing of Sage creek, some six miles from its mouth. After crossing Sage creek the trail follows up the course of the east creek for about four miles, where it re-crosses and continues up the west side. The distance by this trail from the Flathead to the oil on Sage creek is about 11 miles. This trail has comparatively easy grades, is hard and in good order, but as the lower part of the Sage creek valley has been recently burned over, it is often obscure and hard to follow on the burned-over barrens.

A second trail has been recently blazed out, starting at a point on the main river trail some 10 or 11 miles from the Boundary and running due east to the "oil showing," a distance estimated at not exceeding five miles.

The Kish-e-neh-na creek trail has already been described as a part of the old "South Kootenay Pass" trail.

Timber.

The valley of the Flathead, including Sage or Oil creek, appears to have been all burned over about 30 years ago for a distance of possibly 10 to 12 miles from the Boundary, and timber is a second growth, consisting on the lower elevations of small spruce and fir, with some cottonwood and occasional tamarack (*larix occidentalus*), and on the benches of second growth black pine (*P. murrayana*). On the hills the timber consists of black pine, tamarack and spruce, and is small, not of a size to have any value for lumber. On Sage creek there is no good timber, as the second growth extends up point where the mountains close in, and much of the lower part of the creek district is composed of "barrens," devoid of any vegetation save small brush. On Kish-e-neh-na creek, for about 4 miles above the Boundary and for a width of about $\frac{1}{4}$ of a mile, the trees are occasionally of fair size, but there is not a great percentage of merchantable timber. In the valley of the Flathead the land is largely sloughs and islands, cut up by moving channels. On these low lands, from 14 miles above the Boundary northward for about 10 miles, there is a strip of timber having a width of from $\frac{1}{4}$ to 1 mile, say an average of about $\frac{1}{2}$ mile wide, on which there is some very good, large timber, chiefly spruce and tamarack, with some large cottonwood. This timber could be floated down stream in the spring but at considerable initial cost, as there are a number of extensive log jams occurring in the river, besides many abrupt turns and bars. The trees on the upper reaches of the river are not suitable for lumber, but would serve for mine timbers should they be so required.

Soil.

The ancient wide valley of the Flathead, including the present valley and that of its chief tributaries for some 12 to 20 miles above the Boundary, has been previously described as consisting of a series of gravel benches. On this gravel, to a depth of from 6 inches to 12 inches, lies a fine silt and on the lower elevations a dark loam, largely produced from sediment deposited at unusually high water and mixed with a certain amount of vegetable mould. This supports, on many small and larger open prairies, a fine growth of pea-vine, bunch-grass, etc., providing everywhere excellent feed for transient horses, etc., but the soil has not a depth to admit of cultivation, lying, as it does, on a bed of loose gravel.

The Flathead is a wild stream at high water, and is constantly changing the position of its bed in the flat valley through which it runs, forming innumerable islands and back waters; in fact, so changeable is its course that no depth of soil seems to have collected on the sides of the valley.

Other than the valley mentioned the district to the west of the river is occupied by high rugged mountain ranges, for the most part bare or covered with stunted vegetation. The hills

to the west of the river are more rounded off, and are often covered with small growth to the summits, but they rise so abruptly as to be useless for either grazing or agricultural purposes.

As already noted, the elevation of the river at the Boundary is 4,000 feet above sea level, so that, taking the character of the soil into account, none of the land in this section is deemed fit for agriculture, even at the southern end of the district.

There are three large creeks entering from the west, the valleys of these being about half a mile wide to where the hills rise steeply. These valleys contain considerable bog or marsh land, but lie at an elevation of nearly 4,400 feet.

Mineral Resources.

The district is so shut off from the remainder of the Province that very little prospecting has been done there for mineral, other than coal or oil, particularly by British Columbia prospectors, although a number from Montana have visited the vicinity. As far as could be learned from prospectors and others, no mineral locations have been recorded in the district, nor has any mineral of economic value been found. It was reported that copper had been found on one of the tributaries of the Flathead flowing in from the east, but nothing has been done to prove this alleged discovery, nor could the report be substantiated.

On the Flathead, near the mouth of the first creek above Pass creek (still unnamed) there is evidence that in the 60's or 70's considerable prospecting had been done for placer gold in the gravel of the creek bed, but, as far as can be learned, without success.

There is a story, of Indian origin, in circulation among the prospectors, of a "lost creek" in which, in the early days, two men discovered valuable placers, and took out considerable gold. One of these men died at the diggings, and the other, going south to winter among the Indians, died also, and with him all knowledge of the whereabouts of the creek. The Indians claim this creek to have been an eastern tributary of the Flathead, and some of the old-time prospectors are still searching for the lost diggings. No black sand or trace of gold could be observed in the river or any of the creeks, which fact, coupled with the geological formation of the mountains to the eastward, renders the existence of placer gold very improbable. No mineral float, or indication of mineral, was observed at any place in the district.

Coal.

To the eastward of the main Flathead river the rock formations forming the mountain ranges appear to be, and have been so classed by the Geological Survey, of an older age than the Cretaceous, which is the coal-bearing formation in this part of British Columbia; consequently, no coal may be expected in this district nor could any trace of such be found. In the southern portion of the district, to the west of the Flathead, the geological formation is more recent than on the east side of the river. From the few rock exposures visible in this heavily wooded section it is impossible to learn much in a hurried trip.

The hills along the valley of Calder creek are rounded off, the flanks being covered by wash which is chiefly dark shale and clay, through which a few outcroppings of light-coloured limestone and sandstone are visible. From the appearance of such formation as was seen, it is probable that it belongs to what has been classed by the Geological Survey as the "Fernie shales," and this section may possibly contain a small outlying basin of the Cretaceous or coal-bearing rocks, although no coal outcroppings are reported as found. This section has not been prospected, there are no trails in it and travelling is difficult.

On a small creek flowing from the north into Calder creek, about 10 or 12 miles from its junction with the Flathead, there were exposed beds of a black carbonaceous shale which contains concretions of claystone. These concretions, when freshly broken, give off a strong odor of petroleum, but examination of the creek for some distance up revealed nothing further. This creek is about on the boundary between Lots 4,589 and 4,593; it is impossible, in the absence of a survey, to say in which it is situated.

The northern portion of the Flathead valley has been examined in detail by parties of the Geological Survey and the outcroppings of the coal formations are shown in a "Map of the Crow's Nest Coal Fields" published by the survey within this past year. This map is based on actual triangulation and traverse surveys made by the Survey and show the coal measures of the Crow's Nest basin to be almost entirely to the west of the eastern boundary of Lot 4,589 and so, consequently, not within Lot 4,593. This coal basin is also shown as lying north of the east fork of Lodgepole creek.

On the headwaters of the Flathead and of the Lodgepole there are numerous exposures of the eastern edge of the coal measures of the Crow's Nest basin, and these have been prospected by various parties, exposing very promising coal seams.

These coal measures certainly lie very close to the boundary between the two blocks mentioned, and as such boundary has not been run out on the ground, the map of the Geological Survey is undoubtedly the best authority we have, and this places the coal exposures in Lot 4,589.

Oil.

Oil seepages have been reported from this section of British Columbia and also from the adjoining Territory of Alberta, certainly as far back as 1889, if not earlier. The late Dr. Selwyn, then Director of the Geological Survey, visited the district in 1891 with Mr. William Fernie, and in his report to the Hon. Edgar Dewdney, then Minister of the Interior, he says:—

"I found a decided boom in petroleum claims and a company formed to put down a boring, the site selected being 18 miles south, and a little east, of Pincher creek."

Speaking of the rock formation at the site of this venture, he says: "They were the ordinary varieties of sandstone and sandy shales of the Cretaceous."

Further on he tells of collecting a sample of crude oil from seepage through gravel, etc., in the bed of a stream about five miles to the east of the summit. He calls this Cameron Falls creek, but it is possibly the south fork of the Kootanie branch of Watertown river, as at this point oil is found seeping to-day and boring is going on at present to a considerable depth. Over the summit, in British Columbia, he speaks of oil on Kish-e-neh-na creek (he calls it Akamina brook, in error):—

"On the edge of a beaver-dam pool there were ledges of hard, dark-blue shale. Lifting layers of this at and below the water, a quantity of dark-green, circular patches of oil rose to the surface, and a precisely similar result followed by stirring up the mud in the bottom of the pool."

The finding of a trace of oil at this point has been reported to the Provincial Mineralogist by an old prospector who has been in the district for years. On the other hand, the Provincial Mineralogist camped on September 2nd and 9th on the spot described and was unable to detect or locate the seepage referred to. Dr. Dawson made a detailed examination of the geology of this creek in 1885, and must have also camped at this same spot, but he also failed to discover and record any oil seepage on this stream. The probabilities are that the seepage is very slight, or it may only show at certain stages of water.

In the same report Dr. Selwyn tells of his visit to Sage creek and of the finding of two seepages of oil on that stream. These the Provincial Mineralogist found, and they are described hereafter.

As far as could be learned or found on the ground, these are the only seepages in the district known to-day. It will be seen, therefore, that the discovery of oil is a matter of some standing, and that the close prospecting of later years has not added materially to the early discoveries.

Geology of Oil-Bearing District.

Sage and Kish-e-neh-na creeks are the only two streams upon which oil has been reported as actually found. These two creeks are parallel and closely adjoining, being only separated in their upper reaches by a spur of the main range. The seepages of oil reported occur on both creeks just where the mountains give way to the ancient wide valley of the Flathead, and it is quite certain that the geological formations are the same in both these creeks. This fact is immediately visible to the eye from the upper benches of the river valley, from whence the view obtained of the strata exposed on the ends of the mountain ranges shows them to have been at one time continuous. The valleys of these two creeks have been cut out by erosion, there being no evidence in the lower portions of these valleys of any faults, folds or anything more than slight bending of the beds. About three miles above the oil on Sage creek there is evidence of what appears to be a fault crossing the creek and affecting the strata; the mountains here are sheer and bare, enabling the formation to be seen, while on Kish-e-neh-na creek the hills are not as steep and are covered with slide material, obscuring the view of the various strata except upon the peaks; but the same fault probably also extends across the valley.

As to the rocks comprising this regularly bedded formation, they consist of shales, slates, quartzites, compact magnesia, limestones, sandstones and at certain places interbedded trap-flows. All are close grained, compact, and not capable of absorbing oil. The rocks in the upper beds are very red in colour, chiefly shale and slates, while lower down beds of light-coloured magnesian limestones, containing much siliceous matter, occur, bedded with banded sandstones and quartzites. None of these rocks are capable of absorbing oil, nor can they be suspected of being the source of any oil, as they are devoid of any appearance of carbonaceous matter. They have been referred by Dawson, by Selwyn and other geologists, to the Cambrian age, a formation older than the Carboniferous and very much older than the Cretaceous, in which latter the coal of British Columbia and also of Alberta is found. Oil had never been found in rocks of the Cambrian age, and the reported discovery of it rising through such was at first received with much doubt, until thoroughly substantiated by the Director of the Geological Survey, Dr. Selwyn, from personal observation. In the district itself there is no possible clue to the elucidation of even the possibility of such an occurrence, and it was only after the most careful and extended detailed survey of the whole range of mountains that any explanation was possible. On this point it is best to quote direct from Dr. G. M. Dawson, in the report of the Geological Survey for 1898:—

"The geological structure of the Rocky Mountain ranges proper, or that part of the western mountain region that lies between the eastern foot-hills and the great Columbia-Kootenay valley on the west, assumes a great practical importance in view of the opening up and working of the coal beds included within its area. On the map accompanying my preliminary report on that portion of the Rocky mountains between latitudes 49° and 51° 30′, forming part of Volume I. (1885) of the new series of annual reports of the Geological Survey, the areas of the Cretaceous coal-bearing rocks are represented with approximate accuracy, and in so far as the work carried out up to that date allowed. Several sectional diagrams were also given; but at the time the explorations to which this report relates were made, the existence of extensive 'overthrust faults' as a factor in mountain structure had scarcely been recognised by geologists. At a later date, the importance of such faults was very strikingly demonstrated, particularly in connection with the geology of Scotland, and it was realised that by tangential pressure, acting on the earth's crust, older beds may be bodily thrust forward upon newer formations for distances measured in miles.

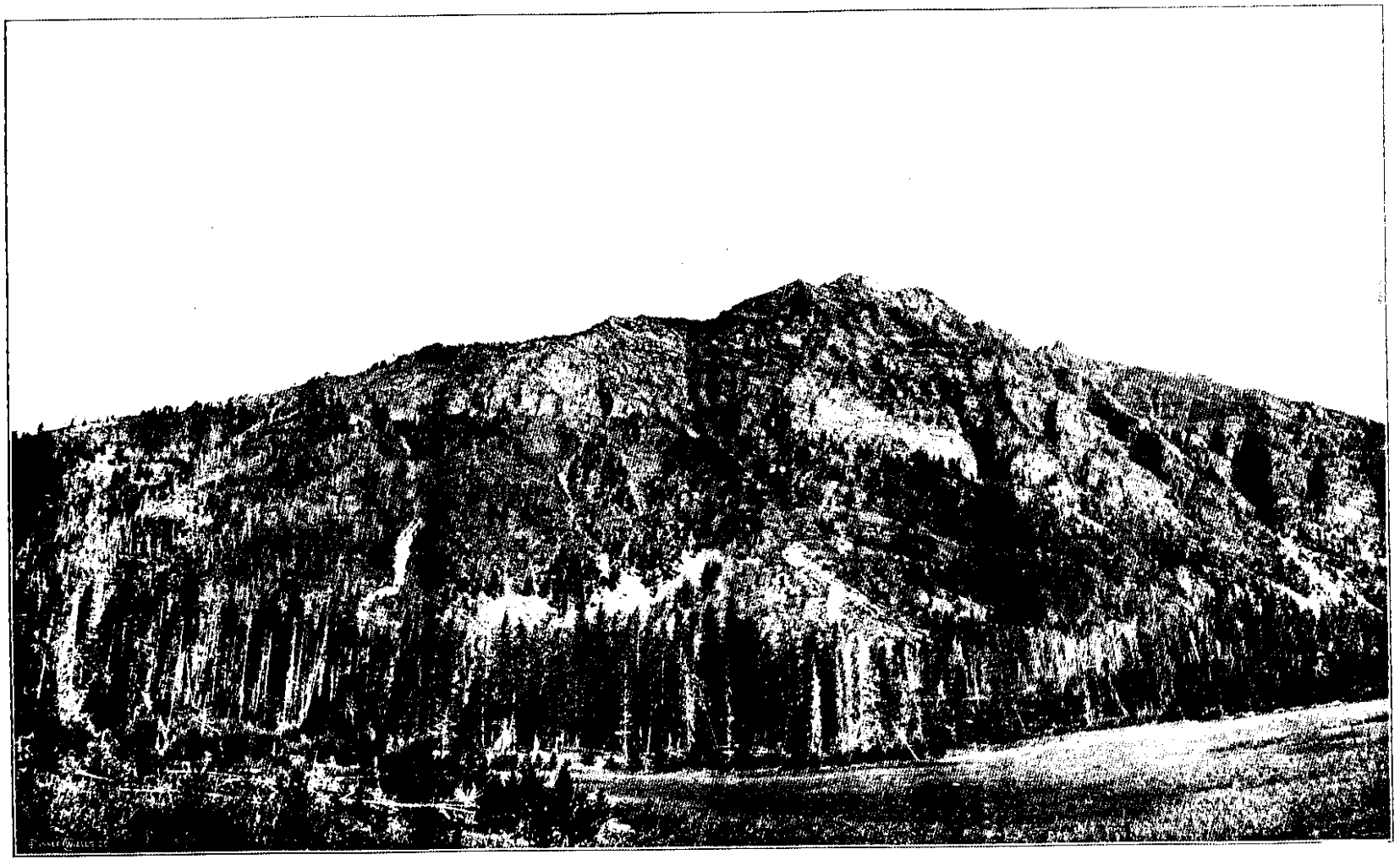
"The position of the Cretaceous coal-bearing rocks at and within the eastern edge of the mountains on the Bow and Elbow rivers appeared to indicate the existence of an overthrust of

this kind, but it was not until Mr. R. G. McConnell made his detailed examination of the Bow Pass, in 1886, that it was actually possible to state that the Palæozoic rocks had, in that vicinity, along the eastern point of the mountains, been thrust forward over the Cretaceous beds and up a gently inclined fault-plane for a distance of about seven miles, by pressure acting from the westward. This feature, as demonstrated in the vicinity of the Bow, is clearly shown in the sections accompanying the report cited.

"It had heretofore been supposed that a great normal fault, with downthrow to the eastward, defined the eastern base of the Rocky mountains in this vicinity and separated the rocks of the mountain region from the wholly Cretaceous and Laramie rocks of the foot-hills; but the structural discovery above alluded to at once threw doubt on the earlier supposition, as well as upon several of the sketch sections drawn in conformity with it in other parts of the mountains.

"It further appears to be quite possible that overthrust of the kind referred to may serve to explain the otherwise somewhat anomalous occurrence of petroleum in the southern portion of the Rocky mountains, between the Crow's Nest and South Kootenay passes. The actual existence of small quantities of petroleum in several places in this portion of the mountains was verified, some years ago, by the personal observations of Dr. Selwyn. The petroleum was actually found in parts of the mountain region characterised at the surface by very ancient rocks, probably of Lower Cambrian age. If it may be assumed, however, that these rocks probably overlie, in some places, those of the Cretaceous series, by reason of overthrusts, it is easily conceivable that the petroleum in question may have originated in consequence of heat, at considerable depths in the earth's crust, acting upon the fixed hydrocarbons contained in the rocks of that series."

The so-called "Big Oil Spring" on Sage creek occurs some 12 miles up from the mouth of the creek and about a mile above where the stream leaves the mountains and enters the flat depression of the Flathead valley. The rocks of the district were certainly not oil-producing, and so gave no indications as to the probable locality of the seepage, and the oil was only located, after some time, by the odour. The spring was found in the brush, about a quarter of a mile from the trail, at the base of the mountain to the north of the valley and near a small lake and marsh, which lie at an elevation of some 200 feet above the stream and 4,400 feet above the sea. The ground to the north of this lake is marshy and full of springs of water which go to form the lake. About 100 yards from the base of the mountain, on a knoll higher than its immediate surroundings, there is issuing a good-sized spring of water, and besides this spring were found several pools covered with thick, dark-green oil. The oil, being lighter than the water, accumulated nearest the highest point, the water flowing off below. The oil had accumulated here in several pools which covered an area of some 50 feet diameter, but, as far as could be determined, actually rose only within a radius of 6 or 8 feet, the remaining pools being formed by overflows. As the oil spreads itself out over the face of the water, all these pools have the appearance of being entirely oil, but an attempt to skim it off soon revealed the fact that it could not be collected by this means, but only by laying a cloth on the top of the pool and allowing it to soak up the surface oil and water, the cloth being then wrung out into a tin, from which the water was syphoned off from the supernatant oil. Samples of the oil were thus obtained and brought down for analysis. In appearance it is lighter than the crude oil of Pennsylvania, probably containing less tarry matter and being richer in the more volatile constituents. The following are the results of an examination made of these oils by the Provincial Assayer:—



SAGE CREEK, FLATHEAD RIVER, SHOWING LOCATION OF "BIG OIL SPRING."

No.	Where Obtained.	Specific Gravity.	Degrees. Beaumé.	Remarks.
1.	From tubing of bore-hole in Alberta, 5 miles east of summit.....	.879	30°	Dark-coloured, heavy oil: commences to distil over at 90° C.
2.	From surface seepage at same point ...	.879	30°	
3.	From "Big Oil Spring," on Sage creek, B. C.....	.828	40°	* Dark-green oil: commenced to distil off at 90° C.; 90 % of oil distilled off below 200° C., leaving 10 % of thick, dark oil containing tar, which latter is estimated at 5 %.
4.	From bed of Sage creek, near above (Leckie spring)	.818	42°	Light-amber coloured oil: commenced to distil off at 90° C.; 97.5 % of oil distilled off at below 185° C., leaving 2.5 % dark, heavy oil containing some tar.
	California oils	.889 to .997 average .940	28° to 10° 19°	Commences to distil off at 150° C.
	Japan oils.....	.82 .98	41° 12°	

* Appliances were not available for complete or further fractional distillation.

It will be noted that both samples 3 and 4 are of exceptionally low specific gravity, and that sample 4 consists almost entirely of the lighter constituents of petroleum.

The oil rises through black marsh earth covered with charcoal, etc., resulting from the frequent ignition of the oil-soaked vegetable matter on the surface, and it is difficult to tell how much of its colour it owes to this source. This "spring" can only be described as an oil seepage; there is no flow and the quantity of oil therefrom is very small, probably not more than a couple of gallons a day.

The flow of oil here reported is exactly as it was observed in the last week in August, 1903. Conversations had subsequently with prospectors of undoubted reliability, would indicate that the amount of oil issuing varies with the season and with different seasons, probably being influenced by the flow of water in the springs, the water seeming to bring the oil up with it. As far as could be noted, there are no warm springs in the district, all being very cold and very clear, having no mineral taste or smell.

The oil rises with the water, as already said, on a knoll. It is not a question of seepage out of any surface material, but of a spring coming up from the formation underlying the surface deposit and carrying oil. The immediate locality is surrounded on the surface by gravel wash, and if lateral flow existed it would be to the lowest level, which is the creek bed.

The place at which the oil is found is at the top of an anticlinal in the formation, that is to say, at the highest point in the bedding of the rocks, the axis of the anticlinal crossing the creek in a N. W. direction. From this point the beds dip up the creek to the N. E., and also down the creek, to the S. W. The beds can be traced dipping to the N. E. for about three miles, at first at a very flat angle, but gradually increasing until the dip reaches about 35°. At this point a fault occurs with, to the east, a different dip to the rocks, while further up the creek this is followed by other faults; hence it may be said that three miles above the "spring" is the limit in that direction of this possible field of accumulation.

To the S. W., that is, towards the valley of the Flathead, the beds dip at a very flat angle, probably not exceeding 10°, and apparently flattening out as they are lost to sight

under the gravel and surface wash of the Flathead depression. In this depression no sign of solid formation can be seen, with the exception, possibly, of two or three places in the bed of the river (and these being covered with water could not be examined), where there seems to be a bed of yellowish clay shale lying flat, and which appears to be "in place" as a primary deposit.

On Kish-e-neh-na creek, at a point where oil is reported, a similar anticlinal fold occurs, but with the axis running nearly N. E. and S. W., or with the course of the creek, the beds dipping off at an angle to the N. W. and S. E. into the adjacent mountains.

In neither of these anticlinals is there any evidence of a break, and it is quite possible that below the faults referred to the overlying beds are unbroken and continuous to the S. W. over the whole area of the Flathead depression, for a distance of 10 or 12 miles north of the Boundary.

Directly across the valley of Sage creek from the "Big Spring" in the direction of the axis of the anticlinal and about half a mile distant, a second seepage of oil occurs in the bed of the creek, just at the base of the mountain to the east of the valley. Here, on the east side of the creek bed, is seen in place, and lying nearly flat, a bed of hard, dark, flinty shale from which issues a spring of clear water, rising in a small basin, some two feet in diameter, formed in the gravel. With this water there is given off constantly a gas, perfectly colourless, having a strong smell of the more volatile constituents of petroleum, and this gas, when collected in a vessel, burns with a yellowish flame, or, when mixed with air, explodes. The water in this little pool is quite clear and the gas can be seen to issue from the shales, but no oil can be seen here issuing as such. On the surface of the pool, however, a whitish scum collects and a piece of paper touched to the surface of the pool absorbs this scum, which does not discolour the paper any more than would water. The paper so saturated is easily inflammable. The occurrence seems to be rather a condensation by the cold water at this point of the lighter and more volatile constituents of petroleum, while the heavier portions may have been arrested below. For some little distance around, the shales show oil on their surface, and there is no doubt much more gas and oil exuding through them than this one little spring would indicate.

The amount of oil collecting on this and a couple of other similar pools is very small; it took a day of careful skimming and syphoning to collect a pint bottle full. In collecting the samples it was noted that, after it was in the bottle, there was a clear portion underneath the whitish-green and more viscous "scum"; this was at first thought to be water, but it was found that paper absorbed it quickly and that it was inflammable. The scum has, on standing in the bottle, become clear amber colour, with the colourless portion below. A careful analysis will have to be made of these two products to determine their character.

The two springs described are evidently at the ridge of the same anticlinal fold and are undoubtedly from the same area of accumulation, the one resulting probably from a fractional distillation only. If the oil should have been generated, as Dr. Dawson suggests, "in consequence of heat at considerable depth in the earth's crust, acting upon the fixed hydrocarbons contained in the rocks of that series" (Cretaceous coal-bearing rocks), then the oil so generated would rise until it met some impervious barrier of overlying rock formation, and if such rock should be in the form of an inverted basin (an anticlinal), it thus would collect and retain the oil.

Assuming the theory advanced as to the origin of the oil to be correct, and that it has been so generated in quantity, then there is a fair probability of there being underneath this "spring" a body of oil, because the overlying rocks are practically impervious, and the position in which they lie, an unbroken anticlinal fold, is such as would serve as a trap or reservoir in which it would be retained under pressure. The fact of the seepage being small does not argue

against there being a large body of oil below, for if the seepage was large it would, in the ages past, have drained off the oil and there would be now no accumulation. As far as the disposition of the surface strata may serve as a guide, they would seem to indicate ideal conditions for such an accumulation, should the oil have been so generated.

If, by reason of an overthrust fault, the Cretaceous rocks *do* underlie at this point the surface formation of Cambrian age, then these Cretaceous rocks must be at very great depth, quite beyond all practical reach, so deep as to be affected by the interior heat of the earth so as to generate the oil in question. Oil so generated would rise until arrested by the barrier mentioned, and the question as to how far below the present surface this barrier may be it is impossible to determine, but, judging from the rock exposures seen to the eastward, the depth must be very considerable. Whether the depth of such oil-retaining barrier is beyond economic reach only very extensive boring operations can determine, although a detailed geological survey and sectional plan of the whole formation from this point well into Alberta might serve as a guide.

As to whether oil in quantity exists under this inverted basin of rock, there is little data upon which to base an opinion. Oil has been found, however, over a considerable area of country, as it exudes at the two creeks mentioned and to the S. E., some 12 miles more or less, at Kintla lake, in Montana, while on the same line of strike it has been found in small quantities. In Montana boring has been done to a considerable extent, it is reported to depths of over 1,200 feet, but without finding any quantity of oil.

About five miles over the Kish-e-neh-na summit into Alberta oil is found. There it occurs seeping through the gravel-wash on the bedrock of the creek, evidently coming out at some point higher up the valley. A few gallons a day have been collected there by washing the gravel in a sluice and collecting the oil from the surface of the water with cloths. Boring has been done here. One bore-hole was put down last year for over 1,200 feet, and it is reported that some oil was found at 1,120 feet down, but the quantity was small, and there is no flow nor has there been any production, although oil was seen standing in the "tubing" of the well and in the pit around the drill-hole.

A second drill-hole was being sunk this last summer by a Vancouver syndicate about half a mile further down same creek, and this hole was down over 1,300 feet without getting oil at that depth; this work is still in progress, while two or three additional bore-holes are being put in further down the valley, near the foothills.

These operations in Alberta are being carried on at a point very near the junction of the Cretaceous rocks and the older rocks which occur over the British Columbia summit, that is near the line of the supposed overthrust fault.

Economic Value of Oil Discoveries.

As to the economic importance of the oil in this district, it is very difficult at present from the data available to predict. The conditions may be summarised as follows:—The geological formation, as exposed in the hills and on the surface, is lying comparatively regular and flat. There is no local evidence of serious disturbance, so that from local observation it might be taken for granted that this great mass of conformably bedded deposit was "in place" in its geological scale. This formation has been classed as of Cambrian age by two successive directors of the Geological Survey of Canada. Oil has never been found *produced* in a geological formation as old as the Cambrian, nor do the rocks here exposed admit of the probability of their being the source of oil. Under anything but very extraordinary conditions, these surface geological conditions would seem to render it impossible for oil to occur in this section, but the stubborn fact remains that it is found there. It is, as Dr. Dawson very appropriately calls it, a "somewhat anomalous occurrence of petroleum."

In accounting for this fact, the explanation given by Dr. Dawson and already quoted seems the only one, viz.:—that these older rocks have been, by a gigantic "overthrust fault," slipped eastward over the Cretaceous (coal-bearing) beds of the plains for a number of miles; and that the subterranean heat, acting on these coal-bearing rocks, generated oil which finds its way up through the older but now overlying rocks. If this explanation is the correct one, the "overthrust" must have been very great indeed to bring the Cretaceous beds underneath the present oil seepage, as the Cambrian beds extend eastward from 12 to 15 miles from this point, in fact over the summit into Alberta.

The oil might have travelled westward underground for some distance, but this is not probable, as a few miles to the eastward of the point of occurrence of the oil there are several faults which have the appearance of being profound, and would, therefore, have allowed the gas and oil to rise to the surface through them, but of this there is no indication. This latter fact does not prove that oil has not been generated in this faulted region, as it may have travelled eastward along the main fault seam, and it may be that which is found seeping in Alberta.

As to whether there is oil in quantity to be obtained by boring, there is little evidence; the seepage at present is trifling, but the geological structure seems suitable for the retention of oil if produced in quantity. If it does so exist it must in all probability be at a very considerable depth, possibly over 3,000 feet.

In conclusion, I would report: the actual seeping of oil in three or more places; that the existence of a body of oil underground is quite possible, though exceedingly problematic; that if such body of oil does occur it can only be demonstrated by boring in all probability to a considerable depth and at a considerable cost.

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 1903.

There are now 137 mineral claims held under Crown grants or certificates of improvements, and during the year 200 new locations and 335 certificates of work have been recorded. The following are mineral claim statistics:—

Sections.	Held under Crown grant or Certificate of Improvements.	Certificates of Work Issued.	New Locations.
North-East	.....	10	3
East Centre	29	66	38
South-East	4	20	33
South-West	26	40	26
West Centre	83	194	95
North-West	.....	5	5
Total for 1903	142	335	200
" " 1902	117	451	253
" " 1901	104	642	455
" " 1900	71	704	470
" " 1899	37	718	729

*See also Report of Provincial Mineralogist, page 73.

In very few instances has development work exceeded the assessments which have been recorded. The depression in mining business has reduced the prospecting to a very low point, nearly all the new locations being old discoveries relocated in new names. In previous reports I have divided the district into six sections, and I continue the same arrangement.

North-East Section.

This section, which includes the drainage area of Wasa, Sheep and Wolf creeks, and of the Kootenay river between these points, has never been much prospected and is distant from railway transportation.

East Central Section.

This section comprises the drainage area of the eastern side of the Kootenay from Lewis creek to Bull river, excluding all territory south of Bull river. Much work was done in this area in former years, but no shipments of ore, except for sampling, have ever been made. The *Estella Group*, on Tracy creek, will probably commence shipping during the coming year. There is no railway in this section, but the proposed Kootenay Central Railway would traverse it from end to end.

South-Eastern Section.

This section includes the eastern drainage area of the Kootenay river below Bull river, and the drainage area of the Flathead river. Nothing beyond development work has ever been done in this section on the mineral claims, although most of the properties are within a few miles of the railways.

South-Western Section.

This section comprises the western drainage area of the Kootenay below Wardner and the drainage area of the Yahk and Moyie rivers. The railway gives transportation to Moyie lake, Lower Moyie river and Palmer bar. The *St. Eugene* mine and *Society Girl Group*, both of which have shipped ore, are in this section. No ore has been shipped during the past year, but much work has been done on the *St. Eugene* in perfecting machinery, defining the "ore in sight," and in arranging a new slime concentrating process for handling the slimes and tailings of the mill.

West Central Section.

The drainage area of the St. Mary's river and its tributaries are included in this section. North Star hill, Sullivan hill and part of St. Mary's river are close to railway transportation. The *North Star* and *Sullivan Groups* are in this vicinity. Their output in former years was large, and this year in September and October small shipments were made from the *North Star Group*, on which development work is being continuously prosecuted. The *Sullivan Group* has also made small shipments during the latter part of the year from its dump. On the *Badger* and *Red Mountain Group* and the *Roaring King Group*, on Perry creek, development on a fair scale has been done.

North-West Section.

This section which comprises the drainage area of Cherry and Skookumchuck creeks, is situate at a distance from all railways and little has been done during the year.

Placer Mining.

Work during the present year has been confined to Wild Horse creek and Bull river, in the East Central section; Perry creek, in the West Central section, and the Upper Moyie river and its tributaries, in the South-western section.

On Wild Horse creek the usual amount of work has been done by Chinamen. One company of white men have gone to considerable expense in opening a part of the *Invicta* mining leases, without much return so far, although another season is likely to be more profitable.

On Bull river the Gold River Mining and Power Co., in developing the water power, intend to divert the stream and mine the diggings in the bed of the river. The undertaking is a serious one, and the company has installed a saw-mill to cut lumber for its flumes. Some time must elapse before mining begins.

On Perry creek three companies are working, each on a different principle. Near Oldtown the Theis Company is sinking a new shaft to bedrock, work on the old shaft having been profitable; the Perry Creek Hydraulic Mining Co. is constructing a flume two miles in length and will work bench diggings by hydraulic power, commencing near the Falls; while the East Kootenay Placer Mining Co., further up the creek, has taken in a railway steam-shovel with which to raise the gravel from bedrock, and is now perfecting the machinery for handling the gravel between the steam shovel and the flumes.

On Moyie river no work has been done, but several applications for mining leases have been advertised. A little work has been done on Weaver creek, a tributary of the Moyie.

COAL MINING.

* The Crow's Nest Pass Coal Company owns all the working collieries in the district. These are situated at Michel, on Coal creek, near Fernie, and at Morrissey, all in the South-eastern section of the district. The production of coal and coke at these points was as follows:—

COLLIERY.	1902.		1903.	
	Coal (gross).	Coke.	Coal (gross).	Coke.
Michel ..... (tons 2,240 lbs.)	113,853	29,347	235,347	64,818
Coal Creek ..... " "	238,776	78,490	215,791	84,321
Morrissey ..... " "	41,332	.....	138,750	625
	393,961	107,837	589,888	149,764
Net coal ..... " "	223,501	.....	340,337	.....

This shows an increase of about 50 % in coal and nearly 40 % in coke. The number of men employed in the mines has been:—

	1902.		1903.
Michel	220	.....	524
Coal Creek	561	.....	441
Morrissey	203	.....	306
Total	984		1,271

* For fuller information concerning these collieries, *See* "Coal Mining in the Province."

Coal and Oil Prospecting.

During the year 191 coal and oil licences have been in force in the Elk River valley distributed as follows:—

Group 1,	on west bank Elk river,	near Morrissey	6 licences.
" 2,	" "	opposite Fernie	13 "
" 3,	" "	40 to 48 miles north of mouth of Michel creek	16 "
" 4,	on east bank "	40 to 50 miles north of mouth of Michel creek	19 "
" 5,	" "	28 to 40 miles north of mouth of Michel creek	46 "
" 6,	on Fording river, west and north of Lot 4,588		79 "
" 7,	on Fitzgerald creek, " "		12 "

Development work has been done on most of these, 67 renewal licences having been granted.

In the Flathead valley, 697 notices of application for coal prospecting licences have been advertised in the British Columbia Gazette.

Office Statistics—Fort Steele Division.

Mineral claims recorded	199
Placer claims recorded or re-recorded	1
Partnership placer claims recorded or re-recorded	2
Certificates of work recorded	297
Payments in lieu of assessment work	3
Certificates of improvements recorded	27
Conveyances or other documents of title recorded	78
Partnership agreements recorded	3
Gold Commissioner's permits recorded	1
Documents filed	22
Affidavits filed	531
Record of water grants and permits	5
Mining leases issued	4
Mining leases in force	23
Free miners' certificates, ordinary	458
" companies	6
" special (individual)	1

Revenue.

Free miners' certificates	$2,529 50
Mining receipts	5,232 25
Mineral tax	374 89
	$8,136 64

NORTH-EAST KOOTENAY DISTRICT.

WINDERMERE MINING DIVISION.

REPORT OF PROVINCIAL MINERALOGIST.

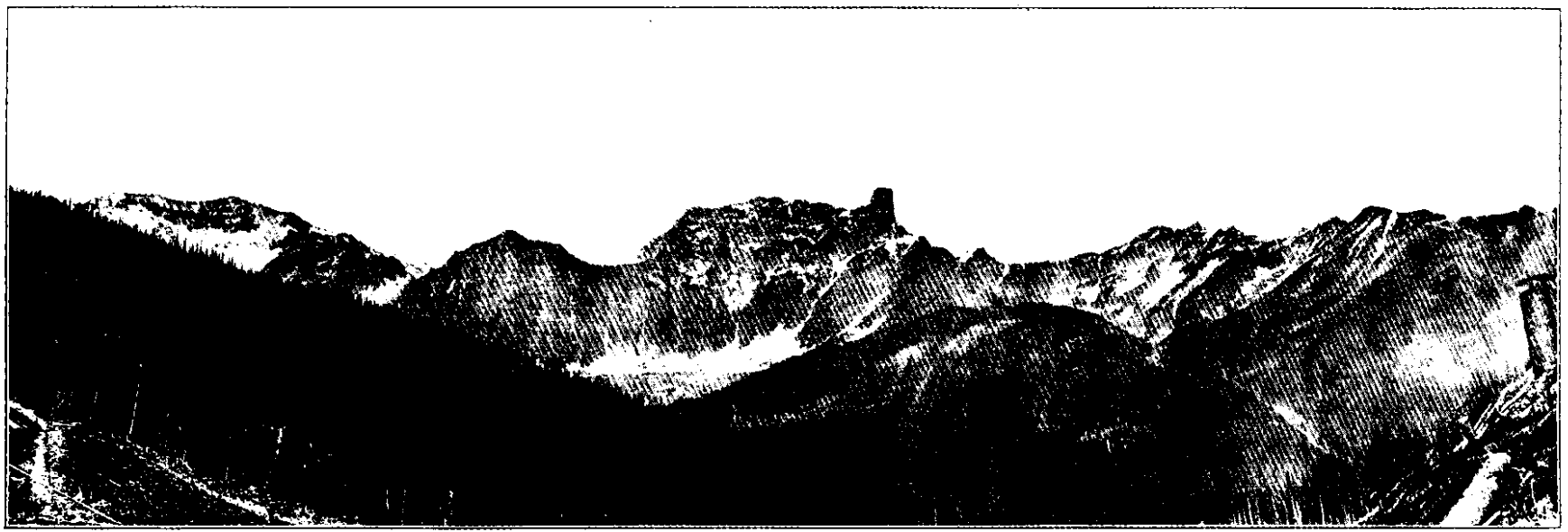
On July 17th the Provincial Mineralogist started from Cranbrook by stage for the Windermere District, to note the progress made in mining in that neighbourhood. During last summer (1903) the stage left Cranbrook, on the Crow's Nest branch of the C. P. R., once a week, on Friday at noon, passing through St. Mary's Mission, Fort Steele and Wasa, and arriving at Windermere on Sunday at noon. From Windermere an auxiliary stage continues to Wilmer, arriving the same afternoon. During the summer months a semi-weekly steamboat service from Golden to Windermere offers the more comfortable means of going into the district, and by this route practically all the freighting in and out of this section is conducted.

The stage route from Cranbrook passes Findlay creek, the scene of the operations of the "Thunder Hill Co." On this Company's property no further work has been done, and it is reported that the machinery in the concentrator has been sold for removal to near Fort Steele. On Findlay creek there has, this past year, been a revival of placer gold mining, and a syndicate of Rossland men was at work a few miles up the stream testing certain gravel deposits, in which gold had been found. Considerable work had been done in prospecting, and at that time a large canvas hose was being brought in to fully test the bank by hydraulic methods, for which an adequate water supply is assured. No practical results had then been obtained, and no authentic information has since been received as to the outcome of the season's work.

The Mining Recording office of this division is at Windermere, a small town most beautifully situated on the east shore of Lake Windermere, and here there are also a couple of good stores, hotels, churches, a school, post office and telegraph office.

Formerly some mining was carried on at the *Swansea* mineral claim, situated on the hill to the east of and overlooking the town, but for the last few years no work has been done on this property. Latterly the mining locations and development of the district have been almost exclusively in the range of hills to the west of the Columbia valley, and which separates the latter from the Duncan river valley. Of this work the most successful and extensive operations have been on Toby, Horse Thief, No. 3, and other creeks flowing from the west into the Columbia river, at short distances below where it flows out of Lake Windermere. This development has caused three more or less successful townsites to spring up on the west side of the river, near the old "Salmon beds." Of these towns Wilmer is the nearest to the mines and is the largest, having good stores, hotels, etc.; it is situated about three-quarters of a mile back from the "Landing" at the river, on a bench where the Horse Thief and Toby creek waggon roads join.

The rock formations seen in the mountains to the east of the Columbia river are those of the main Rocky Mountain range, chiefly dolomitic limestones interbedded with shales, slates and sandstones, a formation which has not, in British Columbia, been found productive of economic minerals. The mountains to the west of the river are chiefly composed of shales, slate, schist and quartzite, with little limestone, all of which have been much folded and disturbed, and occasionally altered, by igneous intrusions. The district was fully reported upon



VIEW FROM PTARMIGAN MINE, McDONALD CREEK—WINDERMERE MINING DIVISION, S. E. KOOTENAY.

in 1898, and of the properties then located and described the only one which has made any shipments is the *Delphine*. On this property some development was done and the lead of clean galena referred to at that time has been all mined. One of the owners latterly in charge of the work informed the writer that no further extension of clean ore had been found, that as yet no attempt had been made to treat a low grade concentrating ore, and that the property was at present not being operated. The shipments for 1902 amounted to about 48 tons, and in 1903 about 12 to 15 tons. This ore averaged about 25 % lead and 135 ozs. silver.

Since 1898 a number of very promising prospects have been located, and two properties, the *Paradise* and *Ptarmigan*, have developed into shipping mines. These are described in detail later.

Of the properties recently located and developed, the *Lead Queen*, on No. 3 creek, appears to be the most successful, and is reported as having a very large "showing" of galena ore, from which samples have been assayed, giving 60 % lead and 30 to 40 ozs. silver per ton. Some 200 to 300 feet of underground work has been done, with satisfactory results. The present low price of galena ore, taken in conjunction with the cost of transportation, has not offered much inducement to fully develop the property under existing conditions.

Situated opposite Windermere and near the lake is the *Bunyan* property, which has produced some good samples of sulphide of copper, carrying small silver values.

Ptarmigan Group Mines.

The property formerly known as the *Red Line*, or *McDonald* mines, is now called the *Ptarmigan* mines, and is owned by the "Ptarmigan Mines of the Selkirks," a syndicate of eastern American investors, under the local management of Mr. Thomas Starbird, of Wilmer, B. C. The group includes the following Crown-granted mineral claims:—*Red Line No. 1*, *Red Line No. 2*, *Iron Cap*, *Iron Crown Fraction* and *Contention Fraction*. The mine is situated in the basin at the head of McDonald creek, a branch of Horse Thief creek, at an elevation of 8,500 feet above sea level, and a distance of about 27 miles from the town of Wilmer, on the Columbia river, from which point a steamer connects in summer with the Canadian Pacific Railway at Golden. A very good waggon road has been built from Wilmer to the mine office and compressor plant at the lower terminal of the aerial tramway, which is at an elevation of 6,500 feet. This road follows up Horse Thief creek, and for about half the distance has an easy grade and was not difficult to build, but shortly after passing "Blowfly," where the manager's house is situated, it enters a narrow part of the valley, where the steep and rocky sides have necessitated heavy work and called for considerable engineering skill on the part of Mr. T. H. Taylor, the company's engineer, to complete the undertaking. This has been done at last, but at the expense of some sharp curves and heavy grades, which fortunately, however, are mostly "down hill" from the mine. The mine has already been described in previous reports, so that a further summary only is necessary.

Red Line Claim.

In the steep hill on the south side of the basin, just below a glacier, a couple of veins were found cutting into the hill with a dip nearly vertical. The country rock appears to be dark silicified limestone, with argillites and quartzite. Surface prospecting above the outcrops is prevented by the glacier, from under which, however, rich float is obtained. The glacier keeps the ground in a frozen condition even in summer, thus increasing the difficulties of mining. On the smaller of these veins a tunnel has been driven for 300 to 400 feet, following a marked quartz fissure vein, which carries a paystreak a few inches wide, containing ore consisting of iron pyrites and tetrahedrite, assaying high in silver with some gold. This paystreak, though small, was found to be so rich that the lead was later cut by another tunnel about 125 feet deeper, and here

about the same amount of drifting was done, a raise being also made connecting the two. The work done on this lead proved the vein to be well defined and continuous, although the paystreak at points become very narrow, while the tonnage of ore produced for fathom of tunnel driven was small. Selected samples of this ore are reported to have given 600 oz. in silver and .75 oz. in gold. On the larger vein a tunnel, driven at the same level as the lower tunnel of the small vein, has been run in about 400 feet, with two cross-cuts to the small vein tunnel. As the development proceeds there are some indications which lead to the belief that these two veins may eventually join. On the "Big Lead" the fissure is not so clearly defined and assumes more the appearance of a strong impregnation of the country rock, along a fissure, with mineral sulphides and quartz, and this may be considered the ore body here. In one place this ore body widens out to 30 feet, again pinching down to a few inches. The length of this wider ore chute is estimated at 50 to 60 feet. Where the ore body was widest preparations were being made to sink a winze; at the time the property was visited the hole had been sunk for some 10 to 15 feet, and was still carrying the ore at that depth. The total length of workings in the mine was estimated at 3,030 feet, made up as follows:—Drifts, 2,645 feet; winzes, 150 feet; raises, 235 feet. No reliable data could be obtained as to exactly what the assay on an average sample of this ore body would be, although the ore was admittedly too low grade to stand shipping without concentration. The ore consists of quartz and rock carrying a considerable proportion of iron pyrites, with varying proportions of tetrahedrite (gray copper), and the values seem to be chiefly associated with and contained in this latter mineral. Small shipments of sorted ore have been made which gave smelter returns as follows:—Copper, 4.1 %; silver, 237 oz., and gold, 0.41 oz. per ton. The silver values of the ore seem to be nearly in proportion to the gray copper contained therein, and concentrates therefrom run as high as 1,000 oz. silver per ton, while the gold values are with the iron pyrites.

A concentration by water of the gray copper from the iron pyrites and quartz was recognised as impossible; consequently, a lot of the ore was sent to New York for a trial of concentration by the Wetherill Magnetic Separating Co., the results of which have been kindly furnished by Mr. Starbird, and are here given as being of more than local interest. It is perhaps unfortunate that the ore sent was sorted too high to make the test of much practical value to this property, as it in nowise represents the bulk of the ore. As a matter of fact, indeed, the ore sent was so highly sorted as not to require any concentration, but could be well shipped as it was.

The following is an analysis of the ore sent from the Ptarmigan mine, Wilmer, B. C., as reported by the Wetherill Company:—

ANALYSIS OF ORE TESTED.

Copper	11.09 per cent.
Zinc	trace.
Iron	22.67 "
Sulphur	31.38 "
Antimony	10.78 "
Bismuth	0.15 "
Silica	16.32 "
Gold	0.73 oz. per ton.
Silver	416.47 " "

Test of Silver Ore by Wetherill Separating Company, March 31st, 1902.

Original.					Poles 3 & 4, 15 Amperes.				Poles 5 & 6, 28 Amperes.				Non-Magnetic Tails.			
Size.	Weight. Grms.	Copper. %	Silver Oz.	Gold. Oz.	Wght. Grms.	Copper. %	Silver, Oz.	Gold. Oz.	Whgt. Grms.	Copper. %	Silver Oz.	Gold. Oz.	Weight. Grms.	Copper. %	Silver Oz.	Gold. Oz.
10 to 20	39,615	6.94	283.25	0.45	9,675	22.59	858.75	0.67	1,710	9.70	358.70	0.55	28,230	1.85	67.20	0.50
20 to 40	20,170	7.05	273.80	0.55	4,700	23.72	910.40	0.50	1,300	15.59	580.25	0.75	14,170	1.15	42.18	0.49
40 to 80	10,880	6.54	248.97	0.52	2,240	27.28	1,030.80	0.50	240	16.18	592.40	0.87	8,400	0.9	32.75	0.50
80 to 200	7,430	6.33	241.35	0.50	1,070	27.53	1,049.30	0.45	290	15.85	982.50	0.53	6,070	1.55	63.85	0.48
Dust E..	7,000	7.03	277.50	0.53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

The writer had the opportunity of witnessing at the Wetherill Company's plant in Newark, N. J., this fall (1903), treatment of some ore from this property, and, as far as the eye could judge, the separation was very complete.

From experiments witnessed it was seen that certain samples of tetrahedrite, zinc blende, &c., when pure, were not magnetic, whereas certain other samples were quite magnetic, probably from the presence of a small quantity of iron combined therein. The Wetherill people say that no chemical analysis will tell whether any mineral is magnetic or not under high powers, and the only way to find out is to try it practically.

The future prospects of this property, and of many others in British Columbia, are dependent upon the ultimate success of this method, and the practical results of working tests will be awaited with much interest.

Plant. A Bleichert aerial tramway, with a nominal capacity of 200 tons a day, was under construction from the mine tunnel, elevation 8,500 feet, to a point at an elevation of 6,500 feet, a distance of 7,550 feet, and was nearing completion. At the lower terminal bins were being built, and a magnetic concentrator was contemplated, the plans for which were all prepared, although no construction had been started. At this point a Riedler straight line air compressor, supplied by a 96-h.p. Babcock and Wilcox and a boiler had been erected, the compressed air being sent up to the mine in a 5½-in. iron pipe line, and supplying the two or three drills which were at work. At the end of the waggon road, at the compressor site, the company had erected a superintendent's office and a boarding-house for employees, while half way up to the mine, at an elevation of 7,500 feet, was located the mine-bunk and cook-house and the mine foreman's office. The combined bunk-house capacity is for 75 men. About two miles down the waggon road, at an elevation of about 5,500 feet, and near McDonald creek, the company had erected a saw-mill and planer to supply the property with lumber for construction purposes, and which is also used to cut up wood for the compressor boiler. A telephone line has been built from Wilmer to the mine, with stations at Blowfly and at the compressor plant.

McDonald creek will supply abundant water power for all mining and concentration purposes. It has been planned to eventually utilise this by erecting a power-house near where the creek crosses the waggon road, from which point the power will be transmitted as electricity to wherever it is required.

The company's *Iron Cap* claim, over the summit from the *Red Line*, has not been worked for two years. Some 1,200 feet of tunnels, &c., are reported thereon. The ore is galena, and at the present time it is not considered rich enough to mine.

Paradise Mine. The *Paradise Group* consists of some 9 claims situated in Paradise basin, at the head of Spring creek, a small stream which flows into Toby creek from the north, about 20 miles from its mouth. The property is

held by an Eastern Canadian syndicate, represented by R. R. Bruce, who is the local manager of the properties. From Wilmer a waggon road has been built up Toby creek by the Government to "Pinehurst," the company's store-house, barns, etc., at the foot of the mountain. From here the company has constructed a very fair waggon road, winding up the hillside to the basin, at about 7,000 feet elevation, at which point is situated the company's mine office, store-house, bunk and cook-houses, etc., buildings which are suitable for the preliminary development of the property.

The formation in the vicinity of the mine consists of shales, slates, sandstones, etc., with occasional beds of limestone, all very much contorted and folded, with numerous small faults, but as a whole not seriously broken. From the basin the mountain rises to the east, at an angle of about 30°, for a height of some 800 to 1,000 feet, measured to the lowest point in the saddle or lowest part of the divide. The hillside is devoid of trees, the surface being covered with loose, brownish shales, through which, occasionally, outcroppings of the same rock *in situ* are seen, lying here tilted to an angle of approximately 60°, with a strike diagonally across and over the low saddle-back range. Such at least is the strike given by the workings, although on the summit of the ridge there are indications which render it possible that towards the top of the latter the strata may have taken a bend and run more nearly parallel with the ridge.

At the No. 1 tunnel, about 650 feet above the basin, following the stratification of the shales, there had been found outcropping a vein or zone filled with red oxides of iron and lead carbonates with some galena. This lead had been followed in, by a tunnel and incline, which "follow the ore," and are therefore somewhat irregular in plan, for several hundred feet of workings, including raises and drifts extending above this level. The general width of the lead is estimated at about 4 feet, underlying which is a layer of clay or gouge, in some places from 12 to 18 inches thick. This vein was traced diagonally down the hillside, and at 125 feet vertically lower No. 2 adit tunnel was driven in on the lead for a distance estimated at about 500 feet. From this second tunnel level connection was made, in ore, with the No. 1 tunnel; a winze had also been sunk for about 150 feet, still carrying ore.

Some 250 feet vertically lower, on the outcrop of the lead, there had been run in No. 4 adit tunnel, which still found and followed the lead, but in which ore was not so abundant. It must be noted in this connection, however, that the slope of the hill being about 30°, a very long tunnel is necessary to get under the dip of the large ore bodies developed above, and the point required had not been reached at the time the property was visited. Subsequent information derived from Mr. Bruce shows that this No. 4 tunnel is now in about 1,000 feet from the portal, but is not yet under the upper main ore bodies, which point, it is estimated, will be reached in March or April, 1904, when systematic cross-cutting will be begun on this level.

The winze from No. 2 tunnel, already mentioned, and known on the company's plan as "Shaft 885," is now below the No. 3 level, which latter is to be run "blind," or from the winze, and not opening to the surface. This level has now been started away from the winze and the first cross-cuts are being made, the vein filling at this depth being still of the same oxidised nature seen in the upper levels.

The lead, it will be thus seen, is traced in depth to the fourth level, and for a length of 1,000 feet. The workable ore is proven to the third level, and there is every reason to think that it will soon be proved to the fourth level also. The lead matter, as already said, is iron oxide with carbonates and sulphides of lead associated with silicious lime (analysis about 20 % SiO, 25 % CuO, with 25 to 30 % Fe.) The lead is either a replacement of a stratum in the shales,

originally largely or wholly composed of lime, or the lime has been deposited from adjacent lime beds, in and with the lead matter, in a foliation of the shales.

In the course of the work done over 1,600 tons of first-class or shipping ore has been actually shipped, that is, about 2,000 tons have been extracted. This ore has largely been sorted in the mine, or rather no attempt has been made to mine any but first-class ore, which, from actual smelter returns, runs about 50 oz. silver and 60 % lead. Although no attempt has been made to mine second-class ore, yet on the dump there were some 4,000 tons, estimated to run about 35 oz. Ag. and and say 35 to 40 % lead. In the mine workings much ore is actually "in sight," and more is demonstrated almost to a certainty. A rough calculation made at the time (July, 1903) gave, if not of ore actually "blocked out," certainly of "probable ore," about 50,000 tons, which amount, there is every reason to expect, has been largely increased by subsequent developments.

The ore is rather too low to be shipped under existing conditions of transportation, etc., without having a great percentage of the values consumed by charges; the management, therefore, is only shipping the best ore "to pay its way," and has in contemplation the erection of a smelter at Pinehurst, at the foot of the hill. With ample capital, with a very large body of ore actually developed and a practical certainty of much more to be developed, and with ore and lead matter of such character as to be nearly self-fluxing, it certainly would seem as if the erection of a lead blast-furnace was amply justified, even by the present development.

A survey has been made for an aerial tramway from the mine to Pinehurst; an exceedingly practicable line has been located and bids obtained for its construction, but it is understood that nothing will be done until No. 4 tunnel has been more fully developed, as such development would materially affect the location of the terminals and line. There is little question but that the line must be built soon, as the saving to be effected on the transportation of the ore in sight from the mine to Pinehurst, say $1 a ton, would more than repay the cost of the tramway.

The company has constructed a private telephone line from Wilmer to the mine, a distance of 20 miles. At Pinehurst the company has laid off a townsite, cleared some land, erected a large barn, a good cook-house, a large store-house, with office for manager, and a sort of half-way stopping place, all built well and substantially of logs. An excellent site has been selected for a smelter, if one is built, with ample water-power, etc. The company owns a considerable acreage of fine timber land, extending from Pinehurst to the mine, through which the tramway line would pass, and a site has been laid off here for a complete saw-mill plant. At Wilmer the company has a manager's house and office, with large stables, etc.

The policy of the company, as indicated by the operations, has been careful and conservative. No expenditure has been made that was not immediately necessary, and no more than was necessary, a "better be sure than sorry" policy which is sufficiently rare and commendable to be worthy of special notice.

Silver Belt Group.

The *Silver Belt Group* of claims, extending from the *Paradise* mine property, across the basin, up and over the opposite divide, consists of the *Silver Belt, Carbonate, Silver Belt Fraction, Sunshine* and *Silver Crown* mineral claims, all held by the Silver Belt Mining Company, a corporation with $100,000 capital, in $10 shares, of which Mr. C. M. Keep, of Kendrick, Idaho, is President. In the upper end of the basin a shaft was found which had been sunk 25 feet on a very good showing of high-grade lead carbonates and sulphides. This shaft could not be examined critically, as it was much caved and filled from effect of winter snows. As far as could be observed, this showing had not been traced out for any distance by either drifts or

open cuts. A second shaft was found a short distance to the south, and was also down 25 feet, at which depth a fault was said to have been encountered which temporarily cut off the ore and evidently discouraged the management, for no serious attempt was made to pick up the ore again, a matter to be regretted, since the showing in the shaft, chiefly iron sulphides carrying silver, was good enough to justify more exploratory work, especially now that the development of the adjoining and similarly situated property has proven successful.

Some little distance up the hillside a tunnel has been run in for 100 feet, it is reported, on a crushed zone lying along a fault fracture, and in which some ore was found. This tunnel was partially caved and nothing further could be learned from it.

In 1901 the company shipped about 15 tons of ore, averaging about 218 oz. silver to the ton, and said to have netted $1,456.

The company has no buildings in this basin and no work was being done on the property.

There are several other claims and groups of claims in the immediate neighbourhood which have good surface showings and which, with some work, should develop bodies of ore.

Of those in the immediate vicinity might be mentioned the *Shamrock Group*, consisting of six claims, which adjoins the *Paradise* on the north side and just over the saddle-back divide, being on the Boulder creek slope. The ore body in the *Paradise*, if continued in the trend of the present workings, would enter *Shamrock* ground, and it is contended by the owners of the latter that it does so, but proof of such contention will only come with development.

WINDERMERE MINING DIVISION.

*REPORT OF J. E. GRIFFITH, GOLD COMMISSIONER.

The past year has witnessed substantial improvements in mining operations in the Windermere Mining Division, and although many promising properties remain idle through lack of capital, it is slowly but surely attracting attention. The *Paradise* and *Ptarmigan* mines are being systematically developed, with very good results.

Paradise Group.

This property is situated on Spring creek, a tributary of Toby creek. In the course of development the mine has shipped about 3,000 tons of ore, close on 1,000 tons being shipped this summer, and a waggon road has been completed from the Toby creek road to the mine, a distance of about eight miles on a ten per cent. grade, with the exception of only 2,000 feet, which is on a 12 per cent. grade. A tramway is in contemplation from the mine to Toby creek, the length of which will be about two and a half miles. The mine is connected with Wilmer by telephone and a portable sawmill will be working next summer. The development work consists of:—No. 1 level, 100 feet; main incline, 264 feet; intermediate levels, 320 feet; No. 2 level, 1,005 feet; No. 2 level cross-cuts, 375 feet; winzes, 220 feet; raises, 200 feet; No. 4 level, 832 feet; No. 4 level cross-cuts, 293 feet; total, 3,609 feet.

Work done during the past 12 months:—No. 2 level, 553 feet; cross-cutting, 140 feet; sinking, 120 feet; raising, 200 feet; total, 1,013 feet.

It is expected that the vein in No. 2 level will be struck about 150 feet from the present breast.

*See also Report by Provincial Mineralogist, pg. 96.

The *Silver Belt Group*, which is situated in the Paradise basin, has been idle for some time; the ore is a high-grade galena rich in silver. The property is owned by the Silver Belt Mining Co.

The *Shamrock Group*, situated near the Paradise basin, consists of six claims. Development work during the past season was confined chiefly to the north side of the hill, with encouraging results. Work will be continued in the spring and a Crown grant applied for.

On the *Silver Crown Group*, also situated in the Paradise basin, on the *Silver Belt* lead, development work consists of open cuts and a 200-foot tunnel.

On the *Diamond C. Group*, situated on Spring creek, close to waggon road, considerable work has been done, with good results.

The *Outcrop* and *Outlook* are situated on the North Fork of Toby creek. Development work consists of numerous open cuts. The lead averages 2 feet in width and has been stripped for 400 feet, showing ore all the way. Assays run as high as 100 ozs. in silver and 70 per cent. lead, with some carbonate going as high as 500 ozs. in silver. The formation is a blue limestone.

On the *Washburn* and *Deserter*, situated on the North Fork of Toby creek, development work consists of numerous open cuts in a blue limestone formation. The lead averages a foot in width and has been stripped for 250 feet. Assays have given 80 ozs. in silver and 75 per cent. lead.

On the *Black Diamond*, situated on Toby creek, the owners have installed a winter camp, and the 30-foot tunnel will be extended another 250 feet. The paystreak averages 11 inches in width. The solid ore assays well in silver and lead, with about 6.3 % iron, 14 % silica, and some zinc.

On the *Hot Punch Group* only the necessary development work has been done during the past year. A survey of this promising property was completed and Crown grants will be applied for during the ensuing year.

The *Mineral King* is situated on Toby creek. The ore-bearing body appears to be about 150 feet wide, and through it there run in all directions ore stringers of about eight inches across, occasionally widening out. For the amount of work done it seems to be a promising property.

The *Bullion Group* is situated on Toby creek, in a black slate formation, the ledge being about 20 feet wide and well mineralised. Assays of 80 ounces in silver, 76 % lead and from a trace to $12 in gold have been obtained.

The *Samson* claim is on a continuation of the *Mineral King* lead. Development work consists of two short tunnels and open cuts. Samples assaying $150 in silver and a trace of gold have been obtained.

The *Lenora Group* is situated on Jumbo Fork and consists of three claims. The ore is a chalcopyrite carrying substantial values in silver.

On the *Charlemont Group*, situated on the south side of Toby creek and consisting of four claims, considerable work has been done in the past, with encouraging results.

On the *Duchess* and *Nickel Plate*, situated on Dutch creek, the ledge is said to be 12 feet in width, the ore being chalcopyrite carrying from $4 to $10 in gold. Only assessment work has been done this year.

The *Bunyon Group* is situated about four miles from Windermere lake, and consists of four claims in a slate and schist formation. The lead is said to be about 16 feet in width, and from a paystreak of 3½ feet in width assays were procured giving 16 per cent. copper and 16

ounces in silver. Development work on the *Bunyon* consists of an 87-foot tunnel, tapping the lead at a depth of 35 feet, a drift on the lead for 30 feet and a shaft 18 feet in depth, showing ore throughout.

On the *Christian* a 20-foot tunnel has been driven.

On the *White Cap Group*, situated on Boulder creek and comprising four claims, development consists of a 65-foot tunnel showing 2 feet of clean ore all the way. The formation is quartzite and slate, the ledge averaging 4 feet in width.

The *Pretty Girl Group*, situated on Boulder creek, on which property considerable development had been done, has now been leased and work is again under way. A tunnel has been driven tapping the lead at 325 feet in and giving a depth of 200 feet, while a shaft of 70 feet has been sunk and another tunnel run for 45 feet.

The *Silver Queen Group*, situated on Law creek, consists of three claims in a formation of limestone, slate and porphyry. The ledge is 5½ feet in width. Samples assay about 69 ounces in silver and 59 per cent. lead. The development work consists of No. 1 tunnel, 70 feet; No. 2 tunnel, 30 feet, and No. 3 tunnel, 30 feet, all driven on the lead, besides numerous open cuts, showing up 2½ feet of clean ore. There are several car-loads of ore on the dump awaiting shipment.

The *Tecumseh Group* is situated on McDonald creek and consists of three claims. The ledge averages about 6 feet in width and is well mineralised throughout. The ore is galena, carrying good silver and gold values. Development consists of No. 1 tunnel, 25 feet, and No 2 tunnel, 25 feet, both on the lead and showing about 20 inches of solid ore, 15 tons of which will be rawhided for a trial shipment this winter.

Ptarmigan Mine.

This property, formerly known as the *Red Line Group*, is situated on Macdonald and Red Line creeks, tributaries of Horse Thief creek. The development work consists of:—Total footage in drifting, 2,646 feet; total footage in winzes, 148 feet; total footage in raises, 234 feet; total, 3,028 feet. A Bleichert tramway has been installed and is now in operation; it is 7,550 feet in length, and has a capacity of 200 tons per day. During the year a 4-drill Riedler straight line express air compressor has also been installed; it is run by steam power, supplied by a 96-h.p. Babcock and Wilcox return tubular boiler. There is besides a portable saw-mill with a capacity of 5,000 feet B. M. per day, and a blacksmith shop, 2 bunk-houses with a capacity for 75 men, general offices, compressor building, saw-mill shed, assay office, 2 tram terminals and stables have been erected. The mine is also connected by telephone with Wilmer, a distance of 28 miles along a good waggon road. Development is steadily proceeding and a large body of ore, 22 feet wide, has been uncovered; this will, in the near future, be treated on the ground, only 60 or 70 tons of high grade ore having been shipped this summer (1903).

The *Paystone Group*, situate on Horse Thief creek, consists of four claims in a quartzite and slate formation. Development consists of, on the *Paystone*, a tunnel 30 feet and shaft 25 feet, and on the *Copper Vault*, a tunnel of 48 feet, showing a good body of ore assaying 12 % copper, 5 ounces in silver and $4 in gold per ton.

The *Imperial* and *Empire* are situated about 6½ miles from where the waggon road ends on Horse Thief creek at the junction of Macdonald creek. There are two distinct ledges running through both claims, one a quartz lead 15 feet wide, carrying bunches of grey copper and coarse cube galena, from which assays have been obtained high in gold and silver, with 60 % lead, while the other ledge is 4½ feet wide with 10 inches of solid ore. The two leads are about 30 feet apart. Development work consists of numerous open cuts and stripping.

VIEW DOWN BASIN, PARADISE MINE—WINDERMERE, N. E. KOOTENAY.

On the *Juneau Group*, situated in the vicinity of the *Imperial*, only assessment work has been done so far, but with promising results.

No. 3 Creek Camp.

This camp is situated on No. 3 creek, and is distant about 21 miles from the Columbia river *via* No. 3 creek or Steamboat Mountain valley, but at present is reached from Wilmer, a distance of about 27 miles, 6 by waggon road and 21 by trail *via* the Hurst ranch. The principal claims in the vicinity are the *Lead Queen Group, Steele Group, McLean Group* and *Isaac Group.*

The *Lead Queen Group* consists of five claims on the same lead, running from No. 3 creek bottom to the headwaters of B.D.S. creek. The locations lie in a quartzite, slate and schist formation, the ledge averaging about 10 feet in width. Development on the *Lead Queen* consists of a cross-cut tunnel 264 feet long, tapping the vein at a depth of about 120 feet, a drift on the lead showing 2½ feet of clean ore and 6 inches of talc all the way, an open cut 25 by 20 in ore and 150 feet of stripping, showing ore all the way.

On the *First Effort* a tunnel 125 feet long has been run, tapping the main lead and pay-streak. A good rawhide trail has been built from the creek bottom to the headwaters of B. D. S. creek. The latest samples assayed gave 75 ounces in silver and 64 % lead.

Steele Group. This group is situated on Williamson and B. D. S. creeks, small tributaries of No. 3 creek, and consists of two claims located on the *Lead Queen Group* lead, which consists of quartzite, slate and schist about 10 feet in width. Development comprises 1 cross-cut tunnel of 50 feet, tapping the lead at a depth of about 50 feet; drift 25 feet, showing 2½ feet of solid ore and 6 inches of talc all the way and lead stripped for 250 feet, showing ore. Assays of 65 to 70 ounces in silver and 65 % lead are obtained. This property can be worked from either Williamson or B. D. S. creek.

There are numerous claims throughout this division upon which a good deal of work has been done, a large number being Crown-granted, but as no development has been performed on them lately, no mention is made of them herein, as they have already been referred to in previous reports.

Office Statistics—Windermere Mining Division.

	1902.	1903.
Free miners' certificates	107	103
Mineral claims recorded	89	77
Applications for placer leases	1	2
Certificates of work	210	129
Conveyances	68	20
Crown grants	12	8

GOLDEN MINING DIVISION.

Report of J. E. Griffith, Gold Commissioner.

The amount of prospecting has decreased considerably, as compared with previous years, but the number of assessments recorded has increased slightly and more actual development work has been done, notably on the *Good Luck Group* and the *Bennison Group.* It is to be hoped that, with the revival of actual mining, capitalists may be again induced to thoroughly test the large numbers of very promising claims throughout the division.

Good Luck Group.

This group is situated on the south fork of Canyon and Maclean creeks and is the property of The Labourers' Co-operative Gold, Silver and Copper Mining Co., Ltd. It comprises eight claims, the *Tough Nut*, *Good Luck*, *Cinnamon*, *Copper Cliff*, *Big Four*, *Big Goat*, *High Eagle* and *High Hawk*. Development consists of about 1,500 feet of drifts, cross-cuts and shafts. Three shifts are employed continuously. The present work shows veins from 3 to 15 feet wide, with 18 inches of copper ore with values from $4 to $8 in gold. About 100 tons of ore were packed down for a trial test, which was made in the company's own smelter at Golden a few days ago, but no analysis of the matte or slag is to hand as yet. The smelter is erected on Hospital creek, the furnace being a standard type of rectangular copper-matting furnace, 38 by 78 inches, with a daily capacity of 65 tons. The main or lower steel plate water-jackets extend down and rest on the cast-iron base plate, thereby forming a rigid base for same. The auxiliary or top-jackets are supported by a steel (I) beam frame resting on the corner columns. The furnace is water-jacketed from the hearth up to within a few inches of the feed floor. The top work is constructed of steel plate and brick. The blower, sampler, crusher and hydraulic elevator are all operated by water-power, which is generated by water taken out of Hospital creek, about two miles above the smelter, and conveyed in ditches and flumes to the hill opposite the latter. At this point a penstock is located and the water is brought from here to the smelter in 16-inch steel pipes; this gives a head of some 250 feet. The company also owns a large deposit of limestone about half a mile distant and is contemplating the erection of a tramway and electric drills at the mine next summer.

The *Bennison Group* is situated at the head of the middle fork of the Spillimacheen river. This promising property has been idle for some time, but a new company has now taken hold of it and is working from the middle fork side of the divide. A contract has been let for a 700-foot tunnel, which is at present well under way.

There are some very promising copper claims on Warren creek, but they have hitherto been hard to get at, as there was no trail. Now that there is some lumbering being done in this neighbourhood, there will be a waggon road practically the whole way to the creek.

OFFICE STATISTICS—GOLDEN MINING DIVISION.

	1902.	1903.
Free miners' certificates	153	141
Company "	7	5
Special "	1	1
Mineral claims recorded	144	64
Certificates of work	87	96
Payments in lieu of work	3	6
Conveyances	32	16
Placer leases in force	4	4
Affidavits filed	242	175

NORTH-WEST KOOTENAY DISTRICT.*

Report by Fred. Fraser, Gold Commissioner.

I have the honour to submit herewith my annual report of the progress of the mining industry in the Revelstoke, Illecillewaet, *Lardeau and *Trout Lake Mining Divisions, for the year ending December 31st, 1903.

In the Revelstoke Division no discoveries of importance have been made since my last report, but development work has been steadily prosecuted, apparently with sufficient results to justify three or four local syndicates being formed for the purpose of more extensively opening up a number of metalliferous properties in the Big Bend District. Placer leases have also been worked steadily, particularly on McCulloch and French creeks.

In the Illecillewaet Division the *George Group* made a trial shipment, with very encouraging results. The *Waverly* and *Lanark* claims have changed hands, and it may be that further work will prove these properties good investments.

The Lardeau Division is fast coming to the front and is proving to be rich in mineral; Fish River camp at the present time is emerging from the prospecting stage to that of a recognised producer. The Calumet and B. C. Mines, the Great Northern Mines and the North-Western Development Syndicate have been and are still working their properties, with encouraging results to their shareholders; the first two companies are running their stamp-mills steadily, and are reported to be doing exceedingly well.

Lexington mountain, on which the *Oyster-Criterion* and *Eva Groups* are situated, appears to be about the centre of the present gold belt, which apparently extends south-east to the *Beatrice Group* and north-west to the *Nelson Group*, covering a distance of ten miles. For the whole of this distance free-gold is found along the strike of the veins at various points. Assuming the gold belt to be of the length mentioned, and the working mines at its centre, we have, on the south-east, gold exposures on the *Lucky Jack*, *Gold Bug*, *Mohawk*, *Homestake*, *Gilman*, *Silver Crown*, *Silver Dollar*, *Beatrice* and other groups of claims. On the north-west, we have the *Stockholm*, *Lobster*, *Kingston*, *Copper Dollar*, *McMinville*, *Canada*, *Gold Finch*, *Independence*, *Nelson* and other groups, on none of which, however, excepting the *Beatrice* and *Gold Finch*, is there any practical work done, and the development on these is limited.

However, the *Eva* and *Oyster-Criterion* properties, when taken over by their respective companies, had no better showings or more work done than have some of the properties under consideration. They possessed strong ledges outcropping at the surface, with values that were sufficient to induce capital to test them by development, and this work is yielding good returns to-day. Knowing the results brought about by development in the working mines, it is to be expected that like development on the properties mentioned will be met with similar results, as the same conditions exist and the same veins pass through the properties, with equally good surface showings.

Last summer's work north and south of Lexington mountain, as well as prospecting work done on the mountain, shows a decided progress made in the finding of larger ore bodies and a better grade of free-milling rock. The Trout Lake Mining Division, owing to the recent discovery of free-milling gold at Poplar creek, has been brought prominently before the public during the past summer.

See also Report of Provincial Mineralogist on the Trout Lake and Lardeau Divisions, pp. 109 & 127.

REVELSTOKE MINING 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 ending December 31st, 1903.

Quartz mining consisted principally of assessment work, and some promising discoveries have been made in the Big Bend district, while in placer mining the year 1903 witnessed substantial advances.

The Duquesne Mining Company, operating on Smith and French creeks, kept a large force of men working all the year, with satisfactory results.

McCulloch Creek.

The Revelstoke and McCulloch Creek Hydraulic Mining Co., Ltd., has expended about $16,000 this season in installing a hydraulic plant and a small saw-mill, with which to cut its own lumber, and it is now in a position to begin washing next season. The plant includes 140 feet of flume from the creek to the penstock, and a penstock which feeds the pipe line, which latter has an intake of 20 inches at the head, and reduces down to 11 inches where it enters the monitor. The pipe-line, which is 1,240 feet long to the giant, is all double-rivetted steel pipe. There are two heavy water gates at or near the deflection of the pipe. The giant is a No. 3 double-jointed. The head, from penstock to giant, is 275 feet, and to the mill 315 feet. In addition, there has been put in a large, new, bedrock flume, some 250 feet long, with block riffles for 100 feet and long riffles for the balance of the distance. Three new houses have been put up, besides kitchen and dining-room, bunk-house, with sitting-room, office and store-room.

Camp Creek.

Messrs. Woodrow and Wells *et al.* have six placer claims, situate on Camp creek and have completed four miles of water-ditching from 3 to 14 feet deep. This will give sufficient water to commence operations in the spring.

MINERAL CLAIMS.

Downie Creek.

Messrs. Woodrow and Wells have also seven mineral claims, which are situate on the north side of Downie creek. Outside of these there are 20 other claims located, and these properties are all undeveloped, owing to the want of a trail, necessitating the packing of supplies. There is a trail partly completed for about eight miles up Downie creek, and it would require about $1,500 to finish this and extend it up the mountain to the properties mentioned. The owners would be willing to help, in conjunction with the Government, to complete this work.

The *George Group* consists of three claims, *George*, *Reggie* and *Alto*, located in September, 1896. They are situated on the North Fork of the Illecillewaet, in the Illecillewaet Mining Division.

There has been considerable work done on these properties, consisting of tunnel and shaft and stripping the vein, showing the lead to be well defined throughout the entire length of the three claims, and lying between lime and schist. The character of ore is a grey copper and galena, and picked samples run as high as $800 in silver, gold and copper. In August last five and a half tons were shipped to the Trail smelter as a test, and gave returns of $110 per ton. Also a test of two and a half tons was sent in November to Tacoma, through Pellew-Harvey, Bryant & Gilman, assayers, of Vancouver, and gave returns of $116 per ton in all values. It is the intention of the owners, Messrs. Woolsey, McCarter and Kilpatrick, to continue development work early in the spring.

Office Statistics—Revelstoke Mining Division.

Free miners' certificates issued	161
Mineral claims recorded	45
Placer claims recorded	12
Certificates of work issued	90
Money paid in lieu of assessment work	6
Certificates of improvements recorded	8
Bills of sale recorded	15
Mining leases issued	7

ILLECILLEWAET MINING DIVISION.

The Illecillewaet Division has, at present, no mining recorder, the office statistics being included in the Revelstoke Division. There is little to report from this section. The results of a trial shipment from the *George Group* proved encouraging, and it is hoped that further work will be accomplished. The *Waverly* and *Lanark* claims have changed hands and further development is expected.

TROUT LAKE MINING DIVISION.

Report of Provincial Mineralogist.

Trout Lake Mining Division comprises the drainage area of the Lardeau river, above and including the drainage area of Poplar creek. The Mining Recording Office of the Division is at the town of Trout Lake, at the head of the lake of the same name, and is situated very nearly in the centre of the division and also at about the centre of its greatest mining activity.

Within the past year the discovery of some very rich gold quartz in the neighbourhood of Poplar creek, in the southern end of the district, has caused a good deal of mining excitement and prospecting in that section, and to meet the convenience of the prospectors and facilitate the recording of their claims, a Deputy Mining Recorder's office, a branch of the main office at Trout Lake, was established at Poplar. This has done a large amount of work and has been a great convenience.

Formerly, the only route into the centre of the Division, the vicinity of Trout lake, was from Arrowhead, at the head of Arrow lake, and thence by a small steamer to Beaton (Thomson's Landing), from which point a stage road, some 18 miles in length, leads to the towns of Trout Lake and Ferguson.

Within the past two years a line of railway, a branch of the Canadian Pacific Railway, has been put in operation from the town of Lardo, at the head of Kootenay lake, following up the valley of the Lardeau river to Gerrard, at the south end of Trout lake, from which point a steamer runs to the town of Trout Lake, situated at the north end of the lake.

From Trout Lake to Ferguson is a distance of about 4 miles by a fairly good waggon road. Both of these towns have good hotel accommodation, general stores, a post office and are connected with Arrowhead by telephone. During the past summer a daily service, consisting of a freight or passenger train one way, has been maintained on the railway, with a boat daily, or oftener if required, on Trout lake, while between Lardo and the other points on Kootenay lake connection has been maintained by the Canadian Pacific Railway Company's steamer three times a week. Communication and transportation facilities are thus now established

between the heart of the Division and the various shipping points on Kootenay lake, giving direct connection with two main lines of railway.

This additional and vastly improved means of transportation into the district, passing, as it does, through a previously comparatively unexplored part of Trout Lake Division, has, by rendering this section more accessible, given a remarkable stimulus to mining within its limits, the effect being clearly evident in the increased number of prospects being developed and in the renewed activity shown by the working mines of the vicinity.

The valley of the Lardeau river, including its drainage area to the east and west, has more particularly received close attention from the prospector, great encouragement having been given to prospecting by the finding near Poplar creek of some exceptionally rich quartz, with the result, it is reported, that some 700 mineral claims have been staked between Poplar creek and the south end of Trout lake.

In the vicinity of Trout lake the mines have been worked for some years under the handicap of excessively heavy costs for transportation, both for supplies coming in and for ore going out, which costs, although not exorbitant under the then existing conditions, were so high as only to permit of "bonanza" ore being mined, and prevented the serious development of certain low grade deposits long known to exist. Under the improved conditions of transportation, attention has been given to the low grade propositions and to certain lower grade ores known to be associated with the high grade, but which it had not previously been possible to extract, and which gave little encouragement even to develop.

Several of these properties have been equipped with aerial tramways, mills and mining machinery, which should admit of much ore being mined that previously could not be, and which had not even received that development by which only can such an extent of ore deposit be demonstrated, or such as would justify the expenditure of the large sums of money which are necessary for the installation of plants to treat a large tonnage of low grade ore.

Although for this Report only those properties in an advanced state of development were examined, there are a number of other claims in the district on which has been done, quietly and unostentatiously, a comparatively large amount of work in practically trying to demonstrate the extent and continuity of surface indications which gave good promise. As to the results obtained from these prospecting developments, it is as yet too early to speak individually, or further than to say that probably within the near future there will be several new properties added to the list of producing mines.

The topography of the Trout Lake Mining Division may be thus summarily described:—

A long, low-lying depression, trending north-west and south-east, traverses the division lengthwise through its centre, and is occupied in part by the Lardeau river and Trout lake, having a gradual slope as indicated by the flow of the river. From Trout lake the depression continues north-westerly to the northern boundary of the Division, a low pass with an almost imperceptible summit, and thence continues in the same direction into the Lardeau Mining Division, towards the valley of Fish river. From this depression the mountains rise on either side, on the east to the divide separating it from the valley of the Duncan river, and on the west to the divide separating it from the drainage area of the Arrow lakes. The hills to the east are rugged, cut by deep ravines and towards the summits precipitous, the range having an elevation of from 8,000 to 9,000 feet, while individual peaks reach 11,000 feet. To the west the mountains are not so rugged, and rise more gradually to a height of from 6,000 to 8,000 feet above sea level.

The average width of the Lardeau drainage area is not more than 25 miles from summit to summit, which argues swift and torrential tributaries flowing in from either side, of which

there are a large number, their sources being usually in some small basin, nestled among the peaks and surrounded by glaciers or snow, which lasts well through the summer, thus keeping up a constant water supply and affording innumerable small water powers. In this narrow drainage area, with a railway or boat service through its centre, no point is very distant in miles from transportation facilities; but though the distance "as the crow flies" may be short, the rugged nature of the country and the elevation required to be gained usually necessitate a very circuitous route to be adopted for a trail, although should it in any instance become necessary to transport ore to the railway, a very direct and comparatively short route may be selected for an aerial tramway, a mode of transportation peculiarly adapted to a country of such character.

The low-lying lands are, as a rule, densely wooded with large timber, which continues, with trees of decreasing size, to the timber line, here at an elevation of approximately 7,000 feet. The undergrowth is usually dense and difficult to penetrate, while moss covers the ground and renders prospecting difficult if not impossible, save where some bluff of rock shows up. Travel with pack animals is also difficult, except over certain defined and built trails, and feed for horses is lacking except above timber line in certain basins near the summits. All of these conditions contrive to render the difficulties of prospecting the district very great, and have undoubtedly greatly retarded its development.

A geological examination is similarly rendered difficult, and very little reliable data is available, save that obtainable from the bare summits and from certain isolated spots exposed naturally, or uncovered in the development of the various prospects. From such data it would appear that the central depression of the district is chiefly, if not entirely, occupied by slates, shales, magnesian and chloritic schists, all more or less disturbed and altered, yet preserving a general N. W. and S. E. strike with the trend of the valley.

To the east of the valley the same class of sedimentary deposits, with the addition of certain beds of limestone and calcareous shales, extends over the summits into the Duncan river valley, and thus forms the rock matter of the intervening range of mountains. In this section a few dykes of igneous origin, felsitic in character, were noted, but as far as the comparatively limited field of observation showed, did not appear to have been of such frequency or importance as to have been the cause of the observed mineralization, although it is quite possible that such igneous masses may underlie the surface deposits more generally than the surface itself indicates. In the low-lying valley no rocks of igneous origin were observed. On the slope to the west of the Lardeau river, as far as was observed, these same altered sedimentaries continued, but no igneous intrusions or float from such were seen.

In the vicinity of certain quartz ledges, the schists had been much altered by siliceous waters, and secondary crystals of iron, garnet, &c., had been formed, which locally gave the rocks a porphyritic appearance, but upon tracing them for a short distance they were found to gradually blend into the ordinary schists and shales of the district.

The upper portion of this slope was not visited, but from information obtained from prospectors working therein and from others, as well as from samples of rocks said to be obtained therefrom, it would appear that the upper portion of it, probably including the summit, is to a large extent composed of rocks of igneous origin, such as granites, gneisses, &c., which are probably of more recent origin than the sedimentaries, and it is likely that their upheaval is probably largely responsible for the tilting of the measures observed and for the alterations noted at a considerable distance from the actual outcropping of such igneous rocks. Along this outcrop mineral veins carrying good values have been already located, and it is probable that such contact will in the future prove a fruitful field for the prospector.

The slates, shales and schists here noted resemble in many respects the formation seen in the Fish River District, and it is highly probable that these two formations will be proved to be continuous, although the data for such assertion is still lacking.

In both of these districts the formation is cut by innumerable fissure quartz veins, varying in size from mere stringers to veins of 6, 8 or even 10 feet in average width. So numerous are these veins that, in certain parts, they form a distinct feature in the visible formation. Of these fissures there are two distinct series or systems; first, an interbedded series running with the formation, and, second, a cross-line system cutting the formation and the veins of the first system approximately at right angles. The veins of the first system are the larger, appearing as a rule to be quite persistent; they can be traced for some distance in the Poplar Creek District, where most work has been done on them, while in other exposures at higher elevations they seem to taper off to nothing, to be replaced or renewed in another strata of the schists or shale, as is the usual habit of veins in such formations, where they are in reality elongated lenses of quartz.

The second or cross systems of veins has the appearance of being of later origin, although no definite proof of this was obtainable, and the leads are on the average narrower, though showing less variance in width than the first series; their breadth might be approximately stated as running from 1 to 6 feet.

Poplar Creek District.

In June of this past year (1903) considerable excitement was caused by the finding of rich gold quartz near Poplar creek and adjacent to the railway, information of which reaching the public caused a great influx of prospectors and others into the district, with the result that during the past summer this part of the Trout Lake Division received much general prospecting and more claims were staked in this vicinity than in the whole of the remainder of the Division. This district has, for the past few years, or since the beginning of the construction of the railway, been prospected more or less, and it had been known that mineral locations had been staked there which gave great encouragement for future development.

Three years ago John Winquist located a group of claims on Poplar creek, from which some exceedingly high assays were obtained in silver and gold. In the Report for 1902 mention was made of a find of rich gold-bearing quartz on Rapid creek, at the *North Star* claim, located in 1901, and a similar find was recorded as being made on the *Maggie May Group* on Tenderfoot creek. Marquis & Gilbert also located gold-bearing quartz on Poplar creek in 1901. This section may, therefore, be said to have been known to have mineral locations from which high assays had been obtained. At the present time the public attention has become centred at Poplar creek in the *Lucky Jack* and *Swede Groups* and in Marquis & Gilbert's claims, although a number of other properties are being quietly developed which have good veins and good prospects.

Spyglass Group. This group, owned by John Winquist *et al.*, was not personally examined by the writer, as, at the time of his visit to the district, a section of the trail on the steep side-hill had been washed away and so rendered travel temporarily impossible, but the following description was obtained from a reliable source :—

The property is situated about 12 miles up Poplar creek from the railway, well into the granite belt already described and at an elevation of about 7,000 feet above the sea, or 5,000 feet above the level of the valley. The lead is described as occurring at or near a point where the granite is cut by a large dyke some 20 feet wide. The lead is partially in this dyke matter and is from 18 inches to 20 inches wide, consisting of quartz carrying galena, gray

LOOKING UP PARADISE BASIN, WINDERMERE MINING DIVISION, SHOWING FOLDING OF STRATA.

copper, etc., together with native silver, of which latter some beautiful specimens were obtained. On the lead a tunnel of 30 feet has been driven and a considerable further amount of prospecting work has been done elsewhere on the claims. No ore had been shipped, but it was understood that a few tons of that taken from the tunnel would be sent out this fall as soon as the trail was in condition. Assays running as high as desired can be obtained from various samples, being reported up to 3,000 to 4,000 ozs. in silver, but with ore of this character its average value will only be definitely known when shipments in bulk have been made.

The recent "finds" of rich gold quartz have been near the river and all within the schist belt already described. The formation here is everywhere cut by quartz veins such as described, which occur on almost all of the claims staked, and from most of these veins gold may be obtained in the pan in greater or less quantity. In some places the gold is plainly visible in the quartz, while again it is not visible to the eye until crushed and panned; and yet again it is found in association with a heavy sulphide, which is evidently the gold-carrying medium.

Marquis & Gilbert Group.

This group, owned by Marquis & Gilbert, consists of three claims, the *Ophir*, *Ochre* and *Gold Park*, and is situated on the north side of Poplar creek, about one and a half miles by trail from the Lardeau river and from the railway, at an elevation of about 2,600 feet above sea level, or about 600 to 700 feet above the valley. The *Ophir* and *Ochre* were the first claims located, while the *Gold Park*, staked later, is situated on the side of the previous claims. The claims are all in the schist belt already mentioned and include a number of outcrops of quartz veins. On the *Ophir* and *Ochre* claims a number of open cuts and surface strippings have exposed two or three quartz veins, which apparently follow the laminations of the enclosing chloritic schist. These veins are not very definitely defined, but are made up of a number of smaller adjacent veins, with occasional schist partings, and may perhaps be best described as exceedingly silicious zones in the schist, the quartz sometimes predominating to such an extent as to form what appears to be one vein, having a width of from 10 to 15 feet. These zones would seem to be fairly continuous and regular and are supposed to be the main leads of the locality. With this quartz are associated certain secondary minerals, forming the lead, and through this lead, scattered in flakes or bunched in considerable masses, there is a considerable percentage of arsenical and iron pyrites, together with a smaller amount of galena. On the surface these sulphides are more or less oxidised and gold can be obtained almost anywhere in the pan. The gold is partly "free" in the quartz, but the values, for the greater part, are in the sulphides, which assay well in gold. The future of the claims depends upon the quantity of such sulphides that may be developed in the working of the property, and owing to the "bunchy" character of the deposit, this will only be determinable after more extensive development has been done. While high assays can be obtained by picking the sample, the owners report the values obtained on legitimate average samples to be about $8.60 per ton.

The *Gold Park* lies lower down the hill, and on this claim a shaft has been sunk for about 25 feet, following down a small quartz vein which lies along a "slip" in the formation and against a very much weathered dyke, or a very "irony" band in the schist; this band was about 10 feet wide and ran with the formation and the vein, having a strike of about S. 55° E. (Mag.). As far as it had been sunk, the shaft carried the quartz, together with a considerable amount of iron oxide, all rather soft but enclosed in walls of the schist. From the bottom of the shaft a cross-cut drift was being driven through the "dyke." From the shaft the vein had been traced for some distance by means of open cuts. Other and parallel veins are indicated on the property, but have not been developed to any extent. The material from the shafts

and open cuts will give good gold on panning, and occasionally free gold is visible. A few tons of this ore was being sacked and a small trial lot will be shipped this fall or winter. In the oxidised material on the dump there were a number of pieces of galena; this mineral is, however, not in sufficient quantity to account for the values found, which are chiefly in gold. While gold is occasionally visible in the quartz, the greater proportion of such value is seen, upon panning, to be in the oxidised material, which is probably the result of oxidisation of arsenical and iron pyrites.

It was from this claim that the samples of gold were taken, in June, 1903, which caused an unusual amount of interest to be displayed in this district, and there is no doubt but that very high assays can be obtained from samples derived from here. The owners took pains to distinctly disavow responsibilities for the statements of fabulous assays attributed to them, or for a report that they had discovered platinum on the claim. The development work so far done demonstrates that on these claims there are a number of quartz leads of fair size and of reasonable continuity, that gold can be panned from almost all of such exposures, and that assays in gold of from $6 to $12 can be expected from large samples. A cabin has been built upon the property and work was to be continued this winter.

These properties are all that the owners claim for them, namely, a group of prospects upon which only about one season's work by two men has been done, but such work has at least indicated that there are a number of fairly regular and persistent quartz veins, that such exposures as have been made show gold in the pan, and that assays obtained from the work done indicate values in gold sufficiently high to admit of the ground being worked and to well justify further development. The claims are being legitimately, carefully and intelligently developed by the individual work of the owners, two prospectors, who believe their property worth trying to develop into a mine, and their belief seems justified by the work done.

The Great Northern Mines, Ltd.

This company holds the *Lucky Jack* and *Swede Groups* of claims on Poplar creek, from which were taken the extremely rich gold samples which caused so much excitement during the summer of 1903. The company is a new corporation and is a consolidation of several mining enterprises in one organization. According to a prospectus issued in September last, it is a consolidation of the *Lucky Jack* and *Swede Groups* on Poplar creek, the *Oyster-Criterion* and *Imperial Groups* on Fish river, the *Lade Group* on Gainer creek, and the *Strathcona Group* on Silver Cup mountain, some 21 claims in all. The capital of the company is $1,500,000, in shares of $1.

Directors.

W. B. Pool (Managing Director), Ferguson, B. C.

T. Kilpatrick, C. P. R., Revelstoke, B. C.,	Jas. Lade, Camborne, B. C.,
W. F. Cochrane, McLeod, Alberta,	J. J. Young, Calgary, Alberta,
E. M. Morgan, Poplar, B. C.,	B. Crilly, Ferguson, B. C.,
F. W. Godsal, Cowley, Alberta,	Robert Hodge (Secretary), Ferguson, B. C.

Of the groups of claims held by this Company, the *Oyster-Criterion* and *Imperial* are in the Lardeau Mining Division and are noted thereunder. The *Lade* and *Strathcona Groups* are in the Trout Lake Mining Division; the former is reported as Crown-granted, but on neither was work being carried on at the time the properties were visited.

Lucky Jack Group.

This group consists of the *Lucky Jack*, *Little Phil* and *Lucky Three* mineral claims, and is situated just south of Poplar creek. The group has been surveyed preparatory to Crown-granting. The claims adjoin and extend from the railway track, about one-quarter of a mile below Poplar creek, directly up the hillside in a direction nearly parallel to the creek. The property is under the local manage-

ment of Mr. E. M. Morgan. The group lies in the schist belt already mentioned, and outcropping on the claims are a number of quartz veins, the management claiming in all some ten separate leads. These veins are believed to belong to the cross vein system previously mentioned and are practically parallel. The outcrops here are particularly noticeable, as they sometimes stick up above the surface for several feet, having apparently withstood the weathering better than the enclosing rocks.

This group was brought very prominently before the public this past summer, owing to the finding of some exceptionally rich quartz in one of the veins outcropping on the property, and such development work as has been done on the group has been practically confined to the vicinity of this vein and outcrop. The vein on which the rich showing was found outcrops in a small ridge or foot-hill rising from the flat valley for 70 to 80 feet high; back of this lies a sag or draw running parallel to the range of hills, and above this sag the hill rises by a series of steps or benches.

As far as could be judged from the surface, a certain amount of step faulting had taken place, and the probability is that the two lower foot-hills, by such faulting, have been moved down from the main mountain, which supposition is borne out by the "broken" condition of the formation and the "blocky" character of the masses of rock. The veins in question had been found "sticking up" out of this first foot-hill for 10 to 15 feet, while from certain lower fragmentary masses found in the alluvium on the hillside and under the exposure, it was apparent that more of the ledge had been exposed and had broken off. From this exposure and from the float lying adjacent to the ledge, there had been taken some wonderfully rich specimens of gold quartz, in which in some cases the gold outweighed the quartz.

In September, when the claim was visited, some sacks of exceedingly rich samples were in the superintendent's cabin, and it was explained that all the coarse gold visible in the ledge had been broken out by hammer "to prevent its being stolen," and that for this reason no further rich gold showings were visible in place in the ledge. In the samples seen in the cabin and elsewhere, the gold was chiefly free in the quartz, in which condition it would be expected in the outcrop. Subsequent development has shown that associated with the free gold in the ledge is a certain amount of arsenical iron sulphide which runs high in gold, an assay of it made at the Government Assay Office giving $116 to the ton.

This vein is traceable, apparently continuous, in a number of exposures and open cuts for some distance up the hill, such faulting as may have occurred not having very seriously thrown the lead. The quartz is white, though stained along fissure lines by iron. The vein is from 2 to 4 feet wide, and has the appearance of permanency, though frozen to the country rock, into which the silicious matter seems to have permeated for some distance, leaving no very distinct line of demarcation between the vein and country rock; this is seen more particularly in the tunnel.

In order to strike the lead at a depth, a tunnel had been started about 20 feet above the flat and run in on the vein, and, at the time it was seen, was in about 80 feet. For this distance the formation was all broken, but the lead could be distinctly followed. It was estimated that the tunnel would have to be driven another 100 feet approximately in order to be under the very rich surface outcrop. The tunnel should give, when under such outcrop, a depth estimated at 50 feet, or about 30 feet in the "draw" back of the first hill. The quartz taken from this tunnel was lying on the dump and was carefully examined; it contained a percentage of arsenical iron pyrites with occasional visible flakes of gold, and would yield "colours" in the pan. No assay was made of this dump; in fact, the only satisfactory test possible would be a stamp mill test. No coarse gold, such as found on the surface, could be seen in the tunnel, and whether the exceedingly rich surface showing will extend to depth can

only be determined when the tunnel reaches that point. Visible free gold has been found in other of the quartz veins exposed on the property, but the exceedingly rich specimens have all come from this one lead. On the property there had been erected of lumber a cook and a bunk-house, while the foundations were being laid for an office and superintendent's quarters. The trees were being cleared away in anticipation of putting up other buildings later, and for a stamp-mill, which the management hopes to erect in the spring.

The Swede Group.

Consists of *Goldsmith* and *Gold Hill* mineral claims, located by H. Magnusson and partners, and recently acquired by the Great North-Western Mines, Ltd. These claims adjoin the *Lucky Jack Group*, lying higher up the hillside; they are probably a continuation of the leads found in such group, and may be so regarded. The only work done on these claims consisted of a little stripping of the leads, from which surface workings samples were shown carrying free gold, practically as rich as from the *Lucky Jack*. No work was being done on this group in September, the development being concentrated on the lower group, and most of the strippings were reported as obliterated by heavy rains. It has subsequently been reported that other rich samples were obtained later from further surface workings.

SILVER CUP MINES, LIMITED.

The Silver Cup mine, well known as one of the most prominent in the Division, is now held and is being operated by an English company, The Silver Cup Mines, Ltd., of which the president or chairman is J. D. Walker, Esq., of London, and the secretary is Mr. E. G. Haddow, whose office is at Ferguson, B. C., as is also that of the general manager of the company, Mr. D. G. Forbes. This new company has taken over the *Silver Cup* and *Sunshine* mineral claims, formerly owned by the Sunshine Company, Ltd. Under the new ownership and management extensive development has been accomplished and important improvements, both in the method of and the means for handling the ore, have been inaugurated. An aerial tramway has been erected, a mill is now under construction and a number of other cost-saving improvements have been or are being installed, on all of which the work is being energetically pushed, and for which ample financial support seems available.

Silver Cup & Sunshine Mineral Claims.

These properties have twice previously been described in the Reports of this Department, so that now only a summary will be given. They are Crown-granted claims located on the South Fork of Lardeau creek, distant some 9 miles from the town of Trout Lake and 7 miles from Ferguson. From Ferguson a waggon road follows up the South Fork to "5-Mile," a distance of 2 or 3 miles, and from here the road leads to "8-Mile," where the old trail up to the mine began. At "5-Mile" the new company is now erecting a mill for the treatment of the low grade ores from this mine, and also from the *Nettie L.*, held by a separate company but under the same management.

Geology.

The general geological formations of the locality may be briefly described as consisting of graphitic and magnesian schists and shales, dipping at a steep angle to the N. E. and having a general N. W. and S. E. strike, all being approximately parallel with what is known locally as the "big lime dyke," which forms a succession of ridges or rocky prominences and constitutes one of the most easily traceable geological features of the district. Outcropping in the claims and running through them is what is known as the "small lime dyke," and which is found to be interbedded with the schists and shales of the district. This so-called "lime dyke" is much weathered on the surface and has been generally classed as of sedimentary origin. On this latter point, however, considerable doubt has been thrown by the underground workings, and while no microscopic

examination of the rock matter has been made, it is believed to be an intrusive igneous dyke, containing much lime as a constituent and, as far as known, following the stratification of the country rock.

Following parallel to this smaller dyke, and within a few hundred feet of the same, there have been developed on these properties two distinct zones of mineralisation containing lines of lenses of ore. The first of these lines of lenses, known as the "Cup" lead, was located some 100 feet from the "small dyke," and on this lead the first shaft was sunk, on the *Silver Cup* claim. Subsequently, in driving a cross-cut tunnel to strike the "Cup" lead, at a depth of 130 feet vertical, a second series of lenses, called the "Big" lead, was cut through, some 45 to 50 feet to the S. W. of the "Cup" lead. This lead is "blind" on the surface, but undoubtedly continues to a considerable depth, as the workings prove. These lenses occur with more or less persistency in a line, interbedded in the schists, and more or less connected with stringers of quartz, sometimes so small as to be difficult to trace, but usually eventually leading to a further lens of ore. The lenses occur along the zone of mineralisation for 300 to 400 feet and have been worked for that distance. The first development of the property was conducted in the belief that the lenses in line constituted all that were to be found, but subsequent work has proved that, parallel with the main line of lenses and close to it, though not in line with it, are certain other lenses. This new development has added considerably to the possibilities of the properties.

In the past only shipping ore was sought or mined, and with the transportation facilities then available this ore had to be of high grade. Since a mill has been decided upon and tramways built, attention has been directed to mineralisation formerly neglected, with the result that it has been shown that between and surrounding the occasional lenses of high-grade ore there is considerable ore that will probably pay for milling. Enough of this low grade ore had been developed to satisfy the management that a mill was justified. The development work done, while it has not shown the ultimate limits of such low grade ore, has developed enough to probably permanently change the style of mining to one more suited to a low-grade proposition with occasional rich lenses.

The ore found in the lenses is a galena with gray copper, carrying a high percentage of silver, and with some zinc blende and occasionally iron pyrites. The galena, when free from gray copper, will assay about 30 to 40 ounces in silver, but when gray copper is present to any extent the assays run very high in silver, the general average of the ore as shipped being about 150 ounces per ton. The gold also found in the ore seems to be in association with the iron pyrites when galena is present, rather than with the galena.

The management reports the following classification of the ores as expected to be mined, and the assays obtained from repeated samplings :—

	Lead.	Silver.	Gold.	Zinc.	Copper.
1st grade ore.....	20 %	150 oz.	$10.00	12 to 15 %	1.5 %
2nd " "	4 "	50 "	8.00	20 "	1.0 "
3rd " " .....3.5 "		30 "	3.50	4.8 "	1.5 "

The low percentage of lead in the second and third class ores, as compared with the other values contained, is very noticeable, and indicates that while the galena may be localized in the lenses, the copper, zinc and iron carrying gold and silver values, appear to be more freely distributed throughout the ore body, which fact renders possible the mode of concentration proposed.

Ore Shipped. The history of the mine shows that from about 1896 to 1901 a total of some 1,286 tons of ore were shipped, which assayed on the average about 35 % lead, 150 ozs. in silver and some $4 in gold. In 1902, under the

new management, and at least to a great extent derived from the newly discovered ore lenses, there was shipped about 966 tons of ore which assayed from $5 to $6 in gold, some 125 ozs. in silver and 22 % lead. In 1903 the shipments amounted to about 975 tons, stated to have run about $10 in gold, 170 ozs. in silver and 25 % lead. The total output from the mine of shipping ore to date amounts, therefore, to about 3,228 tons, roughly averaging $6 in gold and 150 ozs. in silver per ton, and 30 % lead. In the mining and sorting of this shipping ore, low grade ore dumps have been formed at the mine, consisting of second and third class ore, which has been calculated by the manager to amount to about 7,000 tons in all, and which it is proposed to treat in the mill now under construction.

Development.

The *Silver Cup* and *Sunshine* are adjoining claims, both lying on a steep hillside, the former being the higher up the hill. The "Cup" and "Big" leads are supposed to extend through each of the claims, the trend of them both being up the hillside, nearly at right angles to the line of the hill. This enables the leads to be easily reached at various elevations by adit tunnels, a method of development which has been adopted.

On the *Silver Cup* claim work was first started on an outcrop of the "Cup" lead, where a shaft was sunk for 175 feet on the lead, which here had a dip of about 65°. From this shaft, at the 50-foot level, drifts were run for a short distance on a chute of ore. Subsequently, a cross-cut adit tunnel was driven from a ravine to cut the lead at the depth of this shaft. It was in the driving of this cross-cut that the "Big" lead was encountered, lying parallel and some 50 feet to the south-west of the "Cup" lead and being "blind," that is, not extending to the surface. This tunnel, known as the "175-foot," or "Upper tunnel," is 350 feet long and at the level drifts have been made in both leads, on the "Cup" lead to the extent of about 300 feet, and on the "Big" lead of 375 feet. From these drifts, raises and stopes continue nearly to the surface.

In 1898 a second cross-cut tunnel, known as the McNeil cross-cut, was started from the same ravine, but 96 feet vertically lower than the Upper tunnel. This tunnel cut the "Big" lead at 234 feet in and was continued for 100 feet further to the dyke, the "Cup" lead not being found productive here. From this same tunnel a drift was run to the right for 620 feet on the "Big" lead. In driving this drift low grade ore was met with four or five times and was not rich enough then to mine, but now constitutes some of the reserve of ore of this class which will be sent to the mill. At 500 feet from the tunnel and directly under the upper workings, a body of rich ore was encountered, on the side of which a raise was made to the upper workings. Above this level most of the high grade ore as yet developed has been removed, although from 2 to 3 tons a day are still being mined from a stope. From the McNeil tunnel level a winze was being sunk on the "Big" lead and was, in November, 1903, down 71 feet, having carried good ore for most of that depth. When visited there was, in the bottom of this winze and on either side, from 18 to 24 inches of high grade argentiferous galena. No work had been done on the "Cup" lead on this claim below the McNeil tunnel level. It would appear from these workings that the known chute containing the lenses of rich ore is about 300 feet long. Little attention had been given previously to developing the low-grade ore bodies, and, consequently, these to-day remain unproven, although the management is satisfied that they will be shown to be of considerable extent.

Following the mineralised zone down the hillside from the shaft on the "Cup" lead, an outcropping of galena was found on the *Sunshine* claim, about 1,700 feet to the N. W. of such shaft, and at an elevation of about 297 feet lower than the McNeil tunnel. This ore was found at the contact between the dyke and the schist. At this point a tunnel had been run in for some 270 feet by the old company, developing two lenses of ore 10 and 25 feet long,

respectively, and from these lenses some 70 tons of high-grade ore have been shipped. This, the old *Sunshine* tunnel, has not been driven any further by the new company, but a new tunnel, known as the New Sunshine tunnel, has been started 100 feet lower down the hill. This tunnel is now in about 1,000 feet, and it is calculated will have to be driven 700 feet further to bring it to the main ore chute developed in the *Silver Cup* workings. These two last-named tunnels are believed to be on the "Cup" lead. The ore bodies struck in the old Sunshine tunnel, or similar ones, were found in the new or lower tunnel about in place, but otherwise the tunnel is, as yet, in barren ground. The new tunnel is being driven 11 feet high and is designed to be the working tunnel for the whole property, as soon as connections are made with the upper workings. It is being driven by contract for $9 per foot, powder and air for an air-drill being supplied.

Plant at Mine. The old log office, cook and bunk houses erected by the former company just below the McNeil tunnel were still in use in November, 1903, but in anticipation of the completion of the New Sunshine tunnel a commodious and very comfortable bunk-house, cook-house, office, etc., built of sawn lumber, were being constructed and were nearing completion. They are situated on a bench just above and a little to one side of the mouth of the tunnel referred to.

At this same point a small engine-house had been erected and contained a boiler and small air compressor, a temporary arrangement only, it being the expectation of the company to eventually install an electrically driven air-compressing plant.

Tramway. From the mouth of the New Sunshine tunnel an aerial tramway has been constructed to the valley of the South Fork. The upper terminal is just sufficiently below the tunnel to admit of suitable bunkers, while the lower terminal is just across the Fork and on the waggon road, about 3½ miles from "5-mile." The tramway is of the standard "Riblet" type, 7,200 feet long, with a drop between the terminals of 2,600 feet. The cables are 1-inch and ⅞-inch in diameter respectively, and the buckets have a normal capacity of 1,000 lbs. The tram is operated by two men, one at each terminal, and is capable of taking a load up equal to 60% of the down load. The cost of the tramway completed was $20,000. At present the line is used for taking up mine supplies and construction timbers, as well as firewood for the compressor boiler, waste rock from the tunnel supplying the motive power. The plant is a most creditable piece of work and in splendid working order. Since the completion of this line, the determination to build, at "5-Mile," a mill to treat the ore from both the *Silver Cup* and *Nettie L.* mines, from which latter property a tram is under construction to the mill-site, has necessitated a supplemental tramway being added to the *Silver Cup* tramway. This supplemental line leaves the main line some 2,000 feet vertically and 6,000 feet horizontally below the upper terminal, and runs direct to the mill-site at 5-Mile, with a vertical drop of 1,100 feet in this branch. At the junction of the lines bins are to be provided, into which the ore from the main line will discharge, and from these bins it will be filled into the buckets of the supplemental line and by them delivered direct into the bins at the mill. This tramline was under construction in November and will be completed before spring, in ample time to deliver ore when the mill is ready to receive it.

The second and third class ore dumps accumulated in the development of the "Cup" working are now lying just below the mouth of the tunnels, and to convey them to the upper terminal of the aerial tramway a small and temporary tramway is contemplated. Whether this will be a surface tramway or an aerial had not been decided, but it is understood this question will be settled and the construction undertaken early in the coming spring. (An eight-bucket aerial gravity tram has since been constructed.)

The company has secured land at 5-Mile for a mill-site, and is now erecting there a mill for the treatment of the ores from the *Silver Cup* mine. It is also intended to treat here the ore from the *Nettie L.* mine, which, though under a separate company organisation, is directed by the same management and owned by practically the same people as own the *Silver Cup*. The site selected for the mill is a hillside, sloping down from the road to the South Fork at an angle of about 20°, admirably adapted for the laying out of the mill in benches or floors, as has been done. The subsoil is sand and gravel, providing a good material for foundations, and admitting of excavation at a low cost. The mill has been laid out in floors, arranged in steps, the ore being received at the highest point and gradually descending by gravity through the various processes.

The following is an approximate arrangement of the mill as designed:—

Bench.	Drop to next bench below.	Use to which put and appliances to be installed.
1st floor	13 feet 6 inches	Ore-receiving bins, 200 tons capacity. Crusher.
2nd "	6 "	4 batteries of 5 stamps each; weight of stamps, 1,000 lbs.
3rd "	5 "	Sizers.
4th "	8 "	6 Dodd buddles and modified Wilfleys.
5th "	7 "	Vanners and Wilfleys.
6th "	5 "	Drying floor.
7th "	11 "	2 "Howell-White" roasting and chloridising furnaces.
8th "	14 " 6 inches	Cooling floor.
9th " to creek		10 pan amalgamators and 5 settlers.
Total drop	70 feet.	

As will be seen from the above, the plant is partly a concentrator and partly a chloridising plant. The exact process to be employed has not been formulated, and will doubtless be adjusted from the necessities of the case as they arise. The main mill building is 132 feet long by 68 feet wide, with an extension about 37 feet 6 inches by 40 feet wide, containing the stamps and bins, while below the main building is a lean-to extension 32 feet long by 109 feet wide. It is understood that the mill and the process of concentration adopted have been designed by Mr. Attwood, who is employed as consulting engineer. In November the excavation of benches and the erection of the masonry retaining walls below each had been completed, while the wooden framework of the buildings had been mostly put up and would be ready for roof in a short time. Much delay had been experienced in the construction, owing to the excessively wet season, the rain retarding out-door work and rendering excavation troublesome. The machinery was reported as all being on the ground, but not erected. The company had erected at 5-Mile a very complete saw-mill, and had there sawed all the lumber for the extensive construction work undertaken. Very comfortable bunk-houses, a dining-room and kitchen, and a number of cottages for the married men were completed, as was also an office, laboratory and house for the superintendent, although much remained to be done in the way of fitting up these various buildings. The plant is expected to be ready for starting in the early part of 1904.

GREAT WESTERN MINES, LIMITED.

This company is operating the *Nettie L. Group* and the *Ajax*, under the same management as the *Silver Cup* mines, and the arrangements are such that the ore from these properties will be treated at the latter company's mill at 5-Mile, to which point an aerial tramway is being constructed. These properties were described in the Report of 1900, and, although considerable development has been done since that time, the main features remain unchanged.

The *Nettie L.* claim is on the hill overlooking the town of Ferguson. The waggon road from Ferguson to 5-Mile has been extended right up to the mine, and was found to be in very fair condition. The geological surroundings of this claim are very similar to those of the *Silver Cup*. The lead consists of a highly-mineralised zone in the schists, having a strike of N. 45° W. and a dip of 80°, as does the surrounding rock. The mineralisation is chiefly iron and zinc sulphides, with some galena and a little copper. On the surface these sulphides have been oxidised, and have formed an iron-cap of considerable extent. Parallel with the mineralised zone is a crushing, probably more recent, containing in the upper level much crushed and broken quartz ore-matter and iron oxide. It appears as if the minerals had been deposited in the schist by waters circulating along the line of fissuring. The schists are much silicified on and near the fissure plane, sometimes on one side and then on the other. The lead and copper sulphides seem to be the minerals carrying the values, which are chiefly in gold and silver, and, as averaged over the zone that would be mined, are not high, requiring some form of concentration before shipping. As already stated, in the upper levels there is a quantity of crushed matter and iron oxide. From this material very good assays in gold are obtainable, but it forms but a small percentage as compared with the general mass of the silicified and mineralised zone which constitutes the mine, and which is placed by the management as being 40 feet wide by 400 feet long, with a present development of 368 feet in depth.

In the Report of 1900 the existence of a cross fissure vein was noted in the right-hand drift off the 100-foot cross-cut tunnel, and this carried a very fair-sized chute of high-grade galena. In tracing and working out this galena vein it was found to extend, on the 100-foot level, from the fractured zone across the lead and to the surface at that level. This chute has been mined out down to the lowest level, 368 feet, and in this depth the course of the vein gradually swung around until it came to be parallel to the main lead, into which it is now dipping and merging. This subsidiary vein has yielded a considerable tonnage of galena, high-grade in silver, but since its practical absorption at depth by the main lead, the pure galena in this chute has diminished. At present, explorations are being made on this vein to try and locate a second chute of galena. Although no considerable chute is as yet definitely located, small stringers have been found and were being traced down with a fair probability of developing into such a second chute of galena.

In the main ore lead the values are "spotty," and it is very difficult to say what the average of the milling ore will be. The assays on the various samplings vary very much. The property is now regarded as essentially a concentrating proposition with a large body of low-grade ore, which the management expect to be able to treat at a profit in the new "Silver Cup" mill now under construction.

Development. In addition to the tunnel mentioned as having been run in at the 100-foot level, a cross-cut tunnel, 560 feet long and 268 feet lower, had been put in from the other side of the hill, cutting the lead, on which drifts had been run and connections made with the upper workings in two places. An attempt to sink a winze below this lower tunnel had been frustrated by a heavy flow of water from a seam; this water appeared to come from below. The total amount of drifts, tunnels, etc., in the mine is about 6,000 feet.

Buildings, etc. At the mine are ample and commodious bunk-houses, cook-house, and a foreman's office and rooms, while at a short distance down the hill, on the roadside, are several cabins for families. There is a small boiler and air compressor and one Baby drill was in use.

Aerial Tramway. An aerial tramway was under construction by Riblet. The right of way was cleared and the terminal at the mine was being constructed below the mouth of the lower tunnel, from which point the tram line runs over

the small hill, 350 feet above the upper tunnel, in which the mine is located, and extends to "5-Mile," a drop of 2,000 feet. The length of the line is given as 7,200 feet. This work, it is expected, will be completed and in running order early in the spring of 1904. The number of men employed in 1903 averaged about 35.

Triune.

The *Triune* mineral claim is situated on a small tributary of the South Fork of Lardeau creek and about a mile to the south-east of the *Silver Cup*, but in an adjoining basin. The property is at present held by the Metropolitan Gold and Silver Mining Co., of which Mr. J. McCrossan is manager, with office at Ferguson. The claim is reached from Ferguson by a waggon road to "8-Mile" on the South Fork road, from which point a sleigh road has been made up to the basin, at the head of which the property is situated. The workings are located in the high, steep ridge which forms the head of the basin and are at an altitude of from 8,200 to 8,500 feet above the sea, or about 5,600 feet higher than the town of Ferguson. The present cabin, situated part way up this trail, was in use during the past summer, but will be abandoned this winter, as it is liable to be taken away by snow-slides. The distance from Ferguson to the foot of the sleigh road is estimated at five miles. The sleigh road is about four miles long and has a regular grade, but is narrow and not at present suited for a waggon; it ends at the lower terminal of the aerial tramway, at timber line, from which point a trail almost two miles long rises by switchbacks up the side of and around the basin, for about 3,000 feet vertical, to the cabin and tunnel. A telephone line connects the cabin with Ferguson, and is a great convenience and protection when the snow comes and slides are frequent. The mine, from its situation at an elevation of 8,500 feet on a steep bluff and above timber line, has many serious, natural obstacles to overcome, which would have rendered a low-grade property unworkable, but the preliminary operations yielded ore of so high a grade as to admit of its being mined and shipped at a good profit. In 1903 the property shipped 113 tons of ore which yielded about $128 per ton, the values being chiefly gold and silver.

Development.

The bluff in which the mine is situated rises at this point at an angle of approximately 50°, rendering it nearly impossible to ascend without the aid of ropes, but enabling the ore body to be reached by short, cross-cut tunnels from the hillside. The upper outcrop of the deposit was found to be on the edge of and possibly underlying a permanent glacier. This outcrop was composed of a mass of decomposed matter, chiefly iron oxide and lead carbonates, carrying surprisingly high values in gold and silver. The outcrop was so situated as to be very difficult of access and the ore body was consequently attacked by tunnels.

The lower tunnel is approximately 215 feet lower than the outcrop and is 283 feet long, being rather winding in its course, but having a general direction of S. 75° E. (Mag). At 110 feet in, a cross-cut had been run off to the left for about 50 feet, and at 190 feet in from the tunnel mouth there is a raise nearly straight and following the dip of the ore body, which averages about 60°. This raise connects with the upper tunnel, about 105 feet higher up, and is continued to the outcrop some 106 feet above this tunnel. The upper tunnel is about 75 feet long from the surface to the point of intersection with the raise and is continued past the latter for some 40 feet as a drift. From the raise the following drifts have been run:—At 32 feet up, drift to left 15 feet, and to right 10 feet; at 98 feet up, drift to left 10 feet, and to right 25 feet; at upper tunnel drift to left 40 feet; at 118 feet and at 131 feet up, short drifts of 15 and 25 feet are off to the left, while on the right of the raise the ground has been stoped back for about 20 to 25 feet from the raise. Some 200 to 250 feet vertically lower down the hill a new tunnel is being run in and is intended to reach the ore body at that level. To enable this tunnel being started, a small bench had been cut in the hillside and on this a

small bunk-house had been built against the side of the hill, designed in such a manner as to "shed" a snowslide, which at this point may be expected any time during the winter.

The ore body, as developed in the workings above the lower tunnel, consists of an ore chute which will average about 40 to 50 feet long by 4 to 5 feet wide, with a developed depth of about 200 feet, that is to say, to the tunnel level, the ore still appearing at this level. Above the upper tunnel the rich ore chute has been stoped out, apparently as far as the drifts extend, but on the two upper drifts to the left some further galena ore was being mined and the ore body may be found to extend in that direction, although not so developed in the tunnels. It must be said, however, that it looks as though the lower tunnels inside the raise had not followed the course of the lead as developed in the upper workings.

The following assays were obtained on samples taken from various points in the mine by an examining engineer:—

	Au.	Ag.	Pb.
Average sample 8 ft. ore at bottom of raise	$ 4.00	13 oz.	
In drift left, 32 ft. up on raise, 18 in. band	11.00	35	38 %
At left drift 98 ft. up on raise, 12 in. band	9.00	.....	24 %
Special sample	.....	101	
At face of drift, to left, 26 ft. above upper tunnel	15.00	314	51 %

Aerial Tramway. An aerial tramway of the "Hallidie" type was erected in 1901 from the bunk-house to the lower terminal at the end of the waggon road. This tramway had been constructed down the basin, but the towers had been broken and carried away in two or three places by snowslides, as might have been expected. A tramline can, however, be located along the side of the basin, in which the towers would be so situated as to be protected and the line be at such an elevation as to escape all slides.

Lucky Boy Group. This group, consisting of the *Lucky Boy*, *Horseshoe*, *XYZ*, *Blue Jay* and *C. H.* claims, is owned by a Philadelphia syndicate, of which Mr. C. D. Stanwood is secretary, and S. N. Alexander local manager. The property is situated about 7 miles from Trout Lake and, although not visited personally, is mentioned as being one of the shipping mines of the district. The following information has been received from the management:—

Work was started on the *Lucky Boy* in December, 1902, and has been carried on with good success during 1903. The main shaft has been sunk to a depth of 110 feet, and is being continued to a further depth. At the 50-foot level drifts have been extended to the left for a distance of 110 feet, and to the right for a distance of 75 feet. From the 110-foot drift a raise has been made to the surface, and from the right drift nearly all of the high-grade ore which has been shipped has been taken.

A second level has been started at a depth of 104 feet, where a drift has been run for 100 feet to the left, and a raise made to connect both levels. Another drift has been driven to the right for a distance of 30 feet.

Numerous open cuts have been made, exposing the vein on the surface for a distance of 500 to 600 feet. Ore is now being stoped out between the two levels. The ore showings in the shaft continue for the whole distance down, and run from three inches to one foot of clean ore. In the second level both drifts are in ore, running in width about the same as in the shaft. The ore is a high-grade galena and gray copper, and averages from 250 to 300

ounces in silver, and from 20 to 35 per cent. lead. In all about 200 tons of ore have been shipped to Nelson and Trail smelters, and the returns show that the above values are easily within the mark.

During the latter part of the year good bunk-houses have been put up and also a hoist installed. A force of from 15 to 20 men has been steadily employed during the whole year. The trail is now in good condition for rawhiding, and ore is being brought to the C. P. R. landing as rapidly as possible.

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 Mining Division for the year ending 31st December, 1903.

In the past this Division has been considered purely a silver-lead camp, but I am pleased to say that the development of the past year indicates that within the near future it will prove to be a gold-producing district of some importance. The discoveries of free gold made at Poplar creek during the early summer have seldom been surpassed in the Province for surface showings. These discoveries have incited great activity, with the result that the gold belt has been traced for several miles in either direction, and many claims located from which good values are obtained. In the older or the north-western part of the division work on the shipping mines has proceeded vigorously, with good results, while at the same time a few other properties have so developed as to be now practically on a self-sustaining basis.

Silver Cup and Nettie L.

On the *Silver Cup* and *Nettie L.*, which are being worked by different companies under one management, ore bodies of sufficient size have been encountered at a depth to warrant the installation of a combination concentrating and chloridising plant, of a capacity of 30 tons per day, for the treatment of their low-grade base ores. In addition, aerial tramways have been constructed, connecting the mines with the reduction plant. About 80 men have been employed on these works during the summer.

The *Silver Cup*, which is owned by the Silver Cup Mines, Ltd., is situated on the South Fork of Lardeau creek, about eight miles from Ferguson. On this property 1,800 feet of development work has been done during the year, consisting chiefly of a long tunnel from the *Sunshine* claim, which will cut the ore chute worked on the *Silver Cup* at a depth of 375 feet below the old workings. The output of smelting ore for the year has been 976 tons, which has given returns from the smelters of $82,212.87. In addition to this a large tonnage of second class ore has been broken down, which has been reserved for future treatment. The average number of men employed under ground has been 30, and above ground 10.

On the *Nettie L.*, owned by the Great Western Mines, Ltd., and situated on a mountain bearing the same name, 2,000 feet of development work had been done during the year. The output of smelting ore has been about 1,040 tons, giving a net return of $57,678.54. A large tonnage of lower grade ore has also been broken down on this property and reserved for future treatment. The average number of men employed underground has been 25, and above ground 10.

On the *Union Jack*, situated near 7-Mile creek, and owned by J. C. Kirkpatrick *et al.*, the cross-cut tunnel has been continued 100 feet, cutting the lead at a depth of 250 feet. At this point the vein consists of about eight feet of concentrating ore, carrying $10 in gold and 30 ozs. silver per ton.

* *See* Report of Provincial Mineralogist on pg. 109.

On the *Triune*, owing to the destruction of the tramway during the past winter by snow-slides, the work performed has been limited. Sufficient stoping has, however, been done to enable the company to ship about 100 tons of ore, of a value of about 250 ozs. silver and 33 % lead. Eight men were employed during the summer. This property is situated on Triune mountain and is operated by the Metropolitan Gold and Silver Mining Co., Ltd.

The *Black Prince*, situated at the head of Gainer creek, was acquired late last fall by Mr. Anthony Becker and associates, who immediately proceeded with work of a prospecting nature, uncovering a chute of high-grade silver-lead ore, in which a tunnel of about 40 feet was driven. Owing, however, to the lateness of the season, they were unable to equip the property for winter work, but it is their intention to resume operations in the early spring and thoroughly exploit their holdings.

The *Mohican*, adjoining the *Black Prince*, has been purchased by the Cariboo Creek Development Syndicate, which has driven about 400 feet of tunnel during the year. In the workings a large body of concentrating ore has been encountered, which can be reduced to give values of about 200 ozs. silver per ton. Nine tons of sorted ore were shipped, which gave values of about 60 ozs. silver and 30 % lead. As soon as transportation facilities are afforded, it is the intention of the company to erect a concentrating plant.

On the *Lucky Boy*, situated on Trout creek and owned by C. D. Stanwood *et al.*, the main shaft has been sunk to a depth of 110 feet. At the 50-foot level drifts have been extended to the left for a distance of 110 feet, and to the right for a distance of 75 feet. From the left drift a raise has been made to the surface. Nearly all the ore shipped has been taken from the right drift. A second level has been started at a depth of 104 feet and driven for a distance of 100 feet to the left and a raise made to connect with the upper level. Another drift has been run to the right 30 feet. Numerous open cuts have been made, exposing the vein on the surface for a distance of 600 feet, and ore is now being stoped out between the two levels. The ore in the shaft continues for the whole distance down and runs from three inches to one foot in clean ore. In the second level both drifts are in ore, running in width about the same as in the shaft. The ore is a high-grade galena and grey copper, and averages from 250 to 300 ozs. in silver and from 20 to 35 % lead per ton. Two hundred tons of ore have been shipped during the year; 17 men are employed on this property.

On the *Ethel*, which is situated on Glacier creek and owned by the same parties as the last-mentioned property, about 500 feet of development work has been done during the year. Twenty tons of ore were shipped, which gave a value of 200 oz. of silver per ton.

The *Cromwell* is situated about nine miles north-east of Trout Lake. On this property considerable surface work has been done, exposing a lead of an average width of about 4 feet for a distance of 1,500 feet. Assay values are $80 in gold and 70 oz. silver per ton. A cross-cut tunnel has been driven a distance of 200 feet; it is estimated that this tunnel continued 400 feet will cut the lead at a depth of 800 feet below the surface. The property is owned by S. J. Graham *et al.*

The *I. X. L.*, situated about one and a half miles south-east of the last-mentioned property and owned by Dr. Milloy, of Rossland, has been under lease during the year. The leaseholders have driven about 300 feet of cross-cut tunnel, cutting the lead at a depth of 200 feet, at which point a good body of concentrating ore was encountered. About 8 tons of sorted ore were shipped.

The *No. 3.*, adjoining the last-mentioned property, has been purchased by the Gold Belt Development Syndicate, which has driven about 75 feet of cross-cut tunnel. The surface showings on this property give assay values of $60 in gold per ton.

On the *American*, owned by the Mountain Lion Mining Company and situated on Haskins creek, about 1,500 feet of development work has been done during the year and 15 tons of ore were shipped. Seven men were employed on this property.

The *Handy* is situated about one and one-half miles south of Gerrard and is owned by Col. Brayton and associates. On this property is a lead about 4 feet wide, carrying gold, silver and copper values, and 150 feet of development work have been done during the year.

On the *Columbia*, situated near the mouth of Tenderfoot creek and owned by P. L. Huffman *et al.*, a cross-cut tunnel has been driven for a distance of about 100 feet. Gold values are obtained from this property.

On the *John L.*, owned by the Lardeau Valley Mines, Ltd., and situated near the last-mentioned property, a tunnel has been driven 100 feet on a vein averaging from 3 to 12 feet in width and carrying excellent gold values.

About 110 feet of work was done on the *North Star*, owned by Harry Rogers *et al.*, and situated on Rapid creek. There is a quartz lead 4 feet wide on the claim, carrying free gold.

The *Lucky Jack*, situated on Poplar creek, was located on the 9th July, 1903. Phenomenal surface showings of free gold were discovered, which resulted in the acquiring of the property by the Great Northern Mines, Ltd., which immediately proceeded with development work. About 300 feet of tunnelling have been done, as well as considerable surface work.

On the *Swede Group*, which is also situated on Poplar creek and owned by the last-mentioned company, a tunnel has been driven about 70 feet, as well as considerable work of a prospecting nature done. A test shipment of 9 tons was also made from this property to the company's mill, from which good gold values were obtained.

The *Gold Park Group* consists of three claims, situated on Poplar creek and owned by Messrs. Marquis & Gilbert. On this property there are a number of leads carrying good gold values. The work done consists mostly of stripping and open cuts. A small shipment was made to the Trail smelter, from which very satisfactory results were obtained.

The *Broken Hill*, a gold property on Rapid creek, has been acquired by Mr. C. T. Porter, of Spokane, who will proceed with development in the early spring.

The *Home Run*, on Poplar creek, another gold property, has been purchased by Mr. J. L. Whitney, of Rossland, who has let contracts for considerable development work.

The *Spyglass*, also on Poplar creek, and which has one of the best surface showings of high-grade ore in the division, has been bonded by Mr. R. G. McLeod, of Nelson, who has made a substantial payment and will proceed with development in the early spring.

The *Golden West* and *Crown King* have passed into the hands of Mr. W. F. Teetzel, of Nelson. These are also gold properties situated on Poplar creek.

Work of a prospecting nature has been done, with good results, on a great many of the claims located during the year, and the outlook for 1904 is very favourable.

OFFICE STATISTICS—TROUT LAKE MINING DIVISION.

Free miners' certificates issued to individuals	358
Free miners' certificates issued to companies	4
Special free miners' certificates issued to individuals	1
Mineral claims recorded	683
Placer claims recorded	24
Certificates of work issued	556
Cash paid in lieu of assessment work	1
Certificates of improvements recorded	26
Bills of sale, agreements, etc., recorded	176
Gold Commissioner's permissions recorded	2
Water grants recorded	5

LARDEAU MINING DIVISION.

Report of Provincial Mineralogist.

Camborne Camp.

Camborne is a new town that has come into existence owing to the various mining properties which have been opened up on either side of Fish river, and is situated about six miles from the mouth of the latter. Here is located the office of the Mining Recorder of the Lardeau Mining Division. The town is only three or four years old, but has now several comforable hotels and good general stores, livery stables, etc. There is also a post office, and connection is made by telephone with Arrowhead and Trout Lake.

Of the various claims and groups of claims on the surrounding hills, three have approached the producing stage, viz., the *Camborne*, *Eva* and *Oyster-Criterion*. Other claims have developed large quantities of quartz, but the three mentioned have stamp-mills now erected and ready to operate, and it remains for these properties to show what the camp is likely to prove.

Geology.

The rock formation of the district is chiefly magnesian and chloritic schists, often metamorphosed, and is probably a continuation of the similar gold-bearing belt seen in the lower end of the Trout Lake Mining Division. Here also there are two series of quartz veins, as was seen in the vicinity of Poplar creek The main series seems to have a strike parallel with the enclosing schist and is cut by a second or cross series of veins. Speaking generally, the veins of the main series appear to be the larger, sometimes having a width of 20 feet, but are not as clearly defined as the cross series, being in many places frozen to the schists or even merging into them. The second series of veins are, as a rule, clear cut, having widths up to 12 or 14 feet of pretty, clear, white quartz, and where these veins cut those of the main series, the quartz often spreads out to much greater width, while, as far as can be judged by the eye at these points of juncture, the mineralisation is greater, and it was reported that the assays were higher.

The hills to the east rise abruptly above the town and already two aerial tramways are in operation lowering quartz down to two mills, which have recently been constructed. The opportunities for cheap and extensive mining are all that could be asked for; the development work done has shown that the quantity of quartz available for mining is certainly very great, and, furthermore, it is known to be gold-bearing. It is not expected that average values will prove to be high; in fact, the properties are expected to be large low-grade propositions. As far as this camp is concerned, the extent and permanency of the quartz veins may be said to be satisfactorily proven; they carry gold values, the facilities for mining are the best, and the only undetermined factor in the problem is what the gold values of the ore, as mined and milled, will prove to be, and whether these values will leave a margin of profit. This factor should soon be determined now, for two stamp-mills are about to begin work on the ores of the locality, those, namely, from the *Eva* and *Oyster-Criterion* mines, on which two properties the greatest development has been accomplished and which may be considered as indices of the camp.

Eva Group.

This group consists of the following mineral claims:—The *Eva*, *Highland Mary*, *Highland Mary Fractional*, *Iron Dollar*, *Joker* and *Last Chance*, owned by the Calumet and B. C. Gold Mines, Ltd., of which company Mr. John Knox, Jr., is local manager and superintendent. A description of this property, giving much detail, will be found in the Report for last year (1902), and need not be repeated. The group is situated on the west slope of Lexington mountain, at an elevation of 2,000 feet above and overlooking Fish River valley, about half a mile north of the town of Camborne, and slightly to the north of the *Oyster-Criterion Group*.

The *Eva Group* had been previously held by the Imperial Development Syndicate, of Nelson, which had done a great deal of development on the property, consisting chiefly of tunnels, drifts, etc., on extensive quartz veins. The development work done would amount in all to from 2,000 to 3,000 feet, and this has shown three or four main leads and several cross-leads, of large width, through which it is reported rich chutes have been defined by assays, and these chutes are said to carry from $6 to $25 in gold per ton. As far as could be learned, these enrichments were usually near the intersection of a main and cross vein, and it was suspected that the higher values were enrichments from the cross vein, in which there was more visible mineralisation and more visible free gold.

On this property the development has shown up an all-sufficient quantity of quartz, with chutes carrying good values; the average yield per ton remains to be determined by the stamp-mill.

Tramline. An aerial tramline, 4,200 feet long, connects the mine and the mill; it passes over the small intervening summit of a spur, necessitating a span of 1,900 feet. The line built was of the standard Riblet type, with a capacity of 100 tons daily and was in excellent working order, being a difficult but well executed piece of work.

Stamp Mill. The *Eva* stamp-mill is adjoining the townsite of Camborne and consists of a frame building of standard type, 30 by 80 feet in size, behind which is the lower terminal of the tramway and receiving bins. The plant consists of a Comet rock crusher, two 5-stamp batteries, 1,000-lb. stamps, with automatic feeders, sizers and four Frue vanners. The motive power is derived from three separate Peltons, one 65 h. p. for crusher, one 135 h. p. for stamps, and one 20 h. p. for vanners, as well as a 200 electric light dynamo. These wheels receive water from Pool creek, under a head of 400 feet, by a flume on the hillside to a penstock, from which a steel rivetted pipe 16 inches in diameter and 1,000 feet long, flanged and bolted in lengths laid on the ground, carries the water to the mill. The mill building was capable of receiving an extra equipment of stamps if required, and was to be heated by steam from a special boiler. The mill was all ready to run in September, 1903, and was about to be started when an accident happened to a valve on the main water line, and caused a shut-down until such could be repaired. The repairs were promptly made and the mill started up early in October, since which time it has been running with much regularity. Up to the end of the year, approximately 2,300 tons of ore, mined in the course of development, was run through the mill and yielded about $10 per ton, the yield being claimed to be 92 % of the assay value. The greater part of the gold is caught on the plates, but some concentrates are collected, which are worth about $30 per ton. The plant has not been in operation long enough to give reliable data as to the percentage of concentrates produced from a ton of ore, but it is roughly estimated at from ½ to 1 %.

Camborne Group. The *Camborne Group*, including the *Gold Finch*, is situated on the west side of Fish river, about two miles above Camborne, on Menhenick creek, and about 1,600 feet above the valley. The property is held by the Northwestern Development Syndicate, of Hancock, Mich. Considerable development was done underground, and a large quartz vein, supposed to be the *Eva* vein, was opened up. An aerial tramline (Hammond), 4,800 feet long, was built from the mine to a 10-stamp mill, operated by water power, in the valley. Much detail of the workings of the property was given in the Report for 1902, and so will not be here repeated. The company got into financial difficulties some time during last summer, and the plant was closed up after a short run; consequently, it was not seen in operation by the writer. A meeting of the shareholders was held at Hancock, Michigan, on December 26th, '03, to consider a proposal for the reorganisa-

tion of the company, and the Northwestern Trustees Securities Co., Ltd., a company formed for the purpose, has undertaken to provide money to continue the operations. While in operation the mill is reported to have milled 800 tons of ore, from which was extracted bullion worth $8,000, or $10 per ton. The surface showings originally found on the *Gold Finch* are said to have been about the best discovered in the district.

The *Cholla Group* consists of 10 claims, situated adjoining the *Eva* and *Oyster-Criterion Groups*, and contains quartz leads of the same description. The *Cholla* and the *Eva Groups* were both held by the Imperial Development Syndicate, Ltd., A. H. Gracey, of Nelson, manager, but it is understood that the former property was retained by the syndicate when the *Eva* was sold. Assessment work has been done on the property and a number of quartz leads uncovered, which are similar to those on the adjoining groups under development, and from the results of the workings of these groups the future prospects of the *Cholla* will be indicated. Some six men were employed during the summer.

Oyster-Criterion & Imperial Groups.

The *Oyster-Criterion* and *Imperial Groups* are adjoining, and for all practical purposes may be considered as one. They consist in all of 10 claims. These claims are situated on Lexington mountain, on the east slope of Fish river, some six miles from its mouth and directly overlooking the town of Camborne. The two groups were held by the Ophir-Lade Mining Syndicate, but have been absorbed by the Great Northwestern Mines, Ltd., already mentioned in the Trout Lake Report.

Development.

The various claims have been prospected by open cuts, strippings, etc., which have been sufficient to demonstrate that quartz veins of considerable size may be found on most, if not on all the properties, but the actual development workings of the groups have been confined to the *Oyster*, *Criterion* and *Rossland*.

The *Criterion* tunnel is an adit, and for its first 75 feet runs about north, cross-cutting the formation till it reaches a vein near the point at which the latter had been prospected by an old shaft. This vein is known as the "galena lead," and is probably one of the cross-vein series. On this a drift has been run for 560 feet in a direction N. 50° E. This drift, at about 100 feet in, cuts a vein on which cross drifts have been run to the left for 30 feet and to the right for 165 feet. This is known as the *Criterion* lead and is one of the main veins on the property, having a width up to 15 or 20 feet. Nearer the inner end of this tunnel a second main vein has been cut and drifted on some 20 feet to the left and 5 feet to the right. This vein, it is claimed by the management, is the same as the No. 3 vein proved upon the *Eva*.

On the *Rossland* claim the *Rossland* tunnel has been driven in at the same level as the *Criterion* tunnel. The *Rossland* tunnel is 140 feet long and, at 130 feet, cuts the *Criterion* lead, on which latter drifts have been run. The drift to the left is 150 feet long and comes out to "grass roots"; from this drift a winze has been sunk in quartz. The drift to the right of the tunnel is in 175 feet, and is running in the direction of the first cross-cut to the left from the *Criterion* tunnel, with which drift it is expected to connect in about 150 feet. When this connection is made, the ore, etc., will be taken out through the *Criterion* workings.

About 150 feet vertical below the *Criterion* tunnel, a lower tunnel has just been started, which is planned to be the working tunnel of the property and through which, when connections are made, all the ore will be taken out.

Veins and Ore.

Almost all the workings noted in the development have been in quartz and on veins of workable and sometimes large size, capable of being mined at very low cost. The work done quite justifies the claim of an almo t unlimited supply of quartz, so situated as to be easily and cheaply mined and transported to the mill site. The quartz is dull white in colour, in places "banded" in appearance, and may

be regarded as a true vein formation, as indicated in the general remarks on the camp. There is in the veins a small percentage of iron pyrites, galena and other sulphides which carry gold, but the greater proportion of the values claimed for the ore is gold in a free state in the quartz. Fine free gold can occasionally be seen in the quartz, and without doubt it also contains free gold not visible, except after crushing and panning. As in all large free gold propositions, the gold values will be found in local chutes rather than uniformly distributed, which renders sampling, except on a very large scale, quite unreliable and worse than useless because so misleading. Assays can be and have been obtained here varying from nothing up to hundreds of dollars to the ton. What the average value of the ore is can only be obtained from the stamp-mill. The management claims that "average samples" assay from $5 to $20 per ton in gold, with correspondingly higher assays right across the face at certain times. The facilities for mining, such as tunnel sites, good and cheap timber, facilities for transportation, water power, etc., together with the mass of quartz in sight, should admit of a low-grade ore being worked to a profit, and if worked on a large scale under competent management, $4 or $5 ore should be able to pay well. The mill is now in operation, and the results of practical runs will be watched with much interest, as this "sampling" affects the valuation of the camp and district.

Tramway. Just below the lower tunnel have been erected the bins and upper terminal of an aerial tramway, built by Riblet, some 3,500 feet in length, with a drop of, approximately, 2,000 feet, and leading directly to the bins of the stamp-mill. This tram, of the usual Riblet type, was just about completed and was first-class in every way. The ore from the dump at the upper tunnel will be lowered by a surface "gravity" tram to the upper terminal bins of the aerial tramway.

Mine Buildings. Near the upper tunnel there had been constructed a comfortable log cook and bunk-house, as well as a house for the mine foreman, while near the lower tunnel and upper terminal of the aerial tram a log blacksmith shop had about been completed.

Stamp-Mill. On the flat in the valley at the town of Camborne, a stamp-mill, of Fraser & Chalmers manufacture, has been erected and consists of:—Bins and an 18-inch x 10-inch Blake crusher, two 5-stamp batteries (1,000 lb. stamps), 3 sizers, 3 Frue vanners, etc., all driven by Pelton water-wheels, developing, under a head of 280 feet, 300 horse-power in all, which is also the motive power for a Rand air-compressor for supplying compressed air for the mine, to which a pipe-line has been laid. The mill was about complete in October, except for certain pipe connections, the material for which had been delayed in transit. It has since been learned from one of the Directors of the Company that the mill was started up in December and was working quite satisfactorily. The mill building has been constructed large enough to permit of ten more stamps being added at any time.

LARDEAU MINING DIVISION.*

REPORT OF GEO. SUMNER, MINING RECORDER.

I have the honour to submit herewith my report of progress in the Lardeau Mining Division for the year ending December 31st, 1903.

I am happy to be able to state that a decided improvement over the year 1902 is to be seen in the mines of the district. Since my last annual report two mills have been installed, each of ten stamps, one at the *Eva* mine, the other on the *Oyster-Criterion* properties.

* *See* Report of Provincial Mineralogist, p. 127.

Eva Group.

At the last general meeting of the shareholders of the Calumet and B. C. Mines, at Nelson, B. C., the manager, Mr. J. F. Musselman, submitted the following report:—"Your Company took possession of the *Eva Group* of eight Crown-granted claims on October 12th, 1902, from which date development work was carried on more or less aggressively throughout the year, except during the month of May, when no work was done at the mine, owing to the breaking up of the trail, which prevented the getting in of supplies.

"The year's underground work aggregates 746 feet, distributed as follows:—No. 7 tunnel, with drifts, 360 feet; No. 3 tunnel, 249 feet; No. 1 tunnel, 31 feet, and raises 106 feet. The average cost of tunnelling was $11.45 per foot, and of raising $7.30 per foot.

"The No 7 is designed as the present working tunnel, and when fully extended will undercut the uppermost showings on the property at an approximate depth of 700 feet. Because of a large slide which prevented the driving of an adit tunnel, the tunnel proper was run as a cross-cut a distance of 269 feet, at which point the No. 2 vein was reached in the latter part of August and drifting both ways, following the wall of the vein, was commenced. The east drift, running into the mountains, has been driven 65 feet, and the west drift, running towards the slide, 31 feet. The wall was encountered at a point 225 feet vertical below the surface; it is also 225 feet from the surface in the direction taken by the west drift. In the direction of the east drift, it is 305 feet to the ore chute developed by tunnels 3 and 5, and 285 feet to point where connection may be made, by upraise, with winze in No. 3. Depth of winze is 78 feet; upraise required to make connection, 140 feet. Both drifts have followed, throughout, a stringer of from 2 inches to 6 inches of $60 ore lying against the wall. In the direction of the east drift, nothing of importance is expected, until the ore chute above referred to is reached. In the opposite direction we are momentarily expecting to encounter this chute in the west drift. The upper terminal of the tram is located 110 feet below the portal of this tunnel.

"The No. 3 tunnel, at the point where we took it up, has just passed through the ore chute, which at present constitutes our chief reserve of available blocked-out ore, and, as was also expected, our progress has been through practically barren ground, so far as our ability to treat it at a profit, with our present plant, is concerned. However, the tunnel has now reached a point where we may momentarily expect good news from it, as indicated by surface showings. The raises were made as a preliminary to stoping.

"We have now blocked out and immediately available, by means of No. 3 and No. 5 tunnels, approximately six months' supply of ore for the mill. To make the large ore bodies developed by the No. 6 tunnel and the *Highland Mary* shaft conveniently available, much further underground work, involving a connection between those works and the No. 3 and No. 7 tunnels, is necessary. We may reasonably expect to open up further reserves in both the No. 3 and No. 7 before accomplishing such connection.

"It is very necessary that we facilitate in every way possible our underground development work. Our most pressing need in this respect is for a compressor plant and power drills, by which we could not only make much greater headway during the time consumed, at the same time lessening our costs very materially, but could work three shifts of eight hours each, whereas we can now work but two shifts of eight hours each, on account of bad air. The question of ventilation will be a serious one until we have means, other than hand-blowers, to provide it.

"As soon as the snow left the ground last spring, we began the construction and installation of a reduction plant, comprising, as main features, a stamp-mill, tramway and water-power installation. The mill, of Fraser & Chalmers' make, comprises two batteries of five 1,050-pound

stamps each, Comet crusher, automatic feeders, amalgamating tables, cone sizer, four six-foot Frue vanners, and is in every way complete in all the adjuncts necessary to a free-milling and concentrating reduction plant. The foundations of batteries and crusher are imbedded in bedrock.

"The heating plant consists of a 25-horse-power boiler, locomotive type, with all necessary pipes and radiators. The power installation includes flume, pipe-line and motors. The flume, 4,000 feet in length, is of 2-inch plank, with 36-inch base, 12 inches high; the standards, however, are 24 inches high, permitting the addition of another 12 inches to the height of the flume, which would double its carrying capacity. The pipe-line, 1,032 feet in length, is made up of 446 feet of 10, 11 and 12 gauge 16-inch pipe, and 586 feet of 14 gauge 18-inch pipe, flanged, jointed and firmly anchored throughout. The water is delivered to the motors under 400 feet head.

"The motors, Pelton pattern and three in number, are installed in a wing of the main mill building, and are specified as follows:—One 3-foot wheel, developing 135 horse-power, for driving stamps; one 24-inch motor, developing 65 horse-power, for running crusher; one 15-inch motor, developing 20 horse-power, for running vanners. The latter, being supplied with governor and cut-off hood, is also made to do duty in driving a 12½ K. W. 220 horse-power dynamo at present used for lighting purposes only. We have now available at the mill a total of 400 H.P., which, should occasion demand, only requires the installation of additional motors for its full utilisation. By installing an additional 600 feet or 700 feet of pipe to take up waste water at the mill and deliver it at a point some 100 feet vertically lower, where, in addition to the five acres originally granted us as a mill-site, we have acquired a small but valuable piece of ground, an additional 100 horse-power could be developed.

"Our double-rope system tram, with a capacity of 100 tons in 10 hours, was supplied and installed by the B. C. Riblet Company, and though very difficult to construct, owing to the contour of the country, works to our entire satisfaction.

"It should be noted that the design of the entire plant provided for an increase of capacity to 40 stamps at the least possible cost; the size, strength and capacity of power plant, tram, crusher, shafts, belts, pulleys, etc., being considered in this general design.

"Further improvements and equipment required at this time include, in addition to the compressor plant before referred to, a bunk and boarding-house at the mine, a house at the mill to accommodate the men employed there, and a covering for the flume. With respect to the three last-named improvements, orders have been given and the work will be prosecuted with the greatest possible expedition.

"Though we have had many difficulties, even reverses, with which to contend in the installation of our plant, amongst which may be mentioned the exceedingly inclement weather throughout the season, the non-delivery of lumber when most required, the exceptional obstacles to transportation, etc., by reason of which the plant did not go into commission until two months after the date on which it might have started under ordinarily favourable conditions, I think we have every reason to look forward with confidence to the results of our enterprise."

Mr. Musselman further says:—

"Since the date of the above report (September 30th, 1903) our mill has made its initial run, a brief account of which should prove interesting. The plant, as above described, went into commission on October 4th, but ran only a few hours, when the valve in the main pipe-line burst, necessitating a shut down of several days to make repairs. With the exception of a few minor mishaps, the mill ran steadily and uninterruptedly during the rest of the month,

running a total of 499 hours; crushing 705 tons of ore, or 3.38 tons to the stamp per 24 hours, yielding 395.5 ounces bullion, valued at $5,533.02, and 4½ tons concentrates, valued at $100, representing an average recovery of about $8 per ton, and an extraction of 87 per cent. of assay value of ore. Considering the newness of the plant and the fact that the entire tonnage came from dumps in which there was considerable waste, the results, I think, should be regarded as satisfactory. Considering the character of our ore, we are in no wise pleased with percentage of values recovered, and are now making experiments, with every reason to believe that we shall be able to obtain better results in this respect. The tailings are being impounded for further treatment by cyanide or otherwise, if justified.

"With respect to recent underground development, I am able to give you at this date, November 17th, a gratifying report from No. 7 tunnel. Though still 180 feet from the ore chute for which we are driving by means of the east drift, we now have in the face of that drift 12 inches of entirely free-milling ore that should mill $100 per ton. In the west drift we have 15 inches of the same character and about the same grade of ore.

"For reasons beyond our control, but little progress has been made in No. 3, but we now have two feet of quartz in the face, assaying $4 per ton (an average sample from across the entire face assays $3.50 per ton), with every indication pointing to our near approach to a chute of payable ore."

Ophir-Lade. The Ophir-Lade Company owns the *Oyster* and *Imperial Groups* of claims, which adjoin the *Eva Group*. Heretofore the company has not published any reports of its doings, but from what I could learn, it is working energetically and its stamp-mill, compressor plant and aerial wire tramway are running smoothly. Some gold bricks, the result of the first clean-up, were turned out a few days ago, but I have not been able to ascertain the values.

Camborne Group. This property, which consists of eight Crown-granted claims, some of which have good surface showings of free-milling gold quartz, was held by the Northwestern Development Syndicate, but this company suspended operations during the past summer. I am glad to report now that a new company (Gold Finch Mining Co.), has been organised to take hold of the property. This latter company has let contracts for the purpose of developing the veins on the *Gold Finch* claim, with the evident intention of getting a good supply of ore in sight before putting the stamp-mill in operation. The ore will be brought to the mill by an aerial wire tramway, which extends from the *Gold Finch* claim for a distance of 5,000 feet, to the mill near the mouth of Menhinick creek. The tram is equipped with 12 buckets, having each a carrying capacity of about 800 pounds of ore.

The mill is a ten-stamp one, with mortar blocks in place for ten additional stamps when needed, and is driven by electric power furnished by a Pelton water wheel and two dynamos, one of 110 volts and the other 220 volts. These same dynamos also furnish power for driving the electric drills, a saw-mill, and for lighting the buildings.

The Beatrice Group. This group comprises three Crown-granted mineral claims, owned by the Beatrice Mines, Ltd. The property, on which there is a large quantity of galena and zinc ore, has been handicapped for want of a decent trail, but this has now been remedied, as the new trail (which is a good one) is nearly completed. Under adverse circumstances, this property has shipped to the smelter about 445,000 pounds of ore to date.

Considerable excitement was caused during the past summer by the reported discovery on Goat mountain, near Boyd creek, of a very large ledge (about 60 feet wide), of galena ore. It is thought that a large production will be made from this vicinity in the near future. The only means of access at present is by a very bad trail.

OFFICE STATISTICS—LARDEAU MINING DIVISION.

Mineral claims located	135
Certificates of work issued	318
Bills of sale recorded	120
Certificates of improvements recorded	37
Free miners' certificates issued	210

SLOCAN DISTRICT.

Report of E. E. Chipman, Gold Commissioner.

I have the honour to submit my report on the Slocan District for the year 1903.

Adverse conditions have prevailed in the mining industry in the Slocan District during the year. The low price of silver and lead in the early part of the year; the unsatisfactory condition of the zinc market, and the deferring of the relief expected from the lead bounty provided by the Dominion Government until the latter part of the year, have, perhaps, been the principal causes.

While the ore shipments have fallen off nearly one-half, confidence in the future has not abated, and development has been carried on to an increased extent in nearly all the important mines, while a large number of new properties have been opened up, and will be ready to enter the list of shippers in the near future. Improved machinery for the better treatment of zinc ore, and to make it a more desirable and marketable commodity, has been introduced at a number of the larger mines, and this, with the better prices now prevailing, and the distribution of the lead bounty which is now available, make the outlook for an increased production and a prosperous year in 1904 very encouraging.

SLOCAN MINING DIVISION.

Report by Angus McInnes, Mining Recorder.

I have the honour to submit herewith my annual report and office statistics for the Slocan Mining Division for the year ending December 31st, 1903.

The Payne. This property has been working continually during the year, and the company is now sinking a double-compartment shaft and installing hoisting machinery and pumps. In conjunction with the concentrator at the mine, a magnetic separating plant, for zinc ores, has been erected and is, I am informed, a great success. The development work during the year amounts to about 670 feet of tunnelling and shafts, and the output of ore was approximately 1,300 tons. The property is managed by Alfred C. Garde, who has made a wonderful improvement in both the mine and plant during the last three years.

The *Slocan Star*, under the management of Oscar V. White, has been worked with a reduced force during the year, the work being principally confined to developing the mine, although a great deal of ore has been taken out and shipped. It is the intention of the management to increase the force and output in the early spring.

On the *Ivanhoe*, as on the *Slocan Star*, operations were confined to development work. The manager, P. Hickey, has secured a new cable for the tram-line, and when this is put in place, both the tram and mill will be in good shape for a long run. There is a large quantity of lead and zinc ores in reserve in the mine, and it is the intention during the coming year to make heavy shipments.

The Monitor Group. This group is situated near Three Forks, and has been for the last five years under the management of Maurice Gintzburger. During the year operations were principally confined to development work, and in the process about 750 tons of silver lead ore were extracted. It is the intention to increase the force of men employed.

On the *Rambler* there has been a great deal of development work done during the year. A shaft has been sunk 100 feet deep, and from this shaft the management has drifted about 800 feet on the different levels, and has also started a new tunnel, which will be about 4,300 feet long, to tap the lead at a depth of about 600 feet.

On the *Last Chance* there has been a great deal of work done during the year, and it is the intention of the management to carry on still more extensive operations during 1904.

Development work on the *Reco* (J. M. Harris, manager) for the year includes about 550 feet of tunnel and nearly 200 feet of raise. The output for 1903 was about 150 tons of high-grade ore.

The Ruth Mines.

There has been a large amount of development work done at this company's mine during the year, and about 800 tons of ore shipped. Large bodies of ore have been blocked out, and it is expected that the property will ship very extensively during 1904. H. B. Alexander is manager.

On the *Antoine* work has also to a certain extent been confined to development. About 3,000 feet of tunnel has been run during the year, and about 200 tons of silver-lead ore shipped. It is the intention of the management during 1904 to run a long tunnel to gain a further depth of about 500 feet. George Alexander is manager of the mine.

From the *Idaho-Alamo* about 500 tons of ore were shipped during the year, and a great amount of development work done. The mill has been thoroughly overhauled and is now up to date, and a new tramline has been put in between it and the mine. It is expected that during the coming year a large tonnage will be shipped. W. S. Jenkins is manager of the mine.

The *Mountain Con* has been worked in a small way under lease, and is showing up well under development.

The *American Boy* has produced during the year about 700 tons of silver-lead ore, and the development has been kept well ahead. The buildings were all destroyed by fire about the first of December, but new ones are now being erected, and all will be ready to start operations again in a short time. Thomas McGuigan is manager of the property.

On the *Washington* (John L. Retallack, manager) a considerable amount of development work has been done during the year, and large bodies of lead and zinc ores have been exposed.

The *Vancouver*, near Silverton, has been developed in a small way during the year, and I understand that it is the intention of the manager (Leslie Hill) to carry on the work more extensively during 1904.

The *Bosun*, situated near New Denver, has shipped during the year over 1,000 tons of high-grade silver-lead and zinc ores, but for the last three months the mine has been closed down, for reasons unknown here. W. H. Sandiford is manager of the property.

The *Fisher Maiden* (Geo. Long, manager) is situate about 7 miles above Silverton, on Four-Mile creek, and has been worked in a small way by a few men during the last year. About 280 tons of high-grade dry ore were shipped, and I am informed that it is the intention of the management to develop the property more extensively during the year 1904.

The *Lucky Jim* is situated near Bear lake, and has been taken over within the last month on a bond by Mr. George H. Hughes, one of the leading mining men of the camp, who will, it is believed, start development on a large scale.

The *Mercury* is owned and operated by Messrs. Drewry, Twigg & Cunning, and is showing up well under development. The property is situated near the *Payne* mine, Sandon.

The *Queen Bess* was worked under lease in the early part of the year, but nothing has been done for the last nine months. The property is now owned by the Bank of Montreal, and it is understood that a local syndicate is about to take it over.

The *Red Fox*, situated in McGuigan basin, is owned and operated by George Aylard *et al.*, who worked it for about nine months during the year, but were forced to close down about three months ago, on account of the scarcity of snow to rawhide the ore.

The *Wakefield*, belonging to the Wakefield Mines, Limited, is situated about four miles above Silverton, on Four-mile creek, and has been operated by T. R. Lane under lease for the last two years. The output of ore for 1903 has been about 200 tons, and Mr. Lane has expended a large amount of money during the year in repairing the mill and tramline, which are now up to date.

The *Hewett* has been idle during the greater part of the year, but has lately been worked under lease by Mr. Davis, of Nelson.

The *Lorna Doone* has also been worked under lease during the year by Mr. Robert Sutherland & Co., and is showing up well.

On the *Capella* the usual amount of work has been done, and two cars of ore have been shipped during the year. The property is owned and operated by W. R. Will and N. F. McNaught. It is a dry ore proposition and carries high values in silver.

The *Mollie Hughes* and *Pinto* are two adjoining properties situated on Slocan lake, near New Denver, and owned by a local syndicate. They are worked at present under lease, Messrs. Horton & Co. operating the *Pinto*, and Messrs. Sheran & Co. the *Mollie Hughes*.

The *Comstock* is owned and worked by W. Hunter, of Silverton, and it is now considered to be one of the best mines in the Silverton Camp. Mr. Hunter has done a considerable amount of development work on the property during the year, and has now large bodies of ore blocked out ready to stope and ship.

The *Rowse Fraction* is situated on the North Fork of Carpenter creek, and promises to be among the big shippers during the coming year. It is also owned and operated by Mr. William Hunter.

The *Democrat* and *Conductor* are also being worked under lease in a small way.

The *L. H. Group* of claims is situated near Silverton, and is owned and operated by A. R. Fingland & Co. The values are in gold and are very high. The vein has been tapped at a great depth, and it has been found that with this depth the values increase.

I might mention here that the output of ore from this district has been greatly retarded during the fall and winter by the want of snow, rendering transportation of ore by rawhiding impossible.

Office Statistics—Slocan Mining Division.

Free miners' certificates issued, ordinary	433
" " companies	11
Certificates of work issued	320
Locations recorded	104
Transfers and other documents	76
Certificates of improvements issued	21
Traders' licences	37
Cash paid in lieu of work	$1,537

SLOCAN CITY MINING DIVISION.

REPORTED BY H. P. CHRISTIE, MINING RECORDER.

I have the honour to submit my annual report on the Slocan City Mining Division for the past year (1903).

The mining that has been done is satisfactory in a measure, inasmuch as it has shown the ore bodies to be continuous with depth, although nearly all the work done has been confined to development, the tonnage of ore shipped being smaller than in previous years. The owners and operators of the various mines are discontinuing shipping, with a view to installing mills for the more economical treatment of their low-grade, silicious ores, for which purpose experiments are now being made. The system of leasing is becoming more popular and so far seems to be successful.

SPRINGER CREEK.

The *Arlington* shipped 40 tons of ore. Work on this property has been entirely confined to development, about seven or eight men only being employed for the best part of the year. The company definitely announces that it has found a satisfactory method of treating its ore, and it is the intention to erect a suitable mill at an early date.

The *Speculator* has employed about 10 men for the year, wholly on development work.

The *Black Prince* is now under lease to Messrs. Mulvey and Murphy, who are so far meeting with good success; they have shipped two carloads of high-grade ore and intend shipping several more through the winter.

The *Bank of England* has been bought and is being worked by the Pioneer Mining Co., of Nelson. This company employs about eight men, who are engaged in running a cross-cut tunnel to tap the lead. The surface indications are very good.

The *Two Friends*, adjoining the above, has not been worked to any appreciable extent during the year.

The *Ottawa* has been steadily worked during the year with 12 to 15 men, who have driven about 1,500 feet of drifts and have encountered the vein at a vertical depth of over 200 feet. In the last 100 vertical feet the ore chute has increased in size and still retains its former values. The amount of ore shipped is about 145 tons. It is of a combined limey and silicious nature, and carries native silver, argentite and freibergite.

The *Myrtle Group* has been operated most of the year by four men engaged on development work. The character of the ore is the same as that of the *Ottawa*. The work accomplished consists of a shaft 50 feet and 100 feet of drifting at the bottom of the former. The water has forced them, however, to run a long cross-cut tunnel of 450 feet; this will give 100 feet of depth on the vein, which they expect to reach in May.

The *Republic* had about a dozen men working for the greater portion of the year and shipped about 70 tons of ore. The mine is now being worked by "leasers," but the company states that it intends working again itself in the spring.

The *Meteor* was worked under a lease by four men for about six months and they shipped 52 tons of very high-grade ore. This property is unique, inasmuch as a mineral named "scheelite"* was found in small quantities. It occurs in the quartz in lenses varying from two to three inches in width and one to three feet long. About 500 pounds were taken out after it was identified. This is the first time this mineral has been met with in this Province, if not in the Dominion.

* Calcium Tungstate ($Ca\ WO_4$).

The *Hampton* has done a little development and shipped a sample of five tons of ore.

The *Cripple Stick* was acquired by F. Stock, of Seattle, and is now undergoing development, after shipping a sample of two tons.

The *Dayton* has been under lease and is being developed by a few men, making a small shipment of twelve tons.

The *Port Hope* is leased and is being worked, with very encouraging prospects.

The *Bondholder* was under lease and made a small shipment of two tons.

Ten-Mile Creek.

The *Enterprise*, after work being discontinued by the company, has been worked under a lease by local mining men, with marked success. There have been from 20 to 50 men steadily employed since the commencement of the lease, and 895 tons of ore were shipped at a good profit.

The *Hamilton*, *Nansen*, *Westmont*, *Kalispel*, *Highland Light*, *Sapphire* and some others have been worked in a small way by the owners.

The *Mabou* and *Ohio* have undergone a good deal of development by the owners.

Lemon Creek.

On the *Legal* about 150 feet of drifting has been done, giving much the same results as last year.

The *Howard Fraction* has been acquired by American capital and has done some development.

The *Alberta* has been steadily worked for the past year by four men; they have made a small shipment and the vein appears to be very continuous, carrying gold and silver values.

The *Hoodoo*, *Kilo* and some others have had a little work done upon them.

The most striking features determined by the last few years' development are the large, low-grade veins on Springer creek, which have been proved to be continuous both in depth and length, but, although containing chutes of high-grade ore, the bulk of it in the vein is too low-grade for shipping and smelting. In the advent, however, of a good metallurgical process for the more economical treatment of these ores, a great future is assured for this district, as the tonnage of the veins of the *Black Prince*, *Arlington*, *Speculator*, *Ottawa*, *Myrtle* and some others of the same class would be large. Moreover, it has been definitely announced by experts that a satisfactory treatment has been evolved to make a complete success of the mining here.

Office Statistics—Slocan City Mining Division.

Free miners' certificates issued	238
Certificates of work recorded	390
Fresh locations recorded	141
Conveyances, &c., recorded	126
Crown grants issued	18

AINSWORTH MINING DIVISION.

REPORT OF E. E. CHIPMAN, GOLD COMMISSIONER.

Notwithstanding the depressed condition of the mining industry in the district, assessment work has been well kept up, and a large number of the claims have been Crown-granted. In the Ainsworth Division the new locations have more than doubled, an increase due, no doubt, to the recent gold discoveries in the Trout Lake Mining Division, which have proved an incentive to closer and more effective prospecting in a practically new country. It was found that the territory in which the Poplar creek discoveries were made was an extensive one, and covered the larger portion of the northern part of the Ainsworth Mining Division, and many discoveries of gold-bearing ledges have been made on Cascade, Cooper, Meadow and Davis creeks, while it is believed that the same conditions extend to the headwaters of Wilson, Schroeder, Lyle and Whitewater creeks. Extensive preparations are now being made to thoroughly investigate the value of the territory drained by these creeks, as soon as the snow goes in the spring.

HAMILL CREEK.

Argenta Mines.

The Argenta Mines Company has had a force of 10 men constantly employed on its property during the year, doing development work only. Nearly 1,000 feet of tunnel were driven, and upraises have been made connecting the new tunnel with the older workings. Large bodies of ore have been opened in the last working, and the result of the development was of such a satisfactory character that two new tunnels will be driven at lower elevations on the ledge during the year, one of 1,000 feet and the other 1,500. The company intends putting in machinery early in the spring, as soon as the work on the waggon road is completed and enables them to get in the required plant. The estimate of 27,000 tons of ore blocked out last year has been more than trebled by the past season's work. Application is now being made for Crown grants for the property of the company, consisting of 16 claims.

The *Lavina-Butte Group* has been shut down during the year, waiting for the completion of the waggon road, which will enable the ore to be transported.

The *McLaughlin Group* of claims, further up the creek, and adjoining the above-mentioned mines, has kept up development work almost continuously during the year.

SOUTH FORK OF KASLO CREEK.

The *Province* has employed 6 men constantly during the year, principally in development work. About 400 feet of tunnels have been driven, and 200 feet of upraises, winzes and cross-cuts have been made. Shipments of ore were begun in December, and will be continued during the year. The owners contemplate driving an 1,100 foot cross-cut tunnel during the year.

On the *Cork* 15 men have been employed continuously during the year, 1,100 feet of cross-cut tunnel has been driven and several hundred feet of drifting on the ledge has been done. A continuous body of ore has been exposed in one of the drifts for a distance of over 400 feet. The owners intend putting in a concentrator in the spring for the treatment of the large body of ore now in sight.

Two men have been working on the *Bismark* the greater part of the year in development work, and a sufficient amount of ore has been taken out, at present prices, to remunerate the owners for their outlay.

Woodberry Creek.

On this creek, the Slocan Development Company, the *Baltimore Group* and the King Solomon's Mines Company have been working steadily during the year, each with a small force of men. 125 tons of ore have been shipped during the year.

Ainsworth Camp.

The Highland (Kootenay, B. C.) Mining Company, the property of which is situated on the north slope of Cedar creek, has employed on an average 50 men constantly, throughout the year in the mill and mine. Ore mined and milled during the year, 24,000 tons; concentrates shipped, 2,967 tons; development work done, not including stoping, 1,000 feet.

Highlander Mine.

The Highlander Mill & Mining Co., operating this property, started a cross-cut tunnel in June, 1899, in order to cut its ore bodies at a depth, to prove the continuity of the veins in the camp and to obtain cheaper facilities for handling its ore. The main vein was cut at a distance of 1,560 feet from the portal, and was shown to have at this point a width of 72 feet, as against 42 feet on the surface. The depth obtained on the pitch of the vein at this point was 980 feet. A drift was then run on the footwall of the vein, a distance of 700 feet, disclosing payable ore bodies at a distance of 450 feet. The ore is principally of a concentrating grade, but bodies of clean shipping ore were frequently encountered, assaying 70 % lead and 35 ounces silver. In the past year the work consisted of 130 feet of raise and 100 feet of drift. In the raise a fine body of zinc was encountered, running 29 % zinc and 6 ounces of silver. The main tunnel has been continued to a length of 2,250 feet, and all veins showing on the surface have been encountered, with one exception. The property is equipped with a 100-ton concentrator and 3-drill compressors, and the mine is operated by a 150 H. P. water-power system, having probably the greatest head in the Province, the difference in altitude between the penstock and wheel being 1,075 feet. The *Highlander* is the deepest developed property in the Ainsworth camp, and has done much to give confidence in the continuity at depth of the ore bodies and their values.

Office Statistics—Ainsworth Mining Division.

Free miners' certificates, personal	507
" " companies	6
" " special	2
New claims recorded	631
Transfers recorded	151
Certificates of work issued	569
Payments in lieu of work	2
Placer claims recorded	1
Water records issued	19
Pre-emption records issued	39
Certificates of improvement issued	95
Certificates of purchase issued	9
Existing Crown-granted mineral claims on roll	1170

NELSON DISTRICT.

NELSON MINING DIVISION.

REPORT OF ROBT. A. RENWICK, GOLD COMMISSIONER.

The advancement made in mining in the Nelson Division during the year 1903 is to be found rather in the improved condition of a number of the more promising properties than in the number of claims recorded. The depression which characterised the year 1902 was quite as much in evidence during the first half of the succeeding year, and this undoubtedly had its effect upon prospecting.

Throughout the district attention was very largely confined to the gold properties in the Ymir camp and to the belt south-west of Nelson, and in both sections very gratifying success was met with. In the Ymir section, the *Ymir* mine, which for years has been the leading property of the district, has not yet emerged entirely from its difficulties, but there is every reason to believe that the management will be able to make a much better showing for 1904 than was the case in the year under review. Of the greatest importance has been the result of the year's work on the *Hunter V.*, the *Wilcox* and the *Foghorn* properties, all of which goes a long way in establishing the extent and permanency of the ore bodies of that section. In the vicinity of Nelson the result of the year's work has also been most encouraging, considerable shipments having been made from the *Silver King* under the lease held by Mr. Davys, while greatly improved conditions have resulted from the work done on the *Athabasca-Venus* and the *May and Jennie* properties.

Placer mining along the Salmon River, with respect to which there was a great deal of activity during the fall of 1902, did not come up to the general expectations. Of the work that has been done, it may be said that it demonstrated that there was not much money to be made from individual claims along the stream, and on both the Salmon and Pend d'Oreille work during 1903 was held in abeyance awaiting the outcome of attempts to consolidate individual interests. When the season opens at least one company will commence operations on a comparatively large scale.

HALL MINING AND SMELTING COMPANY.

The business of this company during the past year was restricted largely to the operation of a customs smelter at Nelson, the *Silver King Group* of mining properties, owned by it, being under lease to M. S. Davys, a former superintendent of the mine. The fiscal year of the company ends on June 30th, and in the last report submitted to the shareholders a deficit of something over $20,000 was shown as the result of the year's working. In the company's mine account a profit of $3,500 was shown as the result of the royalties paid by the lessee of the mine; and in the smelter account a profit of £1,694 was shown, but as this was subject to a greater charge of £3,890 for maintenance and depreciation, the net result was a loss of the above mentioned sum. The very unsettled condition of the mining industry during the year is the explanation offered by the management, it being found impossible to secure either a constant supply of ores or desirable fluxes.

The close of the year marked the passing by the Federal Government of a bounty measure for the producers of lead whose product was smelted in the Dominion. This was the outcome of a movement to afford the mining industry relief through the medium of increased duties

upon imports of lead into Canada, but the arranging of the preliminaries with respect to the payment of the bounty occupied so much time that the year afforded no opportunity for determining just what stimulus the bounty will give to the industry, although that it will be of considerable benefit goes without saying.

Of the ore treated in the company's smelter during the last fiscal year 7,500 tons were classed as dry ores, 5,270 as lead ores, 4,000 as roasting ores. The shipments of the smelter for the year consisted of 1,023,250 ounces of silver; 8,000 ounces of gold; and 3,350 tons of lead. The large furnace of the company was in blast 222 days and the smaller furnace 165 days. During the last six months of the calendar year the company smelted 10,180 tons of ore, mined 12,329 tons of ore at the *Emma* mine, in which it has a large interest, and received 2,618 tons of ore from the *Silver King* property.

At the *Silver King* mine, work was carried on by the lessee throughout the year, during which period the shipments aggregated about 4,500 tons, the value of which was in the neighbourhood of $18 per ton. All of this ore came from abandoned workings in the mine above the fifth level, and as no development work was carried on, the value of the shipments left the lessee with a good margin of profit after paying all charges.

Athabasca-Venus Company.

The properties which make up the *Athabasca* and *Venus Groups* were operated throughout the year by the re-organised Canadian Company, which succeeded the old Athabasca and Venus Companies. During the greater part of the year the work was restricted to the development of the *Venus* property, from which, approximately, 7,000 tons of ore were mined, while upwards of 2,500 feet of development were performed. The development consists of driving a series of four tunnels. Work has also been started on a fifth tunnel, which will have a length of 1,300 feet before it reaches the boundary of the company's property, and a depth of 800 feet on the vein. Respecting the ore reserves, the management reports that with the commencement of the year 1904 there was more ore in sight in the mine than at any former period in its development, the reserves being estimated at 8,000 tons; and from the appearance of the vein it is estimated that there is an ore tonnage of 35,000 tons ahead of the five levels.

On the *Athabasca* property there was an ore extraction of 800 tons during the year. This came largely from pillars in the old working, the ore being extracted on a tribute system, and from the No. 2 east drift. This was the lowest working in the property, and the new company has made a connection to the surface by means of a shaft and upraise, the former having been sunk by the old management. The drift itself has also been advanced 200 feet and has developed an ore body with a length of about 300 feet and a "back" of approximately 150 feet. It is the intention of the management to sink on this ore body to a depth of 200 feet. Work in the *Athabasca* has been restricted to this portion of the property, as the vein appears to be much more regular than in the other workings.

Of the general result of the year's operations the manager, A. H. Gracey, stated that the same had been profitable, and had enabled the company to put a considerable amount into development, and the close of the year found sufficient ore blocked out to keep the ten-stamp mill running for eighteen months. Milling operations were not commenced until the latter part of November, and the report prepared by the company included some milling which was done during the previous December. This showed that 7,325 tons of *Venus* ore and 935 tons of *Athabasca* ore had been milled, from which the values saved were $92,000.

May and Jennie. This property, which is situated on 49-Creek, is connected with Nelson by means of a waggon road, and was systematically developed by the owners throughout the year. Arrangements have been perfected for the organisa-

tion of a company to take over the property; this plan calls for the erection of a mill capable of treating 100 tons per day. Much of the work preliminary to the erection of the mill has already been done. The property is equipped with good boarding and bunk-houses, a flume 2 by 2 has been constructed for three-quarters of a mile, and is connected with a steel pipe-line 800 feet long to the mill-site, giving a pressure of 480 feet, and a retaining wall and foundation has been laid for the mill. The work done in the mine has resulted in proving up above the No. 2 level some 60,000 tons of ore carrying good commercial values.

The underground work on the property consists of the No. 1 adit, which has been run in for 80 feet, and gives a depth of 125 feet on the vein at the face. There have been 575 feet of drifting on this level, which has shown the ledge to vary in width from 5 to 24 feet, and to carry ore of payable values.

The No. 2 adit has been advanced some 375 feet, the ledge being struck 350 feet in from the portal. Drifting has been carried on north and south from this level along the ledge, the former drift being 400 feet long and the latter 250 feet. There has also been considerable cross-cutting, the work disclosing large bodies of ore. Connection has also been made between the two levels by means of a 112-foot upraise, and a second upraise 97 feet in length connects with the surface.

Extensive surface work was also done on the *Red Top* claim of this group, the wash being cut for a depth of 30 feet. This work uncovered two ledges, one having a width of 9 feet and the other a width of 20 feet, both carrying good gold values.

Extensive tests have been made of the *May and Jennie* ore, both as regards milling and cyaniding, and the installation of a mill is all that is required to enable the property to commence producing.

Gold Hill and Silver Crown.

This property is situated about two miles above the *May and Jennie Group*, and is now sufficiently developed to warrant a company with the necessary capital taking it over. The work consists of a 600-foot cross-cut, which intercepts the ledge at a depth of 300 feet. At the point where the ledge was cut in the tunnel it was drifted upon for 50 feet, and a shaft was also sunk 35 feet. The ledge, so far as it has been developed, shows a uniform width of 3 feet and carries quartz in much of which the gold shows free. From tests made of the ledge it has been shown that the entire 3 feet carries approximately $25 in free gold values to the ton and about 1 % in copper, and from 2 to 3 ounces silver. The owners made two test shipments to the Nelson smelter of five tons each. The first represented the entire ledge matter and yielded smelter returns of $25 to the ton in gold. The second shipment was made up of sorted ore and gave returns of $80 to the ton. The ground in this property is said to be very easy to work, and arrangements are being made under which it is expected the property will be operated during the approaching summer.

Poorman and Granite.

These properties were operated by the Duncan-United Mines during the greater portion of the year, during which time development was carried forward on the three levels. The company suspended operations in October, for the reason that the margin of profit was not sufficiently large to justify operations upon a 20-stamp mill basis. It is said that work will be resumed during the coming summer. From January till October the company mined 14,000 tons of ore, and from this were sorted 9,170 tons which went to the company's mill. This yielded 2,339 ounces gold, and 231 tons of concentrates. The shrinkage in values in the ore more than offset all economies effected in management, with the result that operations were suspended.

Juno Group. This property, which lies immediately above the *Venus*, is owned and operated by the Juno Mines, Limited, the head office of which is in Montreal, and the local manager of which is M. S. Logan. There are two veins on the group, upon which work has been done consisting of an 800-foot adit and a 300-foot shaft, from which a 200-foot drift has been run. Of the adit tunnel the first 300 feet of it was run in on what is known as the *Venus* ledge, from which point it was swung over so that it would strike the bottom of the shaft which had been sunk higher up the hill on the *Juno* vein. Connection was established between the adit and the shaft. The work done has demonstrated the fact that the *Juno* vein has an average width of 4½ feet, and tests made from the ore give it an average value of $13 or $14 to the ton in free gold. Of the *Venus* vein, which runs into the *Juno*, all the work being done on the former is proving up the ledge for the *Juno* owners. The No. 2 tunnel of the *Venus* has already reached the *Juno* line at a point 400 feet below the adit tunnel of the latter. In this portion of the vein the values disclosed in the *Venus* ore were $12.50 to the ton in free gold. A crew of 15 men was employed on the property during the year.

Fern Mine. This property, situate on Hall creek, was operated under lease by E. Rammelmeyer during the whole of 1903, during which period 300 feet of new ground was opened up beyond the old workings, with very satisfactory results, exposing a ledge varying from 2 to 3 feet in width and carrying high-grade milling ore. The property was equipped with a mill at the time the lease was taken on it, but the mill was in bad repair and it was not until the close of the summer that it was in shape to run, so that after satisfactory tests, operations were deferred until the following spring. The close of the year, according to the estimate of the lessee, saw 20,000 tons of ore blocked out in the mine, of which he estimated 5,000 tons would mill at $10, and the remainder from this figure down to $3. The lessee expects to make a very good showing with the *Fern* during the approaching summer.

Ymir Mine. The *Ymir* mine was operated during the entire year under the management which came in with the reconstruction of the company, but, so far as can be learned, the results were hardly such as can be regarded as satisfactory. The ore tonnage milled during the year was 54,850 tons, a slight increase over that treated during the year 1902, but the values recovered were smaller than those of the previous year. The values resulting from the milling and cyaniding were 11,160 ounces gold, 50,060 ounces silver, and 515 tons of lead, which with the concentrates brought the total product up to something over $300,000, a falling off of $45,000 from the previous year's record.

There was considerable development carried on along the fourth, fifth and sixth levels of the mine, and some new chutes of ore were opened up, but the changes made in the management at the close of the year made it impossible to secure details as to the results of the development. Speaking generally, however, it is said that where the drifts have been carried east the prospect of striking payable ore in the 1,000-foot cross-cut on the tenth level has been very much brightened. This is the hope of the management, and the realisation of it would make the *Ymir* the most valuable mining property in the district.

Note by the Provincial Mineralogist.—The Ymir Gold Mines, Ltd., during the year 1903, was under the management of Mr. R. M. Atwater, who retired on the last day of the year and was succeeded by Mr. G. H. Burnhart, who was formerly, under the old company, the mine and mill manager, but who is now in general charge. The Ymir mine has recently installed a cyanide plant for the treatment of tailings from the stamp-mill. The following

notes are extracted from a paper, by E. C. Holden, read before the American Institute of Mining Engineers, and give an idea of the cost of installing and operating the plant :—

The stamp-mill contains sixteen 5-stamp batteries; stamps, 850 lbs.; drop, 6½ inches; about 98 to 100 times a minute; the height of issue is from 3½ to 5 inches; narrow mortars; screens No. 9 and 11, diagonal slot; crushing capacity, from 2½ to 3 tons per stamp in 24 hours. The ore is white, massive quartz, containing from 8 to 12 % of sulphurets, the latter being pyrite, sphalerite and galena.

The saving on the plates was 61.9 % of gold values and 9.4 % of silver. Plate tailings from 10 stamps were fed to 3 Frue vanners. The saving in the concentrates was :—Gold, 16 %; silver, 35.4 %; lead, 42 %; the total saving of the stamp-mill was thus 77.9 % gold and 44.8 % silver.

The cyanide plant has been built about half a mile from the mill and at about 300 feet lower elevation, the site for it having to be cleared in a heavily wooded section. All the plant is housed, the buildings being heavily timbered, as necessitated by the deep snowfalls.

The vanner tailings are carried to the plant by a box launder, 6 x 8 inches in section with drop boxes. The tailings enter the top of the storage solution room and are "classified" in two boxes. From the last box 60 % of the water and 20 % of the tailings, all of which would pass a 100-mesh screen, is run to waste.

All vats and tanks are of steel; the leachers are 32 feet in diameter and 6 feet deep, on timber foundations; the sumps are wood; the distributers are of the usual type and have twenty 1½-inch arms.

The classification of values in charges and overflows was marked, the average assays and screen tests for the year being :—

	Gold, oz. per ton.	Silver, oz. per ton.	Through a 100 mesh screen.
Vanner tails	0.0838	1.008	64.86 %
Charges	0.0931	0.637	50.70 "
Overflows	0.0621	1.878	98.90 "

The high silver in the overflows is due to its association with galena in the slimes.

With all the stamps dropping, a tank was filled in from 28 to 32 hours; a normal charge was 185 tons dry weight. Routine treatment was as follows :—

After levelling and adding dry lime ($\frac{1}{10}$th lb. to ton charge), two 5-ton doses of weak solution (between 0.1 and 0.05 % KCN) are successively given, followed by four or five 10-ton doses of strong solution (0.2 % KCN) at 5-hour intervals. The charge is drained for 6 hours, then 20 tons of strong solution are run in under the filter and false bottom.

The total time of treatment of a charge was 9½ to 11½ days. Residues are discharged through two 10-inch plug-flanges by sluicing with a 2½-inch hose under 115 lbs. pressure. One man will sluice out the residue of a charge and clean the filter in 4 hours.

The filter is three thicknesses of 16-oz. burlap, having the usual false bottom and rope-grouting. Precipitation from the cyanide solution is effected by zinc shavings in eight 10-compartment steel boxes.

Operating costs per ton for the last quarter, when 7,150 tons were treated, were as follows:—

Cost of Treatment per Ton.

Cyanide at 22 cents per lb	$ 0.200
Zinc " 9 " "	0.020
Lime " .009 " "	0.001
Fuel " $2.50 a cord	0.019
Clean up supplies	0.029
Repairs	0.014
Miscellaneous	0.003
Labour (wages $3.50 to $4.50 per day)	0.234
Total	$ 0.520

Assay costs were not allocated, but the cyanide plant proportion should approximate $0.025 per day. These results were obtained when treating but 78 tons a day. This cost can be reduced to 38.6 cents when the plant is treating its full rated capacity of 200 tons per day.

The plant is equipped with steam heating and electric lighting plants, and has an auxiliary water power system capable of developing 300 h.-p. The pumps and lighting dynamo are run by Pelton water motors under 320-ft. head, and the only cost of power is the trifling item of maintenance of flumes.

The total cost of the works, including the power plant, was $57,951.63. Omitting the costs of the main mill building, boarding-houses, power plant and heating system, thus reducing the estimate to the basis of an "open air plant," the cost was $33,782, including the clearing, excavating and masonry, which amounted to $6,321.34.

Dundee. This property, situate on Dundee mountain, in the vicinity of Ymir, received some attention during the year. It has been idle for a considerable period, but some Coast people opened negotiations with the owners, which led to the pumping out of the mine and the working of a small crew of men for some time. This work is being done under the superintendence of A. H. Gracey, and may result in a resumption of operations on this property, on which a number of the prominent mining engineers of the district have from time to time made most favourable reports as to the ore reserves.

Wilcox. This property, situate on Wild Horse creek, is owned and operated by the Broken Hill Mining & Development Company. The past year marked the first run of the company's stamp-mill on a commercial scale. The mill commenced operations on May 1st, and for the six months following made a very successful run, the total product of the mine from the mill and shipments of crude ore in the period being $22,000. As the property is favourably situated for working, the net result was a substantial earning for the company, but the greater portion of it went into improvements in the mine. For the entire year the output of the mine was 2,200 tons milled and 100 tons of high-grade ore which was shipped to the smelter in the crude state. The work accomplished during the year consisted of 300 feet of drifting and stoping on the first and second levels of the *Fourth of July* vein, and 200 feet of tunnel work on development account. The company also intends to continue work in the upper tunnel on the *Wilcox* vein. This tunnel is in 400 feet, and it is estimated a 200-foot cross-cut will tap the *Fourth of July* vein at an additional depth of 400 feet below the present workings.

Foghorn. The results of development on this property are regarded as the most encouraging of the year. For a number of years the owners of the property have been engaged in driving a long cross-cut to tap a vein from which high values were taken. The beginning of 1903 found this cross-cut in 900 feet, and before the year's end it was advanced another 300 feet. In its course it has intercepted two veins which have been deemed worthy of attention. The first of these is known as the No. 2 vein, and was crossed 800 feet in from the portal of the tunnel; upon it a drift has been run for 125 feet. The other vein has been called the No. 3, and is believed to be that to cut which the tunnel was run. Where the vein has been cut in the cross-cut it has a width of 6 feet, and an average sampling of the vein at this point is said to give an indicated value of $10 to the ton. This value, taking into account the fact that the vein has been developed for a depth of 900 feet, gives a most important bearing to the Foghorn development.

Hunter V. The development on this property during the year has fully justified the predictions of its promoters. As has been explained, it is an immense deposit of lime which carries pay values in gold and silver. The nature of the deposit permits the mining of it by the cheapest methods, that is quarrying and chambering. The lime contents of the ore render it valuable to the smelters for fluxing purposes, so that advantageous smelting rates have been secured by the owners.

The work done during the year consisted of an incline shaft 120 feet, 100 feet of open surface work on the *Hunter V.*, and something over 400 feet of work on the *Double Standard* claim, in the same group. To move the ore to the railway a double rope aerial tramway of 13,000 feet, and two subsidiary tramways of 1,800 and 500 feet have been built, while living accommodation for 75 men has been put up. The production during the year was restricted to 400 tons, but with the end of 1903 the company was in shape to maintain an output of 100 tons per day, and by the end of June, 1904, it is the intention to increase the output to 400 tons per day.

Gold Cup. This property, which is situate about four miles north of the town of Ymir, was under development throughout the year by Messrs. Wolfe and Davault. It is a gold proposition and has been opened up to a depth of 100 feet, with very gratifying results, the vein having an average width of 4½ feet and sampling $15 in gold with small values in copper and silver. The holders of the *Gold Cup* option took in an experimental mill during the summer. This has but two stamps, but arrangements have been made for increasing the battery to ten stamps, as they have sufficient confidence in their ore reserves to warrant this.

On the *Arlington* and *Second Relief* properties work was carried on for a considerable period during the year, the shipments reported from the former being about 1,300 tons; and from the latter nearly 1,500 tons. Of the other properties in the vicinity of Erie the only ones appearing on the shipping list were the *Canadian King* and *Keystone*. These were worked in a small way under lease, the shipments from the former being about 100 tons, and from the latter some 250 tons.

NOTE BY THE PROVINCIAL MINERALOGIST.—The following information is condensed from a report on the *Lucky Strike Group*.

The *Lucky Strike Group*, consisting of four claims, two of which are Crown-granted, is situated on Midge creek, about twelve miles by trail from navigation or railway transportation and some 10 miles north-east of the *Ymir*. The surface showings are exceedingly good and there are five well-defined veins on the property, the croppings consisting of a porous quartz with limonite, galena, pyrites and silver sulphurets.

The principal development has been on No. 1 vein, the largest of the five mentioned, which has a width of from 15 to 45 feet. The work consists of 13 surface cuts, exposing the lead for 800 feet along its course, a cross-cut tunnel of 100 feet and one of 87 feet, a winze and a drift. The former tunnel (No. 1) intersects the vein at a depth from the surface of 70 feet on the dip, and assays on samples from this working run from $1.75 to $12 in gold and from 60 cents to $8 in silver, while assays on samples from the second tunnel (No. 2), which intersects the vein at a depth of 50 feet, and from the winze and drift, which latter has been driven 200 feet north on the lead, run from $4 to $26 in gold and from $2 to $7.25 in silver, while section samples from a rich streak in the middle of the vein in the drift run from $18.25 to $32 in gold and from $6 to $12 in silver. On No. 2 vein development consists of a drift (42 feet) and cross-cut; the mineralisation is in lead oxides and chlorides and assays give also good gold values. No. 3 vein, 40 inches in width, has a small shaft and open cut, and No. 4 vein, about 150 feet east of No. 3, has been developed by six open cuts; assays from these veins give good gold values and up to 13% lead. On No. 5 vein open cuts are being made.

The total development on the property is: 67 feet of shaft; 187 feet of cross-cut tunnels; 241 feet of drifts; 25 open cuts. There are besides a log bunk-house for 16 men, cook-house, dining-room, store-house, blacksmith's shop, etc., and a water-pipe line of 2,700 feet has been laid for domestic purposes, the value of improvements being about $10,000.

GOAT RIVER MINING DIVISION.

With regard to the Goat River Mining Division there is little to report during the past year. By an Order in Council dated November 10th, 1903, the territory embraced in this Division was merged in the Nelson Mining Division, and the boundaries of the latter Division extended to include the Goat River Mining Division, a Sub-Recorder being appointed with office at Creston, B. C. This Order in Council took effect on the 31st December, 1903,

In the Summit Creek camp there are reported to be some promising new locations. Among the properties in this camp may be mentioned the *Bayonne Group*, referred to in last year's Report, and on which a considerable amount of work has been done, the *Red Horse*, *Granite*, *Lone Star* and *Black Watch*.

The *Silver Hill*, situated on Crawford creek, is stated to have shipped some ore during the year, under a lease.

Alice.

The *Alice*, in the vicinity of Creston, which has been idle for a number of years, has been secured under lease by Mr. John Hampson, who has previously had much to do with the development of the property. There have been upwards of 2,000 feet of work done on the *Alice*, and there are on the dump between 800 and 900 tons of ore which will yield from 25 to 30 ounces silver and high percentages of lead. A depth of 250 feet has been attained on the vein, which has an average width of two feet. The lease on the property is for ten years and the lessee has perfected arrangements for the erection of a concentrator capable of handling 50 tons of ore per day. The concentrator will be connected with the mine by means of a tramway, upon which work was commenced late in the year. It is estimated that there is sufficient ore in sight on the *Alice* to keep the mill running for two years.

With regard to the discoveries of iron ore, further finds have been reported from Gray creek, a distance of 30 miles from the Kitchener deposits. On the Kitchener deposits themselves no work has been done during the year.

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, 1903.

The *Empress*, *Delanger*, *Anna S.*, *Maple Leaf*, *Ontario*, *Forest Chief* and *Monarch* claims, located on the "Big Ledge" on Pingston creek, were inspected recently by interested parties, who are reported to have offered $20,000 for a half interest, an offer which the owners declined. The vein has a width of 30 feet and the mineralisation is largely zinc. Sixteen claims are recorded upon this same ledge and three have been Crown-granted.

The *Meadow Group* of mineral claims, situated on the headwaters of Mineral creek, consists of the *Skylark*, *Shakespeare*, *Boita* and *Meadow Queen*. The claims have been grouped and a considerable amount of work done upon the *Meadow*, a shaft being sunk for 30 feet. There is a quantity of shipping ore on the dump.

On the *Millie Mack* mineral claim, situated on Cariboo creek, there is a large quantity of ore on the dump, and the owner intends shipping next season.

On the *Paladora Group*, consisting of the *Paladora*, *Meadow View No. 2*, *Reward* and *Cornwall No. 2*, situated near the headwaters of Fire Valley creek, considerable work has been done this season and the claims are showing up well, the assay values running $15 to $30 in gold per ton. This section of the country is attracting a good deal of attention.

The *Cornwall Group* consists of the *Cornwall*, *Devonshire*, *Ophir*, *Cascade* and *Pearl* claims, situated near Cape Horn, Upper Arrow lake, about half a mile from the shore. The annual assessment work was done on the *Cornwall*, where there is a large showing of low-grade copper ore assaying 8 % copper and $2 gold per ton.

The *Chieftain Group* consists of the *Chieftain*, *Duchess*, *Dundas*, *Mammoth No. 2* and *Silver Tip No. 2*, situated on Cariboo creek. These properties have all been Crown-granted. On the *Chieftain* a tunnel has been driven 200 feet, the vein showing up strongly and carrying native silver. A large quantity of shipping ore is on the dump and assays $200 silver per ton.

OFFICE STATISTICS—ARROW LAKE MINING DIVISION.

Number of mineral claims recorded	18
Certificates of work issued	18
Certificates of improvements recorded	14
Bills of sale, etc., recorded	10
Free miners' certificates issued	63
Special free miners' "	1

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 1903.

Concentration of Ores.

Apart from the ordinary detail of the year's work which is here given, some experiments which have been conducted for the better reduction of Rossland's ores have been carried to what might be called a successful finish during the past year. In consequence of this, several plants, of varying nature, have been completed, or are under way, and the year to come will probably see a revolution in the treatment of the ores of this camp, the initial stages of which have been witnessed during 1903.

Of these experiments perhaps the most important, at all events the most advanced, is the "Elmore" process for the concentration of the values in the silicious ores, and while it would be well to refer to the whole of these various methods, yet, in a sense, the "Elmore" is a key to all. The Elmore Oil Process is applied chiefly to the reduction of silicious ores of low grade having a greater or smaller percentage of copper and low values in gold. It will also treat lead ores, and is more or less suitable to ores which are not base. The typical mill is that which has been erected upon the property of the Le Roi No. 2 in this camp. It is a combination of the water process and of oil.

(Note by the Provincial Mineralogist.—The description of the Elmore Oil Process furnished by the Gold Commissioner has been amplified by information kindly supplied by Mr. H. Hayman Claudet, the technical representative of the Canadian Oil Concentration, Ltd., the company holding the Canadian rights to the process.)

The Elmore Oil Process, as worked at the Le Roi No. 2 Plant at Rossland.

The mill is so situated that ore from either the Le Roi No. 2 mine or from the dump can be trammed direct into it. The ore is first fed into a Blake crusher, in which it is crushed to about 4 inches in size. From this it goes to a Gates crusher and is reduced from ½-inch to ¾-inch, in which size it goes into the ore bin, which holds a sufficient supply to last over night. From the ore bin the ore is fed by Challenge automatic feeders into two 6-foot Trent mills (Chilian), in which it is pulverised to the desired mesh. Up to the present time the mesh used has been No. 40, but to a certain extent this is a matter of experiment as yet, and naturally would vary with different ores. From the Trent mills the pulp passes through automatic samplers and thence on to two Wilfley tables, by which the coarser and cleaner, and therefore the heavier, particles of mineral are separated out. The tailings from the Wilfleys, which consist of the gangue matter, together with particles of mineral not entirely freed from gangue or in too fine a state to have been readily caught by the Wilfleys, then pass on to be treated by the Elmore Process proper.

As will be seen, the process up to this point is the ordinary water concentration, and the oil process is employed simply as an adjunct to this, to treat the tailings from the former method and from them to make a saving of what would otherwise be a waste product.

The tailings from the two Wilfleys, having already passed a 40-mesh screen, are run on to two units of an "Elmore Oil Plant." (One unit = an estimated capacity of 25 tons per day.) These "tailings" are fed into "mixing cylinders" with water and oil from the storage tanks. These mixers, of which there are three, are long iron cylinders, placed horizontally and provided with inside baffle plates, which, as the cylinder is revolved at a low rate of speed by power, thoroughly mix the charge, bringing the oil into contact with every particle of mineral in the tailings. The oil, for some reason not explained, has the faculty of catching up and retaining fine particles of sulphides and of free gold. From the mixers the charge is flushed with water into settling tanks. Here the gangue matter settles to the bottom, while the oil, being lighter than the water, floats on the surface, retaining with it the metallic sulphides, etc. The oil can only carry a limited amount of sulphides to an extent such as will not render the oil-mineral compound heavier than the water.

The first settler-tailings (gangue matter, with such sulphides as may have escaped the first mixer) are run with the water into a second mixer, with the addition of more oil, and a second separation is similarly made in a second settler. The second settler tailings are usually fairly clean, but are run through a third mixer and settler. From this last the tailings go to the dump through an outside settling tank, in which is collected any oil which may have escaped.

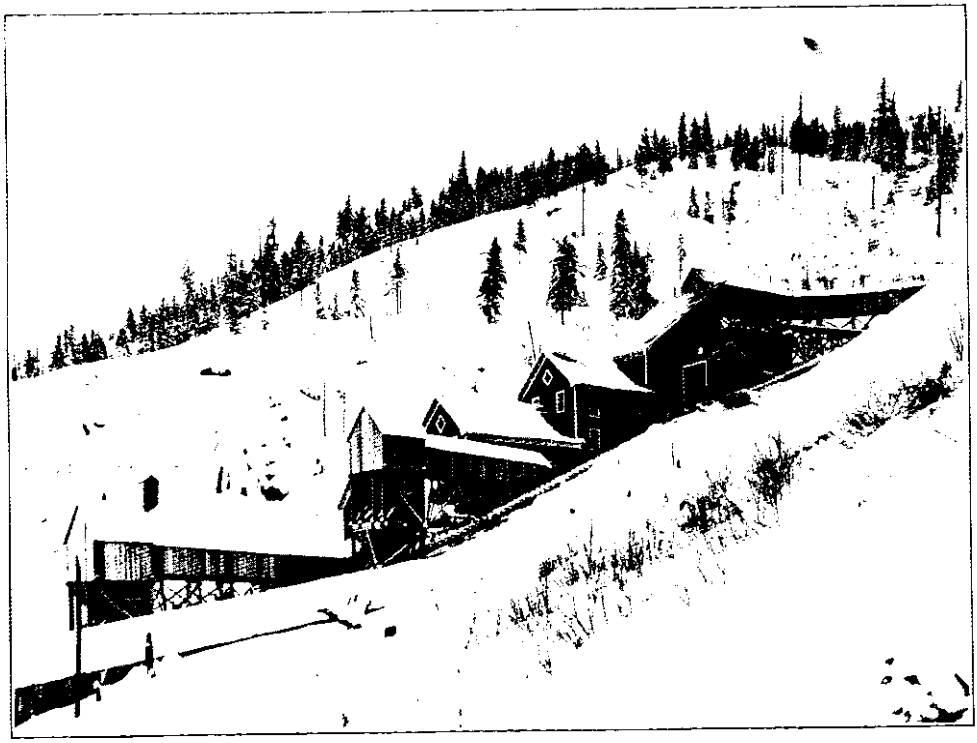
The mineral-charged oil and any surplus oil is run off from the surface of the various settlers into the first "oil extractor," which is a centrifugal machine, 4 feet in diameter with solid walls, revolving at a speed of 1,000 revolutions a minute, in which any surplus oil is washed out by water and flows over into an oil-settling tank, from which it goes back eventually to the storage tanks on the higher level.

After all the surplus oil has been washed out, the water is run off and the "oil concentrates" are discharged and carried by a worm conveyor to a second extractor at a lower level. This second extractor is a centrifugal with perforated screen side, and here a steam jet is introduced, which renders the oil more fluid and at the same time assists in the removal of a further quantity of it, "drying" the concentrates somewhat. All oil not absorbed by the concentrates is returned to the process to be used over again. The concentrates, both from the Wilfley tables and the oil process, are sent to the smelter.

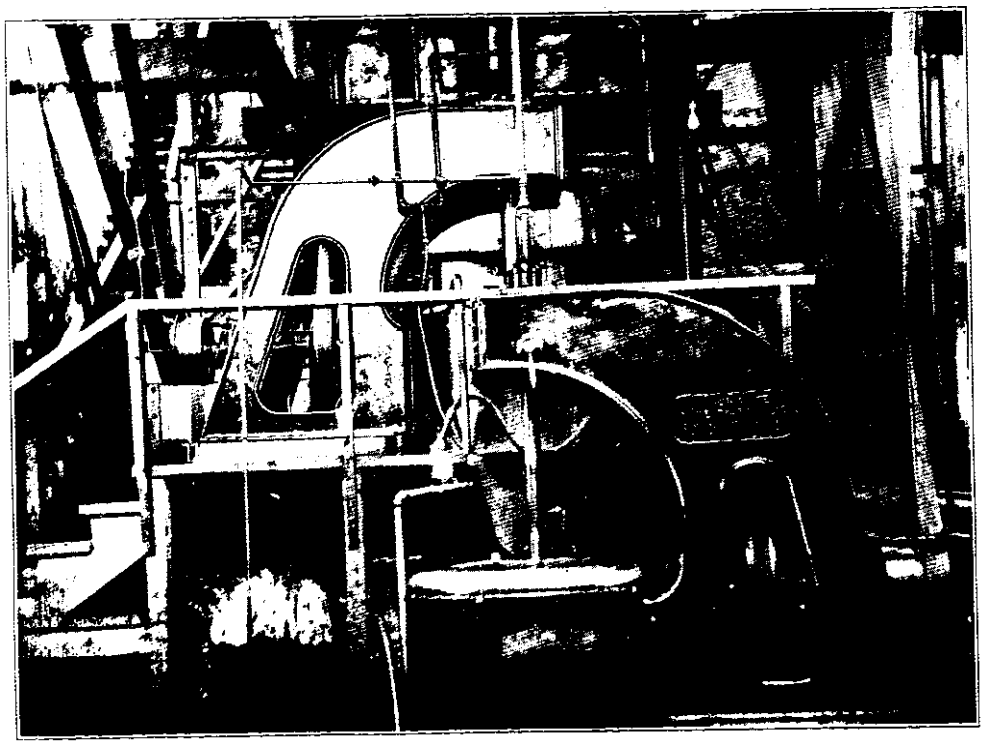
Mr. Claudet says: "The cost of installing such a plant will, of course, depend on the location to a certain degree, as well as on the style of crushing machinery which is installed. The oil plant itself costs, approximately, $6,000, to which must be added the cost of the building to contain it and the erection. The power required to drive a 50-ton oil plant is about 10 H.P. The water required is from six to ten times the amount of ore treated; or, to take an average, for every ton of ore about 8 tons of water would be required. The consumption of oil varies with the nature of the ore which is treated, but it may be taken as ranging from one to one and one-half gallons per ton of ore treated. In the LeRoi No. 2 mill, up to now, they have only treated low grade ore, viz. between $4.50 and $5 ore. The ratio of concentration has been on the average about 13 to 1. From ore of this value they are obtaining concentrates from the Wilfley tables of about $50 and oil concentrates of about $40, and the tailings will run a little over $1 per ton. By finer crushing, together with one or two modifications, we shall be able to reduce the value in the tailings even lower than this.

"The great feature of the oil process is that it saves the finest slimes without any trouble; while very good work is done by the Wilfley tables on the comparatively coarse material, the finest particles of values which escape the tables are readily picked up by the oil.

"With regard to the applicability of the process, one might say that, with very few exceptions, all sulphides are amenable to the oil treatment; on the other hand, oxides are not.



LE ROI No. 2 COMPANY'S MILL-ELMORE OIL PROCESS-ROSSLAND.



INTERIOR VIEW, SHOWING SEPARATORS.

It is also essential for close work that the sulphides should have a fresh surface, as the oil seems to take up any brightened surface better than a tarnished one.

"The cost of treatment will depend of course on the size of the plant, as well as on the local conditions; but, for the guidance of anyone in this Province, I think it is near enough to say that for a plant on a large scale, say of 200 or 300 tons capacity per day, the total cost, including loss of oil and the royalty, would come to about $1.25 per ton of ore treated; while for a small plant, say of 50 tons a day, the total cost would probably be in the neighbourhood of $2 per ton. At present the cost of treatment in the LeRoi No. 2 plant has exceeded this last figure; but then, it must be remembered that up to now there have been stoppages and delays, due to the large amount of snow we have had, as well as to unavoidable delays in starting up a new plant, which have interfered with the continuous running essential to any mill.

"I consider that eventually we shall have a very large field on copper ores, which slime considerably when crushing. There are plenty of these ore bodies in this Province too low grade to smelt and yet impossible to concentrate by water. Also, I believe we shall have a field anywhere where there are already existing water concentrators, which are losing a lot of values in the slime running away in the tailings,"

These are the main conditions of the process, and it may be stated that the mill is run by electricity, of which there is a cheap supply in the camp.

Below the mill described is to be erected another of a larger size by the White Bear Company, and probably a third, below that of the *White Bear* but within a few hundred yards of the first, will be built by the *Spitzee*. It may be said that the details of this work have not as yet been thoroughly elaborated, and further orders of similar machinery are but awaiting this being accomplished.

In the mines of the Rossland camp, even including those mines which are generally classed as silicious, many kinds of ore are found. It will at once be apparent that heavy pyrrhotite requires different treatment to silicious quartz. Also, as is not generally known, there is a variable quantity, occurring irregularly, of free-milling gold in the base ledges.

As may have been gathered from these remarks, the Elmore process, however eminently suitable to the treatment of the silicious ores of the camp, cannot in the very nature of concentration touch the ferruginous. And yet the ferruginous ores of Rossland are considered to be quite as plentiful as the silicious, and some method of treating these cheaply must be found if the lower grades are to be treated successfully. For the heavy pyrrhotite ore smelting is sufficiently economical, but for the low-grade iron ore, running between four and eight dollars per ton, of which there is plenty in the camp, notably on the north-eastern side of the crater, as well as occurring plentifully in the south belt, smelting is far too expensive.

As these ores often run from 40 to 80 % iron, it will be seen that concentration, which only gets rid of the silica in the form of mud, but saves all the metallic particles, is absolutely useless. Pyritic smelting has been suggested and the sublimation process, but according to recent experiments on the Rossland-Kootenay ores, the process which is popularly known as the "Hendryx," but which is really an adaptation of the electro-cyanide, will be adopted some time during the coming year.

In detail the Hendryx mill commences its treatment process much as does the Elmore plant at the Le Roi No. 2. There are the ordinary crushers, through which the crushed ore is fed to Chilian mills. Here, instead of water, a weak solution of cyanide is introduced, coming from a storage tank above. The pulp flows into the storage tanks where the surplus cyanide solution is drawn off and returned above. The pulp is then let into the only part of

the plant which can possibly be called "Hendryx"; this is the agitator, and in this the oxidisation is set up. Before cyanide will act upon the precious metals oxygen must be taken up. This is supplied by the atmosphere, and usually is introduced by means of compressed air; it takes some considerable time to thoroughly permeate the pulp. Moreover, there is a thermal action set up which tends to separate nitrogen and oxygen in the air, causing the formation of nitrous compounds which give trouble. This agitator, which practically makes the electro-cyanide process available for Rossland ores, acts in a different manner. Inside the agitator is a cylinder, and inside the cylinder are a series of paddles which elevate the pulp in the path of a spiral to the top, where it falls in a thin stream over a flat surface back over the sides of the cylinder to the bottom of the agitator, whence it is again lifted up. The cyanide, during its exposure, absorbs oxygen from the atmosphere; hence the process takes a few hours instead of days, thus making a small mill do the work of a larger one. After the lapse of sufficient time the solution is decanted into a tank below, the pulp squeezed dry by hydraulic pressure, forming the tailings. The cyanide solution contains the whole of the gold and the small proportion of the copper present in the ores. The iron and sulphur goes untouched into the tailings, and electrolysis then precipitates the metallic contents upon a silver plate. The cyanide solution is then regenerated by electric power, only about 4 % of cyanide being lost, which is added. The Hendryx process does not as yet recover copper, though Hendryx says he is hopeful of accomplishing this eventually.

A third method for reducing the low-grade ores of the camp, namely, pyritic smelting, has been the subject of much investigation during the year. To this investigation attention was recently called, in a general way, at the annual meeting of the Rossland-Kootenay Mines held in London in December. As a result of these experiments, it has been decided by the Chairman of the Velvet-Rossland Mine, Ltd., to erect a small pyritic stack on or near the *Velvet* property, probably on Big Sheep creek, at the foot of Sophie mountain. This is to be run in conjunction with a concentrator which will be set up upon the property itself. The concentrator is planned to be of the water type, and is calculated to save about 80 % of the values. The concentrates from the mill will be used in the pyritic smelter in order to bring up the value of the matte. The matte will be in the form of a concentrate of about 25 to 1.

Description of Milling Plant and Method of Treatment of the Rossland Power Company, Limited.

The plant of this company is now in course of construction at a point about three-quarters of a mile north of Smelter Junction, on the line of the Canadian Pacific Railway from Rossland to Nelson. It is being built primarily for treating the lower grades of ore from the *War Eagle* and *Centre Star* mines, but will probably handle more or less custom ore as well, when the capacity has been raised to allow of it without interfering with the output of the two mines mentioned. The initial capacity of the mill will be 200 tons per 24 hours, but it is being so arranged that, by duplicating certain machines, the capacity can be greatly increased—possibly doubled—without adding to the buildings now under construction.

The essential feature of the process used is a thorough water concentration, with gradual reduction to prevent the formation of rich slimes, a preliminary coarse crushing and concentration permitting of the removal of a considerable percentage of the sulphide contents as a product for smelting. The tailings will then be ground and separated into sands and slimes, each of which will be given a special treatment for the recovery of the remaining values.

The location of the works and the arrangement of the plant are such as to afford an almost automatic handling of the material from the time it enters from the railway cars as

crude ore until it is discharged into the railway cars as concentrates, the tailings going to the waste dump. The plant is of the "level site" type, as distinguished from the usual side-hill type. It is believed that this is the first mill of this type of construction to be built in British Columbia. The water supply, which is necessarily a large one, is from Stoney, Rock and Murphy creeks, whence it will be conveyed by flume to a point on the north side of the first-named stream, and thence to the mill by a steel pipe-line. The waste water and tailings will be discharged to the large sandy flat opposite the mill. The motive power will be electricity from the system of the West Kootenay Power and Light Company, Limited. The equipment of motors will be a little less than 500 H. P. It is expected that the plant will be ready for starting some time during the spring. When operations commence and the mill is running to its full capacity, from 40 to 60 men will probably be employed. The estimated cost of the plant is $150,000.

The ore shipments from the Trail Creek District for 1903 were, approximately, as follows:—

Le Roi	184,151	dry tons.
Centre Star	82,257	"
War Eagle	60,093	"
Le Roi No. 2	16,000	"
Rossland-Kootenay	7,500	"
Jumbo	4,200	"
Velvet	4,000	"
I. X. L	1,389	"
Giant	660	"
Spitzee	483	"
White Bear	150	"
Miscellaneous	150	"
Total	360,408	"

The gross value of this ore is estimated at $4,289,857. The difference between dry and wet tonnage is about 2 %.

Detailed Statement.

Le Roi Mining Company, Limited.—Le Roi Mine.

Tons of ore shipped	184,151	
Average number of men employed	324	
Underground	240	
Surface	84	
Development:		
Shafting	140	feet.
Driving	3,799	"
Raising	588	"
Cross-cutting	2,465	"
Winzing	69	"
Diamond drilling	6,123	"

There were no additions to the plant during the year.

NOTE BY THE PROVINCIAL MINERALOGIST.—In the report to their shareholders, the directors of the LeRoi mine state:—"The operations of the year resulted, as shown in the accounts, in a profit of £80,242, arrived at after writing off £32,015 in respect of development, and £19,148 for depreciation of plant, machinery, buildings, etc., at the mine and smelter. It will be seen from the report that during the year under review, 172,669 dry tons of ore were mined and shipped to the Northport smelter, the gross value amounting to $2,307,069, equal to $13.36 per ton. In addition, the ore shipped from the dump to Northport amounted to 7,195 tons, with a gross value of $80,368, equal to $11.17 per ton."

Mr. S. D. Parrish, general manager of the company, says:—

"*Ore Production, etc.*—The ore mined and shipped to Northport during the year amounted to 172,669.259 dry tons, its metal values averaging: Gold, .443 oz.; silver, .6 oz.; copper, 1.655 per cent. per ton. Its gross value was $2,307,069.70, equal to $13.36 per ton. Mining operations were carried on continuously during the year—the only stoppages which occurred being on "shift" Sundays and public holidays. The second class ore shipped to Northport during the year amounted to 7,195.69 tons. It contained average metal values of gold, .368 oz.; silver, .53 oz. per ton, and copper, 1.27 %. As the average value of ore mined during the year was equal to $13.36 per ton, and the entire operating expenses for the same period $11.370 per ton, a profit of $1.999 is shown to have been made on the first-class ore, equal to $343,611.82. The gross value of the second-class ore shipped being $11.177 per ton, and the total expense of handling and treating same $6.34 per ton, the profit assumed to have been made on this ore is, therefore, $4.837 per ton, or $34,809.30.

"*Working Costs.*—The books show that our operating expenses, which embrace mining, freighting of ore, smelting and realisation of matte values, were equal to $11.370 per ton during the year. The subjoined table gives the comparative costs under this head for the years 1901, 1902 and 1903:—

	Per ton, 1901.	Per ton, 1902.	Per ton, 1903.
Stoping and loading on railroad	$3.487	$3.100	$2.715
Exploration	.423	.451	.899
Depreciation:			
Mine equipment	.080	.138	.081
Surface improvements	.050	.061	.064
Mine machinery	.106	.125	.144
Pearl and Ruby claims and sundries	.....	.....	.011
Freight on ore to smelter	.510	.400	.367
Smelter expense	4.465	4.205	4.319
Depreciation of smelter plant	232	.119	.208
Interest and discount on ore in yard and matte in transit	.229	.233	.375
Freight on matte to refiners	.536	.404	.440
Sacking and crushing matte	.044	.043	.054
Eastern representation, assaying, etc	.028	.013	.022
Penalty for low copper	.....	.....	.091
Refiners' tolls	.534	.579	.741
Metal losses in smelting	.....	.781	.839
Totals	$10.724	$10.652	$11.370

"During the year the sum of $149,601.57 was expended on the development of the mine. The details of the work performed and of costs are as follows:—

Work.	Footage.	Cost.	Cost per ft.
Combination shaft	90	$9,763 57	$108 48
Peyton shaft	50	1,417 20	30 34
Station cutting	.....	2,766 59	.....
Pocket cutting	.....	1,639 62	.....
Raising	588½	13,874 98	23 57
Winzing	69	2,563 85	37 15
Cross-cutting	2,453	34,529 49	14 07
Drifting	3,799	57,056 07	15 01
Prospecting	.....	45 88	.....
Open cuts	.....	135 25	.....
Diamond drill station (1,200)	.....	185 31	.....
Diamond drill station (1,350)	.....	130 43	.....
Peyton tunnel and open cuts	.....	4,753 44	.....
Peyton tunnel cross-cut	12	215 90	17 99
Diamond drilling	6,123½	20,423 99	3 33
Totals	13,185	$149,601 57	.....

"*General Remarks:*—The profit made during the year, after making the very liberal allowances previously referred to, amounts to $366,309.11. To this should be added the sum of $68,487.01, which represents the amount realised from the ore stocks and furnace bottoms on hand at June 20th, 1902, over and above the valuation placed upon them at that date. The difference between the sum gained in mining the first-class ore and the total profit of the year is made up of the earnings of the smelter in the treatment of 'custom ores.'

"The matte shipped during the year was 5,823,362 tons, of a nett value of $2,332,393.11, equal to $400.52 per ton. The ores smelted amounted to 187,232.64 tons, of which 36,115.958 tons were purchased."

Le Roi No. 2, Limited—Le Roi No. 2 Mine.

Tons of ore shipped (dry)	16,000
Average number of men employed	104
Underground	74
Surface	30
Development:	
Driving	2,070 feet.
Raising	18 "
Cross-cutting	300 "
Tunnelling	110 "

The additions to plant during the year are valued at $45,000.

Centre Star Mining Company, Limited—Centre Star Mine.

Tons of ore shipped (dry)	82,257
Average number of men employed	133
Underground	114
Surface	19
Development:	
Raising	230 feet.
Winzing	79 "
Drifting / Cross-cutting	1,844 "

The value of the mining plant, machinery, buildings, etc., is given at $204,482.22.

NOTE BY PROVINCIAL MINERALOGIST.—The Centre Star mine is one among a few in the Province which publish, or allow to be published, the details of cost of operating. The reports of the management of this property are, in this matter, so admirably gotten out that they are reproduced here, not only as illustrating the costs of mining in the Rossland District, but as examples of the form in which such statements are made.

The following is taken from Mr. Kirby's report to the Directors, at the annual meeting of the Centre Star Mining Co. held November 24th, 1903, for the fiscal year ending September 30th, 1903:—

"Developments up to date show that the Centre Star mine has experienced the same general change in the character of its ore deposits which has occurred in all other productive mines in the Rossland District, and which is the general rule throughout the mining districts of the world. This is the transition from the occurrence of high grade bonanza ore bodies, capable of profit under the expensive process of smelting, to masses of lower grade, requiring a cheaper treatment by milling.

"As the bodies of smelting ore in the vein become less frequent and their average size diminishes, the proportion of this ore to the increasing quantity of development or dead work required to expose it rapidly lessens to a point where its profit is consumed by the cost of the dead work. The relief to be derived from milling will, therefore, be not only in the direct saving of cost expected, but also in the increased proportion of pay ore to development work, while the stoping of low-grade blocks will assist the exploration work by disclosing the unknown bodies of smelting ore contained within their limits.

"The ore sales during the year have been 88,387 tons, averaging $10.58, smelter's gross assay value. The average assay contents were: gold, 0.50 oz., silver, 0.40 oz., copper, 0.99 %. The net profit in excess of all expenditures was $228,358.90, which has covered the indebtedness of the company and left a surplus of $88,157.12 in the treasury. The reserves of smelting ore at the present moment are not large, and are of such shape that their dimensions cannot be accurately estimated.

"The development work of the year has continued to add to the great masses of ore too low in grade for smelting, but rich enough to afford a profit to successful milling. Now that the mill of the Rossland Power Company assures an outlet for these ores in a few months, their contents will soon be available. It is impossible to present any reliable estimate of their quantity or precise value, because their limits have not been defined, and until milling begins they cannot be exposed or sampled accurately without excessive expense. They occur in extensive bodies 15 to 30 feet in width, and exposed very imperfectly by the mine workings, since these have been in the past directed to the exposure of smelting ore bodies only."

The following details of development work done are condensed from the report:—

4th level,	431	feet deep (measured on vein),	extended	to	point	690	feet	from	shaft.
5th "	608	feet deep;	extended	to	point	358	feet	from	shaft cross-cut.
6th "	778	" "	"	"	"	1,060	"	"	
7th "	924	" "	"	"	"	615	"	"	
8th W. level,	1,077	" "	"	"	"	285	"	"	
E. "			"	"	"	425	"	"	
9th level,	1,222	" "	"	"	"	109	"	"	

The report states that besides certain bodies of ore of smelting grade, considerable bodies of lower grade ore were encountered, which averaged roughly from $4 to $8 in "smelter's gross values," and further remarks: "The necessity for milling has long been foreseen, but although every effort has been made towards the desired end, there has been unexpected delay, owing to unusual difficulties and obstacles. The technical problem presented by the nature of the ore has been a serious one, and the business arrangements necessary for success have also taken time.

CENTRE STAR MINE.

Comparative Statement of Work Done and Its Costs, General Expenses Included, Per Foot or Ton, to September 30th, 1903.

	Oct. 1, 1899, to Sept. 30, 1900.			Oct. 1, 1900, to Sept. 30, 1901.			Oct. 1, 1901, to Sept. 30, 1902.			Oct. 1, 1902, to Sept. 30, 1903.		
	Work Done. Feet or Tons.	Total Cost.	Cost per Foot or Ton.	Work Done. Feet or Tons.	Total Cost.	Cost per Foot or Ton	Work Done. Feet or Tons.	Total Cost.	Cost per Foot or Ton	Work Done. Feet or Tons.	Total Cost.	Cost per Foot or Ton
Development Work :—												
General work, stations, re-timbering, machinery and equipment repairs, maintenance, etc	.....	$15,216 59	.....	.....	$15,663 36	.....	.....	$13,517 06	.....	.....	$3,057 62	.....
Sinking main shaft	228.5	28,250 81	$123 63	337.	33,415 68	$99 16	362.	34,445 82	$95 15	.....	.....	.....
Sinking small shafts or winzes	103.5	6,107 39	59 01	50.5	2,268 93	44 93	50.5	2,283 67	45 22	79.	3,062 47	$38 77
Raising	903.5	50,606 61	56 01	324.5	10,099 31	31 12	153.	5,081 80	33 21	186.	5,577 48	29 97
Drifting	2,421.	64,942 85	26 82	2,107.	42,927 22	20 37	3,997.5	87,664 29	21 93	2,903.5	49,621 49	17 09
Total development work	3,656.5	165,124 25	.....	2,819.	104,374 50	.....	4,563.	142,992 64	.....	3,168.5	61,319 06	.....
Ore Production :—												
Ore from development work sold—tons	4,034.94	.....	.....	4,522.	.....	.....	1,018.	.....	.....	3,934.	.....	.....
Ore from dumps, storage, etc., sold—tons	.....	.....	.....	7,774.	2,291 80	0 29	.....	.....	.....	.....	.....	.....
Stoped ore sold—tons	20,489.95	73,591 27	3 59	68,123.	151,682 93	2 23	10,069.	29,559 82	2 93	84,453.	174,425 78	2 07
Total ore sold	24,524.89	73,591 27	3 00	80,419.	153,974 73	1 91	11,087.	29,559 82	2 67	88,387.	174,425 78	1 97
Summary :—												
Expense of development, per ton of ore sold	24,524.89	165,124 25	6 73	80,419.	104,374 50	1 30	11,087.	142,992 64	12 89	88,387.	61,319 06	70
Expense of production, per ton of ore sold	24,524.89	73,591 27	3 00	80,419.	153,974 73	1 91	11,087.	29,559 82	2 67	88,387.	174,425 78	1 97
Total expenditure, per ton of ore sold	24,524.89	$238,715 52	$9 73	80,419.	$258,349 23	$3 21	11,087.	$172,552 46	$15 56	88,387.	$235,744 84	$2 67

CENTRE STAR MINE.

TOTAL HEADINGS OF CENTRE STAR MINE, SEPTEMBER 30TH, 1903.

	Sinking Main Shaft.	Sinking Winzes.	Raising.	Drifting.
	Feet.	Feet.	Feet.	Feet.
Total headings of mine, September 30th, 1902	1,289.5	1,693.5	1,994.5	15,286.5
Advance of headings, October 1st, 1902, to Sept. 30th, 1903	....	79.	186.	2,903.5
Total headings of mine, September 30th, 1903	1,289.5	1,772.5	2,180.5	18,190.

TABLE OF MINE COSTS—TWELVE MONTHS ENDING SEPTEMBER 30TH, 1903.

	Development Work.				Ore Extraction.
	Sinking Main Shaft.	Sinking Small Shafts.	Raising.	Drifting.	
Total advance, feet	.....	79.	186.	2,903.5	.....
Ore stoped, tons	.....	.....	.....	.....	84,453.
	Cost per foot.	Cost per foot.	Cost per foot.	Cost per foot.	Cost per ton.
1. Drilling	.....	$6 10	$7 31	$4 53	40.5
2. Blasting	.....	2 48	2 40	1 08	03
3. Explosives	.....	3 13	3 72	2 72	14.5
4. General mine supplies	.....	51	64	43	04
5. Mine lighting—candles	.....	26	19	14	01.5
6. " electric	.....	30	22	13	01
7. Smithing	.....	1 00	1 14	72	06.5
8. Tramming and shovelling—direct	.....	5 51	65	1 21	24
9. " " apportioned	.....	64	35	42	08.5
10. Timbering—labour	.....	1 81	3 08	02	19
11. " material	.....	33	57	01	11
12. Machine drill fittings and repairs	.....	86	94	60	05.5
13. General mine labour	.....	1 57	1 18	84	09
14. Hoisting—underground	.....	4 79	.....	.....	.....
15. " main shaft	.....	1 48	89	94	19
16. Compressed air	.....	1 74	2 08	1 07	12
17. Mine ventilation	.....	23	17	13	01.5
18. Pumping	.....	1 71	1 09	34	03.5
19. Assaying	.....	55	47	14	03
20. Surveying	.....	20	17	11	01
21. General expense	.....	3 57	2 71	1 51	18.5
Total	.....	38 77	29 97	17 09	2 06.5

ORE SOLD.

Stoped	84,453 tons.
Met in development	3,934 "
Total	88,387 "

War Eagle Consolidated Mining and Development Company, Limited—War Eagle Mine.

Tons of ore shipped (dry)	60,093
Average number of men employed	121
Underground	103
Surface	18
Development:	
Raising	125 feet.
Winzing	23 "
Cross-cutting	328 "
Drifting	797 "

The value of the mining plant, machinery and buildings is given at $165,000. There were no additions during the year.

Note by the Provincial Mineralogist.—The *War Eagle* mine is under the same management as the *Centre Star*. The following is taken from the annual report of the manager:—

"The ore sales during the year have been 60,039 tons, averaging $13 full assay value, or $9.87 smelter's gross assay value. The average assay contents were:—Gold, 0.418 oz.; silver, 1.02 oz.; copper, 1.45%. As shown by the profit and loss statement, the net profit for the year was $30,340.47, which, with the amount charged off for the depreciation of plant, etc., $38,171.74, shows an excess of revenue over expenditure of $68,512.21. The present reserves of smelting pay-ore are estimated at $20,000 tons, averaging $10 smelter's gross assay value.

"A preliminary mill of 200 tons daily capacity, but designed for prompt enlargement to 400 tons, is now being built by the Rossland Power Co., Ltd., and is located upon the line of the Canadian Pacific, near the town of Trail. It is expected to begin operations by early spring, affording the desired outlet for the milling ores of the *War Eagle* and *Centre Star* mines.

"An examination of the cost sheet will show that the costs per foot for raises and drifts have been brought to lower figures than hitherto, while the stoping cost has been kept down approximately to the minimum record. The width, shape and distribution of the *War Eagle* smelting ore bodies are not so favourable for cheap stoping as those of the *Centre Star* vein, so that even with the same skill and economy the minimum cost figure is necessarily higher than that of the *Centre Star* vein.

The mine produced 60,093 tons of ore during 1903, of a real or full assay value of $13 per ton. The smelter net value of this ore, f. o. b. cars at the mine, was $5.31. The expense of production was $2.82 per ton. Development cost 44 cents per ton of ore shipped. The following charges are made per foot:—Drilling, $17.06; winzing, $30.70; raising, $26.29; stoping, $2.90.

"Since 1894, during which year the mine shipped 48 tons, the *War Eagle* has produced 240,465 tons of ore, worth $5,152,109.11."

Rossland Kootenay Mining Company, Limited—Nickel Plate and Kootenay Mines.

Tons of ore shipped (dry)	7,500
Average number of men employed	45
Underground	35
Surface	10

Development—*Kootenay:*	
Driving	25 feet.
Raising	30 "
Cross-cutting	39 "
Tunnelling	457 "
Winzing	210 "
Development—*Nickel Plate:*	
Driving	403 "
Raising	41 "
Cross-cutting	198 "

The Jumbo Gold Mining Company, Limited—The Jumbo Mine.

Tons of ore shipped (dry)	4,200
Average number of men employed	21
Development:	
Cross-cutting	70 feet.
Tunnelling	100 "
Winzing	15 "

There were no additions to the plant during the year.

The Consolidated White Bear Mining Company, Limited—White Bear Mine.

Tons of ore shipped (dry)	150
Average number of men employed	17
Development:	
Shafting	248 "
Driving	1,400 "

The additions to the plant during the year amounted to about $40,000.

The Spitzee Gold Mines, Limited—The Spitzee Mine.

Tons of ore shipped (dry)	483
Average number of men employed	15
Development:	
Shafting	120 feet.
Driving	160 "
Raising	80 "
Cross-cutting	130 "

The additions to the plant during the year amounted to about $8,000.

No accurate account can be given as to the *Velvet* mine, owing to suspension of work and change of management, together with the taking away of the books and accounts to the head office in London. The approximate tonnage is shown.

The *Giant* also gives no definite information, from reasons which are very similar to those applying in the case of the *Velvet*.

Outside of the companies whose work is here set forth in detail, little has been done in the camp beyond the ordinary assessment work, with a notable exception of some gold recovered from the dumps of the *I. X. L.* Work, however, on this property, has stopped, at all events for the present.

Beyond this there have been made several inquiries, by various owners of smaller properties now lying idle, as to the Elmore process. The demonstrated success of this method of reducing silicious ores will probably lead to work being resumed by some of the inquirers.

Outside of the camp proper some work has been accomplished during the year upon the *Jessie F.* property upon Norway mountain, and also upon the *Inland Empire*, also in the Norway mountain section of this Division, but situated upon Grenville mountain.

Office Statistics—Trail Creek Division.

Mineral claims recorded	64
Certificates of work recorded	136
Payments in lieu of work	2
Certificates of improvement	14
Bills of sale, etc., recorded	24
Water grants issued	6
Free miners' certificates issued :	
Companies	15
Personal	466
Substitute, personal	1
Special "	11

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 1903.

The Boundary country during 1903 has made substantial progress in development, both in output of ore and in the opening up of new properties. The mines already shipping are making efforts to increase their production to the highest possible figure, which their immense bodies of ore permit to be easily done, and in consequence the smelters of the district are encouraged to increase their capacity. This, notwithstanding the fact that operations were necessarily suspended for nearly two months during the coal strike, has drawn the attention of investors more than ever to Southern British Columbia, and the prospects for the coming year are of the best.

GREENWOOD CAMP.

Granby Company.

This camp naturally takes the first place on account of the Granby Consolidated Mining, Smelting & Power Company's properties, of which the principal are the *Knob Hill* and *Ironsides* claims. This company has raised its output of ore to about 2,000 tons per day, and at the same time is actively engaged in opening up new workings underground. In this way, during 1903, 4,386 lineal feet of underground work was done, consisting of 1,743 feet of raising, 110 feet of sinking, and 2,533 feet of cross-cutting and drifting, but the bulk of the 394,448 tons of ore shipped to the company's smelter at Grand Forks was taken from the quarries on the *Knob Hill*. To handle this quantity of ore the company has installed an enormous plant, using principally electricity for motive power around the mine, and steam shovels and locomotives in the quarries. The electric current is supplied by the Cascade Power & Light Co., whose power-house is at Cascade, 30 miles from Phœnix. As the object is to reduce the cost of production as much as possible, the company has four tunnels connecting with shafts and upraises at 325, 425, 525 and 700 feet depth, through which the ore is trammed to the ore bins on the railway sidings. No. 4 tunnel will be 900 feet long when completed and will connect with the 300-foot level on the *Old Ironsides* claim. Two compound duplex tandem air compressors, having a capacity of 8,228 feet of free air per minute (equal to 60 drills), and two 700 horse-power Westinghouse induction motors of 2,000 volts, 3 phase, 7,200 alternations per minute, speed 290 revolutions per minute, to operate same, have been installed, besides two steam shovels, one of 750 cubic yards per 10 hours capacity and one of 1,500 cubic yards per 10 hours capacity, and two 9-inch by 14-inch saddle tank locomotives, hauling capacity 80 tons each, for loading and hauling ore. In prospecting and testing the ore bodies, 4,150 feet of diamond drill work has been done. A new compressor building 121 by 60 feet, and new ore-bins of 3,500 tons capacity, were added during the year. The work done in 1903 has raised the total of underground work to 19,208 feet and the total quantity of ore shipped to a little over 1,000,000 tons.

Brooklyn and Stemwinder.

These properties have been at a standstill during 1903, but there is evidence that a move is soon to be made in shipping ore, as spurs are being constructed connecting with the C. & W. Railway. The development already done is sufficient to make this mine a shipper of ore at once, should the owners (the Dominion Copper Co., Ltd.) decide to open it up, there being two shafts on these claims, one of 270 feet and the other of 340 feet depth, and cross-cutting of about 4,000 lineal feet.

The *Nellie Cotton* and *Mystic* claims have been recently bonded to Spokane parties, and it is expected that work will be resumed in 1904.

Deadwood Camp.

Mother Lode Group.

The *Mother Lode Group* of claims, owned by the British Columbia Copper Co., has been the most active producer in this camp. Following the practice of the district where large bodies of ore occur, these properties have been of late mostly opened up by means of quarries, there being now four of these on the *Mother Lode* and *Primrose* claims. The ore from the upper quarries is trammed to a railway spur immediately below, and from the lower quarries is dumped through shafts into the lower tunnel, whence it is hauled to a lower spur. In this manner about 1,600,000 cubic feet of ore have been extracted, and, in development work, about 250,000 cubic feet of stripping done, while underground 310 feet of upraising and sinking and 1,090 feet of cross-cutting was performed. There was shipped to the company's smelter at Greenwood a total of 137,000 tons of ore during 1903, making the aggregate shipments to date 381,000 tons. There were added to the plant at the mine a general shop, extra stable accommodation, three cottages for employees, and a dam and pond for water purposes. To meet the added increase in shipping, a second Jenckes crusher of large size, with driving machinery, will be erected, while large skips for raising ore will be installed in the shaft. As most of the ore shipped in 1903 was from the quarries, this improvement was necessary, as in 1904 underground stoping will be resumed.

Sunset and Crown Silver.

The development of these properties, the principal ones of the group of claims owned by the Montreal & Boston Copper Co., was not systematically pushed during 1903, as the company's smelter at Boundary Falls was generally stocked with custom ores; nevertheless, 100 feet of sinking and 500 feet of cross-cutting and drifting was done underground. The quarry on this property represents 175,000 cubic feet of rock removed, and altogether 16,000 tons of ore were shipped, leaving still 10,000 tons on the dump and in bins ready for shipment. The company's smelter at Boundary Falls was closed down in November, and since then no ore has been shipped. It is expected, however, that during 1904 drifting will be resumed from the 400-foot level on the *Sunset*.

Morrison.

Very little work has been done lately on this claim, the property of the Morrison Mines, Ltd., compared with what had been carried out in previous years; of the total of 3,735 feet of development only 241 feet of cross-cutting was performed in 1903. At the station in the tunnel connecting with the upper and lower workings, 19,200 cubic feet of rock were removed and prospecting to the amount of 1,040 feet done with the diamond drill. As there is no railway communication nearer than a mile and a half, the ore shipped had to be hauled that distance by waggon to a siding, and in this manner between two and three thousand tons were shipped, of which 2,404 tons went to the smelter at Greenwood and the balance to Grand Forks and Trail. In the future only shipping of ore already on the dump or in the stopes, of which there is 1,100 tons, will be attempted, until better railway facilities are secured.

The McRae Copper Mines, owning the *Ah There*, *Greyhound*, &c., did a little work in the summer of 1903, but only a trial shipment of 27 tons was sent to the smelters. These properties are at present shut down. On the *Buckhorn*, *Marguerite* and *Great Hopes* nothing was done, and on several other properties only assessment work was performed.

Copper Camp lies west of and adjoins Deadwood Camp. There are a number of valuable claims here, but nothing of consequence has been done since 1902, when about 1,000 tons were shipped from the *King Solomon*, and a move was made to get the *Copper Mine* (commonly known as the *Big Copper*) put on a shipping basis.

In Central Camp is the *No. 7 Group*, owned by the No. 7 Mining Company of New York. Nothing of importance was done in 1903, and from the *No. 7*, the principal claim on which extensive development work has been done, only 66 tons of ore were shipped. There is no railway nearer to this camp than Boundary Falls, and the waggon road is not only of heavy grade, but is liable to damage from water soakage and washouts.

On the *Ruby* claim, in Smith's Camp, a force of men has been at work since the fall of 1903, and a drift is being pushed in to cut the ore body. This property is under bond to local parties.

LONG LAKE CAMP.

Roderick Dhu. This property was bonded in the summer of 1903 to a local syndicate' and since that time, in addition to a considerable amount of surface work to prove the strength of the ledge and the necessary underground work to get out a few trial shipments of ore, a waggon road was constructed to the top of the mountain. The result obtained from the smelter returns was of sufficient importance to encourage the lessees to continue development, and during 1904 work on this high-grade property will be continued.

Ethiopia. Very little was done on this property, but towards the end of the year work was resumed, and five tons of high grade ore were sent to the Montreal & Boston Copper Co.'s smelter at Boundary Falls.

The success met with on these properties, in addition to the *Jewel* (on which, however, nothing was done in 1903), has given a stimulus to this camp which has been wanting for some years, and it is to be expected that very early in 1904 more claims will be taken up and developed.

PROVIDENCE CAMP.

Providence. One of the most gratifying results of quartz mining in southern British Columbia during 1903 has been the ensured success of the small but rich ledges found on many of the mineral claims surrounding Greenwood. These had been neglected for the larger bodies, so common in the district, for many years, until Mr. Fowler bonded the *Providence* and shipped 26 tons of ore, which netted him $4,898.33, free of all charges, or nearly $200 per ton. This property was soon afterward acquired by the Providence Mining Company, a local concern, which has persistently developed it, and has put it on a sound financial and shipping basis. Last year 702 tons of ore were shipped, which realised almost exactly $100 per ton, free of all charges. The development consists of two shafts, connected by cross-cuts and upraises, one of 180 feet depth and one of 64 feet depth. Altogether, about 1,098 feet of underground work has been done. The company installed a small steam plant for hoisting and pumping, lighted the mine and surface workings with electricity, and built the usual mine buildings necessary. These improvements, and the cost of the property, have been nearly all met by the proceeds derived from the ore extracted, and the shareholders have received two dividends of 10 cents per share each. This is one of the first companies in the Boundary to pay a dividend.

Elkhorn.

This claim almost adjoins the *Providence* and has had practically the same success. After several futile attempts by various parties to find the ore, this property was finally acquired by Messrs. Sutherland & Macdonald, who commenced shipping small trial shipments to the smelters. The character of ore is much similar to that met with in the *Providence* and nets about the same values. There is an incline shaft of 180 feet depth and cross-cuts at the 80 and 140-foot levels, the depth attained by the lowest of these being 300 feet from the surface. It is known that the purchasers have paid for the mine and development with the ore taken out, and work is being vigourously prosecuted to increase the output during 1904.

E Pluribus Unum Group.

This group is commonly called the *E. P. U.* and comprises the claim of that name, the *Marjorie*, *Lancashire Fraction* and *E. P. U. Fraction*. This property has had the same phenomenal success as the *Providence* and *Elkhorn*, with similar character of ore and values. Since it was taken over by Mr. D. W. McVicar and associates, a main shaft has been sunk 85 feet deep, with drifts at the 60 and 85-foot levels of a total length of 150 feet, and solid quartz carrying high values, estimated at $125 per ton, is met in both cases. A large amount of stripping has been done on the surface and the existence of the ledge for at least 350 feet has been proved. The average value of the 104 tons of ore shipped was $105 per ton, gross. During 1903 a horse-power hoist was installed and an ore-house built. The owners have also built a gravity tramway, to enable them to get out their ore more economically, and during 1904 it is expected that greater progress will be made than heretofore, as there is a large body of ore ready for stoping. The work at present on hand of extending a level from a point 85 feet north of the shaft, will give a depth of 125 feet where the ore is met.

On the *Goldfinch* in 1903, a shaft was sunk 100 feet, 100 feet of drifting done, and about 900 cubic feet of ore stoped. This claim adjoins the *E. P. U.* and was soon taken over by the same owner. The level is being carried south and will be at a depth of 160 feet from the surface when the ore is met. Twenty-two tons of ore were sent to the B. C. Copper Co.'s smelter at Greenwood and 5 tons to the smelter at Nelson, from which similar values were obtained as from the *E. P. U.* ore.

On the *Helen*, *Barbara*, *Strathmore*, *Fremont*, *Coronation*, *Combination*, *Abercraig*, *Defiance* and *Gold Bug* claims work is at present being done, or had been done during 1903, but no reliable account of results can be at present obtained.

Skylark Camp.

This camp has been in a backward state for the last two years, but during 1903 work was done on several properties, with a view to shipping if the ore could be encountered in sufficient quantity and of sufficient value. On the *Don Pedro*, *Dandy*, *Dynamo* and *Trilby*, the owners or lessees have spent a considerable sum in development, meeting with encouraging results. Work will be resumed on all of these properties in the spring of 1904. On the *Dandy* a total of 120 feet of tunnel work was done, which proved up a well-defined ledge 15 inches wide, of quartz and galena, with assay values in gold and silver of $15 per ton. Of this ore there are 8 tons on the dump, but the lessees were unable to prosecute the work further.

On the *Trilby* over $1,000 was expended, while on the *Dynamo* work is still going on in the shaft.

From this camp was shipped the first ore from the Boundary country, when the *Skylark* was in operation, but as it had to be packed on horses and, a little later, hauled in waggons to Marcus, a distance of 90 miles, and thence by rail to Everett, it was too expensive and

the mine was shut down awaiting more favourable conditions. On both the *Crescent* and *Lake* there is an extensive plant, and a large amount of development work has been done, but nothing of importance has been attempted for nearly two years.

MAIN KETTLE RIVER AND CANYON CREEK.

Riverside. The only property on which more than assessment work has been done in this neighbourhood is the *Riverside*, near James creek. This claim is owned by Mr. Ben. Perkins and was under bond to outside parties in 1902. They did a considerable amount of development and installed a small working plant, but, after nine months, they failed to take up the bond. The owner started work himself at a lower level, and after running about 50 feet encountered a strong ledge, which assayed over $200 in gold and silver values. Work is now being done to stope this ore during the winter, as, on account of the situation of the mine, this is the only time shipping can be successfully and cheaply done until the Kettle river is bridged or a waggon road constructed down the east side of the stream. The total amount of work done underground is 530 feet.

WEST FORK OF KETTLE RIVER.

Development work on all properties in this neighbourhood has again been handicapped on account of the non-completion of the waggon road from Westbridge to Beaverdell and Carmi, but with the advent of winter it is hoped that shipments will be made. This is especially the case with the *Butcher Boy*, on which, during 1903, further sinking of 75 feet and drifting of 85 feet was done on the *Standard*, *Bounty*, *Sally* and several other claims. On the *Sally* stoping is at present being done, while on the *Standard* and *Rambler* ore has been ready for two years. As the Vernon & Midway Railway has commenced preparations for building a road through this country, it is now only a question of time until this area of valuable mineral land is opened up. From the *Butcher Boy* 3½ tons of ore were shipped to the Greenwood smelter, for the first 40 miles by waggon, and there are 30 tons now ready. This ore realised about $60 per ton.

CAMP MCKINNEY.

Cariboo Group. After operating this mine for the last ten years, during which time about $350,000 dollars were paid in dividends, the directors decided to close it down last November, on account of the values being too low to earn much more than expenses. This decision, it is hoped, is only temporary, but nothing will be definitely known until after the annual meeting of the company in February, 1904.

Waterloo. The owners of this claim, the Waterloo Consolidated Mining and Milling Co., have settled down in good earnest to make this property a steady producer of ore, the financial troubles having been settled and a stamp-mill and other improvements necessary for turning out bullion installed. It is reported that during 1903 enough gold was saved to pay for these improvements, besides the cost of development. The ore has been proved to be in place at the lowest depths attained, and is said to be of good value, but reliable figures are not available. The company, however, has a good force of men steadily at work, and it is to be hoped that this property will take the place of the *Cariboo*, which was so long the mainstay of the camp.

The owners of the *Dayton Group*, where the finding of large quantities of free gold created so much excitement a year ago, after first bonding it and then receiving it back again, have decided to open it up themselves and a shipment of ore is now being got ready. A small force of men is kept at work.

Nothing of importance was done on the other claims in the camp. It is expected that an amalgamation may be effected between the *Waterloo* and *Fontenoy*, which adjoin and have probably the same ledges.

On Rock creek a small amount of placer mining is still being done by whites and Chinese. Of the 25 placer leases taken up about two years ago, all have now been cancelled, but some new ones are being applied for.

The British Columbia Copper Company's Smelter at Greenwood.

Extensive additions were made to the plant at this smelter during 1903, and at present a steel-framed converter, 45 by 90 by 38 feet inside, is being built. A new brick smokestack 122 feet high, 12 feet diameter; a brick sub-station for the Cascade Power and Light Co., which is to supply electric current for motive power; excavations for converter foundations, with retaining walls and foundations for buildings and machinery, were finished before the end of the year. The transformer house will connect with the sub-station at Phœnix by a pole-line five miles long, and the equipment will be of 1,000 horse-power capacity, with Westinghouse step-down transformer from 20,000 to 2,000 volts, and all other necessary appliances. The converter power-house will be 81 by 40 feet, and will be equipped with the latest machinery suitable for electric or steam power, although the former will be used. The converter will, for the present, have five converter shells, 84 inches diameter and 126 inches long, each supplied with 14 tuyeres with ball valves and a 40-ton four-motor travelling crane, with 5-ton matte ladles, on a 40-foot span, 26 feet above the floor level. The whole plant is arranged for a downward movement of all material that has to pass through it. An additional spur from the main line of the C. & W. Ry. has been constructed through the smelter yard to a level 4 feet 6 inches below the converter floor, to facilitate loading the copper turned out. The change from granulating the slag to hot dumping necessitated the building of a trestle railway and the purchase of a Baldwin locomotive and six 5-ton side-dumping slag cars. The following is a summary of the tonnage of ore smelted and values obtained, with the source of the various ores treated at this smelter:—

1903—Month ending	Tons Smelted.	lbs. Matte made.	lbs. Copper.	oz. Silver.	oz. Gold.
January	12,078	597,800	292,411	2,715.87	682.12
February	6,432	334,100	152,732	1,288.60	355.78
March	.....	.....	.....	.....	.....
April	.....	.....	.....	.....	.....
May	21,470	866,000	413,020	6,181.60	1,083.70
June	21,060	866,000	423,678	4,922.30	1,038.17
July	18,080	834,000	391,832	5,211.40	1,079.23
August	17,969	863,200	368,895	3,754.76	990.91
September	18,635	726,000	358,918	3,595.90	892.21
October	13,846	742,000	333,822	8,227.00	1,554.63
November	18,238	919,048	391,812	12,217.20	2,592.32
December	15,646	646,720	294,605	8,605.72	2,090.04
Totals	163,454	7,394,868	3,421,725	56,720.35	12,359.11

Gross Value of Product at Average New York Quotations for 1903.

Copper	3,421,725	lbs. @	13.235....	$452,865 30
Silver	56,720.35	oz. @	53.45	30,317 02
Gold	12,359.11	oz. @	$20 00	247,182 20
				$730,364 52

SOURCES OF ORE SMELTED.

Mine.	Tons.
Mother Lode	137,816
Snowshoe	12,417
Emma	2,255
Le Roi No. 2 (Rossland)	5,722
Morrison	2,404
B. C.	1,442
Athelstan	426
Winnipeg	315
Oro Denoro	284
Elkhorn	145
No. 7	66
Providence	90
None Such	19
Ah There	27
Gold Finch	22
Roderick Dhu	2
Helen	2
Total	163,454

THE MONTREAL AND BOSTON COPPER COMPANY'S SMELTER AT BOUNDARY FALLS.

The same progressive spirit was manifested at this smelter as at the two others in the district. One extra furnace was erected and another is on the ground ready for building. These are all 40 by 176 inches inside tuyere line, and have each a nominal capacity of 300 tons per diem. A locomotive and a number of 5-ton slag cars for dumping hot slag were installed, the change here from the granulating process being also found necessary. Altogether, over $60,000 was expended in improvements during the year 1903, before the smelter closed down. Following is a summary of the output during 1903:—

1903—Month.	Tons Smelted.	lbs. Matte made.	Copper Value.	Silver Value.	Gold Value.
January	7,997	719,010	$43,929 51	$3,602 06	$8,627 58
February	7,883	635,816	37,938 59	3,257 76	8,667 48
March	3,000	282,489	16,419 62	1,216 89	2,536 02
April					
May	7,276	735,259	38,172 45	3,015 16	6,421 46
June	9,323	813,740	42,317 58	3,171 11	9,248 24
July	12,607	609,651	34,725 49	5,267 18	13,597 14
August	14,857	510,490	30,597 24	2,807 00	16,420 12
September	16,270	575,049	31,610 94	3,963 15	31,086 60
October	15,691	676,500	26,000 00	3,115 00	31,600 00
November	11,977	380,700	17,400 00	1,655 00	18,820 00
December	3,200	188,900	8,200 00	800 00	9,000 00
Totals	110,081	6,127,604	$327,311 42	$31,870 31	$156,024 64

SOURCES OF ORE SMELTED.

Mine.	Tons.
Snowshoe	61,593
Oro Denoro	13,440
B. C.	12,843
Providence	225
Elkhorn	81
Winnipeg	1,645
Senator	15
Ethiopia	5
Strathmore	2
Mountain Lion (Trout Lake)	1,682
Jackpot	218
Sunset	14,110
Athelstan	4,008
Quilp	213
Total	110,080

OFFICE STATISTICS—GREENWOOD MINING DIVISION.

Free miners' certificates	699
Location records	369
Certificates of work records	635
Abandonment records	5
Conveyance records	165
Certificates of improvements issued	88
Placer location records	5

GRAND FORKS MINING DIVISION.

REPORT OF S. R. ALMOND, GOLD COMMISSIONER.

I have the honour to submit my report of progress made in the mining industry in the Grand Forks Mining Division for the year 1903.

The season has, in many ways, been brighter than the foregoing one of 1902. In the spring of this year (1903), quiet, though persevering, inquiries were being made for promising mineral claims, with the result that, towards the close of the season, several good properties were being worked under bond.

Very little money was expended on public works during the year in this division, but, though small in amount, it was utilised to the best advantage.

Granby Smelter. The Granby Consolidated Mining, Smelting and Power Company's works have undergone noteworthy additions and improvements during the year, for information relating to which I am indebted to Mr. H. N. Galer, assistant general manager, viz.:—Two new water-jacket blast furnaces were put in, bringing the total up to six furnaces, with a capacity of 2,000 tons per day, and three standard Connersville blowers with three 100 horse-power Westinghouse electric motors; two Canadian Rand Drill Co.'s locomotives and fifteen 6-ton slag-cars, the slag now being dumped hot instead of being granulated; machine and blacksmith shops, as well as the furnace and blower rooms, enlarged. Arrangements for extra electrical power and light have been made

with the Cascade Water Power and Light Co., a brick sub-station having been built at the smelter and equipped with the necessary apparatus, a double-circuit, three-phase line connecting with the main transmission line between Cascade and Phœnix. The estimate of ore smelted during the year is 399,062 tons, and the computation of the copper produced is 16,932,156 pounds.

The supply of coke has been a difficulty, and the shortage resulted in a curtailment of smelting operations. The company, it is stated, intends to obtain its fuel in future from certain coal mines being opened up in Alberta by the International Coal and Coke Co.

Volcanic Group.

The Volcanic Mining and Development Company, of Marquette, Michigan, holds under bond the following claims in Brown's Camp:—The *Volcanic* and *Fantantine* from R. A. Brown; the *Superior* and *Dabney* from Evans and Willett; the *Mammon Fraction* from Evans and Sargeant; and the *Black Eye, White Elephant, Criterion, Monongahela* and *Rob Roy* from W. Bentley; and in Wellington Camp the *Evening Star* and *Sibley* from J. K. Fraser. The bond on Mr. Bentley's five claims is for $40,000; how much the bonds on the others are I do not know, but it is said that that on the *Volcanic* and *Fantantine* approximates $100,000.

The Hesperus Gold and Copper Mining Company, also of Marquette, Michigan, has acquired claims within three miles of Grand Forks, on Fourth of July creek. The claims are known as the *Betts* and *Hesperus* and the *Lancaster* and *Tennessee*. The company has done considerable work on its property, and is well satisfied that it has acquired a valuable asset.

The Granby Consolidated Mining, Smelting and Power Company has taken under bond the *Senator, Freemont, Victor* and *Thirty-seven*, in Summit Camp, and has already shipped ore from the *Senator*. These claims have been acquired by the company on account of the heavy percentage of iron contained in the ores.

The *Jack Pot Fraction* has been purchased by W. T. Hunter, who, I understand, holds a lease on the *Athelstan*, an adjoining claim. The ore on these claims carries rather high values. It is quarried out and shipped to the Boundary Falls and Greenwood smelters. The *Jack Pot Fraction* was located about a year ago by John J. Farrell, an old-timer in Wellington camp, was bonded to W. T. Hunter for $15,000 during the summer, and was finally acquired by him a short time ago.

The *Seattle*, in Brown's camp, was under bond to the Granby Company for a short time, and afterwards to the Trail Smelter, the latter company doing considerable work on the property and shipping some ore. At present the *Seattle* is not working. The work performed on the claim for the past year consists of 180 feet of tunnel, 175 feet of drift, 70 feet of incline raise at end of tunnel, a drift of 100 feet to south side of tunnel, and one 75 feet long to the north side. Considerable surface work was also done. I am given to understand that the *Seattle* has very good prospects.

Among the mines that have been prosperous and continued work all the summer are the *Snowshoe* and *Athelstan* in Wellington camp, and the *Emma* and *Oro Denoro* in Summit camp.

Work in the following camps has not been very great, on account of the need of transportation:—White's or Central camp, Christina, Burnt Basin and Franklin camps. Some of the best showings in the division occur in these camps, especially in the latter, but transportation facilities will be required for their development.

The *Riverside Group*, in Brown's camp, is owned by Mr. Bentley, and consists of the *Riverside, Forest Rose, Pennsylvania, Hunter, Mountain View* and *Last Chance*, all adjoining claims. The work for the past year has all been done on the *Riverside*, which has now an excellent showing.

The *Emma* mine, in Summit camp, shipped 20,000 tons of ore in 1903, and the work performed during the same time includes an incline 100 feet long with 30 feet of face, from which ore is quarried, and another incline drift run from the end of the former for 180 feet, giving a still greater depth of face, from which ore has been stoped at 120 feet in. On this last drift a raise was put through to the surface, 100 feet, and stoping done at the surface, the ore being blasted into the raise, where chutes had been placed at the bottom, whence it was hoisted up the incline. On a lead 700 feet east from the former lode a small plant is being installed, consisting of a 25 horse-power boiler and hoist, a hoisting frame for skip track, suitable for a larger plant, if required. A boiler and hoist building is under construction, 20 by 30 feet. About 300 tons of ore have already been shipped from this vein.

B. C.

The *B. C.* mine, in Summit Camp, took out ore from the large stopes, from the 150-foot level to the surface; this was done from January to August, when the mine closed down. Since work ceased, I am given to understand, the company has sold all the machinery off the mine; why this should have been done it is difficult to know, as the company has a group of eight or more claims, on some of which it is said there are good showings of ore.

Oro Denoro.

The *Oro Denoro* mine, in Summit Camp, has been rapidly coming to the front among the mines of the Boundary District. Here, as in most of the better worked mines, quarrying the ore is the method employed, and the company has shipped over 10,000 tons during the period it has worked the mine in the last year. The property is, I believe, shut down at present on account of the smelter at Boundary Falls having been closed; this is a state of things, however, that is likely to last for a short period only. The work accomplished, since the first of January, 1903, consists of cross-cutting from the main tunnel, 120 feet; quarrying No. 1 vein 120 feet in length, 90 feet in width and 30-foot face; quarrying magnetic vein 75 feet wide, 40 feet long and 40-foot face. Machinery installed consists of:—One 7-drill Ingersol compressor; two Rand drills, size 3½ inches; one Rand drill, size 3 inches; one boiler about 80 horse-power, a 10 horse-power hoist, and two feed pumps, 4¾ by 3¾ by 4 inches. There is a frame compressor building, 30 by 40 feet, and a log powder-house, 12 by 16 feet.

Snowshoe.

The *Snowshoe*, in Greenwood Camp, was handicapped during the months of March and April by the miners' strike at the Crow's Nest coal fields, and, in consequence, lost its usual shipments; nevertheless, the work done on the mine and the amount of ore shipped during the year makes a very fair record. The ore was shipped to the Greenwood and Boundary Falls smelters and amounted to some 70,000 tons. The three-compartment shaft was continued from the 300 to the 350-foot level; of driving, cross-cutting and raising, some 550 feet was done, making a total, in all, of 6,800 feet to date. Considerable surface stripping has been done, and stopes opened up and timbered on the different levels. The new buildings erected and machinery put in during the year consist of ore bins with a capacity of 2,500 tons, head-frame, skip-ways and 150 horse-power electric hoist; also, one 150 horse-power boiler was added to the plant. Sixty men were employed.

The *Winnipeg*, in Wellington Camp, suffered a disastrous fire in May, 1902, and no attempt, from that time until the 25th of August, 1903, was made to work it. On the latter date Mr. Richard Plewman, with five men, started to unwater and re-equip the mine, and had just finished this work when financial trouble again caused it to be shut down. During the period that Mr. Plewman worked he shipped 2,500 tons of ore, partly from the dump and partly from the 50-foot level. It is a pity that such a promising property as the Winnipeg should be so heavily handicapped.

The *Golden Crown*, another well-known property, adjoining the *Winnipeg*, has lain idle for over a year.

Contact.

In the Burnt Basin Camp, at the Contact mines, owned by the Contact Consolidated Gold Mines, Ltd., the No. 1 upper vein, at the 200-foot level, was drifted on for 130 feet, and at the same level a cross-cut tunnel was driven 55 feet, to cut the No. 1 lower vein. No shipment of ore has been made, but a two-ton sample is being prepared for shipment to London, England, for experimental purposes. The vein on the *Treasury Fraction* was stripped for 100 feet, and a shaft sunk to the depth of 20 feet. On the *Preston* the tunnel was extended some 50 feet; and on the *London Prize* a shaft 20 feet deep was sunk, besides other work.

The work on the *Betts & Hesperus Fraction*, in Wellington Camp, on Fourth of July creek, was commenced on the 7th of July last, and has been steadily pushed, since that date, with a small force of men. The work so far accomplished consists of surface work, in the shape of 208 feet of open cuts and shallow shafts to a depth of 25 feet, while 75 feet of tunnel have been driven and a winze 40 feet deep sunk on the vein; from this last, at the present time, an upraise is being made to the surface, which will give a depth of 80 feet, and the intention is to carry this on to the 100-foot level, and then to cross-cut the vein. I am given to understand that the intention of the company is to put in machinery, wherewith to run a tunnel in to tap the lode at a depth of 350 feet. The number of men steadily employed on this property is from four to six.

COAL.

NOTE BY PROVINCIAL MINERALOGIST.—Mr. Wm. Blakemore, mining engineer, of Rossland, has sent me a copy of his final report to the B. C. Coal Co., Ltd., of Toronto, of the operations conducted under his personal supervision on the West Fork of the Kettle river, in an attempt to develop and prove the coal measures there located. Mr. Blakemore states the first thing he discovered was that the whole section of country was a granite formation, with a comparatively small basin of coal formation left by erosion. The points at which he found coal were—(1) one mile north of Boulder creek, and again (2) at Wiseman's camp. He reports the coal to be of good quality, but that he "regrets to say that, after a month of most careful prospecting, I am bound to pronounce this impossible," viz., the finding of coal in workable quantities. At Wiseman's camp the seam of coal, he reports, is 3 inches in thickness.

OFFICE STATISTICS—GRAND FORKS MINING DIVISION.

Free miners' certificates	355	$1,677 00
Companies' "	3	300 00
Special "	5	75 00
Certificates of work	435	1,117 50
Records of location	196	490 00
Conveyances	88	228 40
Certificates of improvements	37	92 50
Permission to re-locate	1	12 50
Filings	56	14 00
Water rights	3	52 25
Miscellaneous		197 08
Fees for Crown grants passed through this office		925 00
		$5,181 23

OSOYOOS MINING DIVISION.

Report of C. A. R. Lambly, Gold Commissioner.

I have the honour to submit herewith my annual report of mining operations in the Osoyoos Mining Division during the year 1903.

Fairview Camp.

On the *Stemwinder*, owned by the New Fairview Corporation, the work done during the year consists of 400 feet of drifting, and the continuation of the main shaft 100 feet, while 12,000 tons of ore were extracted and milled. A cyanide plant of a daily capacity of 150 tons has been erected and is now in operation.

On the *Morning Star* the work begun in 1902 was continued, the old shaft was enlarged and sunk to a depth of 300 feet, and at the 150 and 250-foot levels drifts were run, 150 and 255 feet respectively. A 16 horse-power hoist and 30 horse-power boiler were installed, and the necessary buildings for working the mine erected.

The Dominion Consolidated Mines Co., Ld., of Fairview, has done, during the year 1903, work to the value of $1,000, chiefly in upraises on the lead from the tunnels. This work was done for the purpose of taking out ore to make a mill test, besides ascertaining the dip and trend of the leads. Twenty-five tons of unsorted ore were put through the *Stemwinder* mill, giving an average value of $5.08 per ton. Besides this work, the company has expended nearly $1,000 in water power surveys, reports and surveys of the mine. There are now about 1,500 feet of tunnels and shafts on this company's property.

The King Edward Mines, Ld., own the following claims:—The *King Edward, Night Hawk, Westmorland, V. V. & E., Johnny Bull, Tip Top, Woodland, Bank of Fairview*, and *Kendall*. This group is located on the West Fork of Susap Creek, one mile above its forks and about three miles from its confluence with the Similkameen river. Power for mining operations can be easily obtained from the creek, which carries abundance of water throughout the year.

It is reported that the main ledge can be traced in a north-westerly direction through five claims, running over the divide and down to the North Fork of Susap Creek, a distance of about a mile and a quarter, and that in places it shows from 10 to 40 feet wide. The values in this body of ore consist of gold, silver and copper. On the *King Edward*, where the greater part of the work has been done, the ore crops out 200 feet in length by 40 feet in width Here a cross-cut tunnel has been run in and the lead tapped at a depth of 150 feet. On the *Bank of Fairview* there are, besides the main lead, eight well defined ledges of from one to five feet in width.

Olalla Camp.

On the *Bullion Group*, during the past year, in addition to several open cuts, over 300 feet of drifting and sinking have been done. The results proved satisfactory and a large body of copper ore has been opened up, carrying gold values.

On the *Flagstaff Group* the annual assessment work only was done during 1903. The ore produced carries gold with a small percentage of copper.

On the *Opulence Group* the work accomplished consists of 25 feet of crosscut, from the bottom of a vertical shaft, at a depth of 45 feet, and is intended to intersect the ore body, which dips to the south-east.

The *Sunset Group* consists of three claims, adjoining the town of Olalla. A shaft sunk 25 feet on the lead shows values in gold. The best returns are obtained from a small vein of

quartz, 18 inches in width, occurring in a large quartzite dyke. Samples taken across 4½ feet of the formation, including the quartz vein and adjoining dyke rock, gave values of $5.60 per ton in gold.

The claims comprising the *Elkhorn Group* were surveyed last fall and seven were Crown-granted. No development work has been done on the property during the year.

The *Copper King Group* consists of two claims, the *Copper King* and *Pembroke*. Only the necessary assessment work was done during the past season.

On the *Copper Queen Group* also only the annual assessment work has been done. There are three well mineralised dykes running through the claims, which carry a small percentage in copper as well as small gold values.

On the *Mayflower Group* there is a fine showing of ore of a good grade. The work done during the year consists of open cuts and shafts.

On the *Dolphin Group* there is a large body of copper-gold ore. Only the annual assessment work was done on this property during the year.

The *Goldman Group* is located about one mile west of Green mountain, and has had a very considerable amount of work done on it during the year, which consists of tunneling and shafts. The width of the vein is about 10 feet, carrying values in gold. It is expected the property will be worked on an extensive scale during the coming season. It is easy of access by waggon road, which runs from Penticton to the *Nickel Plate* mine.

On the *Midnight Star, Penticton* and *B. C. Groups* assessment work only has been done during the year.

The *Gem Group* is located on Red mountain and has been worked continuously during the year. There is a large body of pyrrhotite ore, which carries gold with small copper values.

The *Shamrock Group* is located on Riordan mountain. The work consists of open cuts and pits on the summit of the mountain, all in ore, the latter consisting of quartz intersected with spar and quartzite, carrying iron and copper pyrites. Some 300 feet below the work on the summit a tunnel has been driven in the outcrop of the ore. This tunnel is in a distance of 50 feet.

The *Independence Group*, which is located on Independence mountain, has been worked continuously during the past season, and together with the development done in previous years, gives very encouraging results. The ore is exposed by open cuts, shafts, tunnels and stripping.

On the *Monarch, Rocky Ryan, Evening Star* and *Dominion Groups*, all located on Independence mountain, only the annual assessment work has been done.

The *Dividend Group* is the first property located on Dividend mountain. The work during the past season consists of a shaft 25 feet deep and several open cuts. The object of the work was the definition of the contact between the large surface exposures of ore and the adjoining formation. This has been successfully accomplished for a distance of 1,500 feet along the line of contact. The ore is pyrrhotite.

The *Mountain Rose Group* is located on Dividend mountain and adjoins the *Scotia* and *Nellie Groups*. The lead has been exposed for a distance of 300 feet. The ore is pyrrhotite.

The *Maple Leaf Group*, which adjoins the *Mountain Rose*, has been worked continuously during the past season. The development work has exposed a body of pyrrhotite and arsenical iron, carrying an average value in gold and copper of $11 per ton.

CENTRAL CAMP.

In this camp, which is situated on Upper Keremeos creek, 15 miles from Keremeos, on the Nickel Plate-Penticton Waggon road, a large amount of development work has been done during the past season, with gratifying results. The properties are all in the hands of prospectors, over 40 of whom worked on their claims during the past year.

The *Nelson Group* consists of five claims, situate on Dividend mountain, and is owned by Nelson parties. The work done during the season is principally drifts and open cuts. The ore is pyrrhotite and arsenical iron.

On the *Rawhide*, situate on Green mountain, in addition to the annual assessment, a shaft was sunk 25 feet in solid ore.

The *Scotia Group* consists of five claims, located on Dividend mountain, and in addition to assessment work on the claims, a tunnel was driven on the principal vein a distance of 40 feet in the ore, which is pyrrhotite, carrying copper and gold.

On the *Apex* the work done during the season consists of tunnelling, shafts, stripping and open cuts.

On the *Mathieson Group* work was carried on continuously for five months during the past summer, and a fine showing of gold-copper ore is the result.

Nickel Plate.

On this property, which is located on Nickel Plate mountain, about 3½ miles from Hedley, development work has been continued during the year and about 300 feet of tunnels and drifts run, besides which the mine has been put in shape for the extraction of ore. The Daly Reduction Company has erected at Hedley, for the purpose of working this mine, a 40-stamp mill, concentrating and cyanide plant, and has constructed 3½ miles of electric railway and tramway to connect the mine with the Hedley works. A flume (not yet completed) 3 miles long, from 20-Mile canyon, with a capacity of about 1,000 inches of water, will supply power to run the mill and generate electricity and compress air. The company expected to have the machinery in place and the plant in operation by the end of the year, but owing to the difficulty experienced in getting in plant and supplies, it will be spring before the work begins.

OFFICE STATISTICS—OSOYOOS MINING DIVISION.

Free miners' certificates issued	245
Records of location	217
Certificates of work	406
Records of conveyances	79
Certificates of improvements	20

The revenue collected for the above free miners' certificates and mining receipts generally for the year ending 31st December, 1903, was $3,830.55.

VERNON DISTRICT.

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VERNON MINING DIVISION.

REPORT OF L. NORRIS, GOLD COMMISSIONER.

I have pleasure in reporting very gratifying advancement in the mining industry in this district during the year 1903. It is true that only a few new claims have been recorded, and that on most of the locations held but little more than the necessary assessment work has been done, but in the two camps, where work has been carried on continuously, the results have been most encouraging.

On the *British Empire* and *Royal Standard* claims, situated about 5½ miles south-west of Vernon, Mr. Gendar, who has these properties under bond, put up a 5-stamp mill, and is now running a tunnel in to tap the ledge at a greater depth. The first run of the mill of seven days gave $27 to the ton of gold on the plates.

On the old *Monashee* properties, on Monashee mountain, about 50 miles east of Vernon, some $7,000 was expended, under the management of Mr. D. R. Young, in cross-cutting and in extending the tunnels. A strong company of local men has been organised to further develop these claims.

On the *McPhail Group*, on the north-west slope of Monashee mountain, the Cherry Creek Mining Company has erected a 5-stamp mill, which, after running for some time, closed down on account of the cold weather. I have not been able to secure the exact returns, but I understand they were very satisfactory. This company expended altogether about $50,000 on its claim last year, under the management of Mr. Fred Williamson.

As most of the claims in the district have been referred to in my former reports, it is scarcely necessary for me to again refer to them or give the work done on each in detail. The following statistics show the mining transactions for the year.

OFFICE STATISTICS—VERNON MINING DIVISION.

Mining records	61
Free miners' certificates issued	124
Transfers	10
Certificates of work	36
Certificates of improvements	2
Claims Crown-granted	2

YALE DISTRICT.

REPORT OF G. C. TUNSTALL, GOLD COMMISSIONER.

I have the honour to submit my report of mining operations in the Yale District during the year 1903.

The outlook of the Kamloops Mining Division is particularly promising; one of the principal mines has reached the shipping stage and will, it is expected, be in full operation next summer, while another is at present engaged in shipping 1,000 tons of ore to the Crofton smelter, the first returns from which gave a value of $18 to the ton and are deemed very satisfactory. The prospects of the Coal Hill camp are encouraging. The large bodies of low-grade ore are self-fluxing and capable of concentration, besides possessing the great advantage of existing in close proximity to railway transportation.

In the Yale Mining Division, the Mount Baker and Yale Mining Co., of Whatcom, Washington, is about to erect two quartz mills on Siwash creek, near the forks of which a large body of gold-bearing quartz is situated, a short distance above the old town of Yale. One of these mills has been already transported across the river. Mr. Dodd, the Mining Recorder at Yale, further states that all the Fraser river, extending from the upper boundary line of the New Westminster Division to Kanaka bar, will be shortly re-located for dredging purposes.

In the Similkameen Mining Division everything is very quiet, in the absence of railway transportation to render available the mineral resources of the district.

KAMLOOPS MINING DIVISION.

In describing the mining operations in this division I shall merely confine my remarks to those properties on which continuous work has been performed independent of annual assessment requirements, considering it unnecessary to mention the large number of claims held by the yearly expenditure of $100, and which exhibit no changes of importance beyond that mentioned in former reports.

Iron Mask Group.

The *Iron Mask Group* is situated between five and six miles south-west of Kamloops, and consists of the *Iron Mask*, *Sunrise*, *Prince of India*, *Ben Hur*, *Lucky Strike*, *Bonnie Jean* and *Delta Fraction*. The *Iron Mask*, on which the most work has been effected, was first located and recorded by George Breedsen, W. H. Ford and R. H. Lyon on the 13th August, 1896, during the excitement that prevailed at the time, owing to the discovery of extensive bodies of chalcopyrite on Coal Hill. Since then the property has passed through several hands, being first purchased by W. T. Newman, acting as agent for James Armstrong and C. H. Glassford, of Toronto. A tunnel was run into the hill on the vein, and in addition holes and cross-cuts were made to determine the extent of the ore body. The exposure on the surface exhibited a large vein. Subsequently it was sold to the British & Canadian Gold & Silver Mines, which in turn disposed of the property to the Coal Hill Gold, Silver and Copper Mining Company. Over two years ago the B. C. Exploring Syndicate, of London, acquired a bond on the mine for $40,000, which was subsequently paid, and systematic development was proceeded with, under the

management of Capt. Argall. Work has been diligently pushed up to the present, with a force of from 20 to 30 men. A double-compartment shaft has now attained a depth of 600 feet. The ore bodies consist of two large lodes, possessing an aggregate width of 100 feet, which have been exploited by five levels, drifts on the veins and numerous cross-cuts, represented by 4,000 feet of rock work, which has amply demonstrated the value of the mine.

Recognising the fact that a large expenditure was still necessary to place the mine in a position to secure the best results, the present owners have made arrangements for the transfer of their rights to the Ashanti Lands, Limited, of London, on favourable terms, including the retention of a considerable interest in the new company. Mr. H. Jones, a mining expert, arrived here from England last October, and made a critical examination of the property. His report was favourable and his principals readily agreed to effect the purchase.

The contemplated improvements consist of sinking the shaft an additional depth of 200 feet; a new hoist; two new Corliss engines of 125 horse-power each; a 10-drill compressor; an electric light plant; a saw-mill and machinery for timber framing. A contract has been awarded for the construction of a large boarding-house (now in process of erection), to provide for the accommodation of a large number of men, and a concentrator with a capacity of treating 200 tons per day, the site for which has been located near a small lake about one-quarter mile from the shaft-house, where the necessary water rights have been recorded.

Copper King Group.

The *Copper King Group* consists of six locations situated about 16 miles west of Kamloops, on the road leading to Savona. The vein on the *Copper King*, which was four feet wide when work was first begun, has since increased with depth to a width of 62 feet. The ledge, to a certain depth, was found greatly broken up and difficult to follow. A shaft has been sunk for 40 feet and a tunnel run a distance of several hundred feet to strike the ore body at a lower level.

Mr. A. N. Gray, of Woodstock, Ont., purchased the property last year, and work was resumed shortly after. Towards the latter part of the summer preparations were made for the shipment of 1,000 tons to the Crofton smelter, the first returns from which gave a value of $18 to the ton in copper and gold, yielding a very satisfactory profit, in consequence of favourable rates obtained for freight and treatment. The following improvements were effected during the past year: 200 feet of cross-cutting; an upraise of 70 feet; an addition to the bunk-house for the accommodation of an extra number of men; three 80-ton ore bins; blacksmith shop; assorting house; stabling for six horses; waggon road about one-quarter mile long, and a gravity tramway.

Orphan Boy Group.

The *Orphan Boy Group* consists of four mineral claims. It lies west of the Python, about four miles from Kamloops. The surface exposure is very promising. The vein is in a diorite formation and exhibits a width of 20 feet, 7 feet of which is solid ore. The mineralisation is chalcopyrite, which assays about 6 % in copper. A shaft has been sunk to a depth of 30 feet, and several deep cross-cuts made on the surface. The owners are Messrs. Willis and Delaney.

The *Evening Star* belongs to Mr. John Morrison, of Kamloops. The vein is 42 feet wide, containing chalcopyrite possessing an assay value of 6 % in copper. The work performed embraces an open cut 54 feet long, averaging 3 feet deep, connecting with a tunnel 24 feet long, 6 feet high, 4 feet wide.

The *Lost Chord* is owned by W. W. Wood. Considerable work has been done on this property during the past year. The vein is exposed for over 400 feet by a series of cross-cuts. At present a tunnel is being run which will tap the vein at a depth of 110 feet from the surface.

The Glen Iron Mines, on Cherry Creek, have not been worked during the past year.

Assessment work merely has been performed on the mines in the vicinity of Kamloops lake and Savona.

PLACER MINING.

The dredge operating on Tranquille creek, owned by Mr. T. L. Boyd, of London, has paid little over expenses. It has been ascertained that a considerable amount of fine gold is not saved, as proved by prospects obtained from holes sunk in the gravel, which gave a value of 14c. to the cubic yard, whilst the dredging returns did not exceed 2½c. to the same quantity of ground. It is the intention to put in six more tables to prevent this serious loss. Frequent breakages also occur which consume a good deal of time in repairing. The ground improves as progress is made up stream, and the large boulders are becoming less numerous. Operations are confined to a depth of from 12 to 14 feet. Most of the gold will be found on the bedrock, which has not yet been reached.

NICOLA VALLEY.

Mr. Geo. Murray, Deputy Mining Recorder, sends me the following information relative to the work done in the Nicola valley:—

Development has progressed favourably in the Aspen Grove camp, which has been visited by a number of mining men recently. On the *Big Sioux* a well-timbered shaft has been sunk for 40 feet in ore, much of which is high grade in copper, and a drift has been run from the bottom of this shaft for 30 feet. On the *Maggie, Victoria* and *Royal Fraction*, a group of claims having the same owner as the *Big Sioux*, there is a well-timbered shaft 40 feet deep, and a contract has been let for an additional 30 feet. The exposures on the group are very favourable.

On the *Troy Fraction* and the *Giant* the ore bodies appear to be of considerable extent, and the tunnelling, cross-cutting and stripping done have satisfied the owner, Mr. Schmidt, that with transportation facilities it will be possible to commence shipping.

On the *Copper Standard*, one of a group of four claims, a 6 by 8-foot shaft has been sunk for 55 feet, giving a depth of 100 feet below the summit of the ridge. A cross-cut has been run for 50 feet from the bottom of the shaft and the showings are very favourable.

On the *Portland*, owned by parties from Terre Haute, a shaft has been sunk for 115 feet with a cross-cut of 106 feet. The work done, together with surface stripping, has shown a considerable extent of ore, and the owners are very well satisfied with the prospects of this property.

On Messrs. Lassen & Co.'s claims, situated about a mile north-east of the *Copper Standard*, a tunnel 28 feet long has been run, and when extended twice that distance should cut the ore body at a depth of 100 feet.

Among other claims being developed may be mentioned those of Messrs. Bates Bros. & Co., some of which have exceptional showings; those of Messrs. Silverthorne, Rogers & Co., for two of which Crown grants have been applied for and in which American capitalists are interested; the property of Messrs. Starwell, Murray & Co., on Bare mountain, on which five assessments have been performed with satisfactory results, and several groups owned by an old prospector, Dad Allen, who is steadily carrying on development. Assessments are also being regularly performed on many other locations.

In the Ten-Mile creek section, the *Aberdeen* has received considerable attention, and the owners are said to have refused some good offers for the property. Development has been

steadily carried on with good results, and 30 feet of drifting have recently been done. Notwithstanding the satisfactory returns, it was found impossible to continue shipments without transportation facilities. At present the ore has to be rawhided for a mile and then carried 50 miles by waggon.

On the *I. X. L.*, on which there is an extensive surface exposure, a shaft has been sunk for 80 feet, and assays running from 9.5 to 37 % of copper, with a little silver, have been obtained.

On the *Alice* and *Champion* a cross-cut tunnel was commenced about 90 feet below a vein exposure, but, so far, has not intersected the lead. Assessment work has been done on the *Nottingham, Golconda, Mountain View, U. L. L., Manchester, London, King Solomon's Dream, Copper Belle, Boulder, Alice, Champion, Saucy Lass* and *Saucy Sally*. Mr. Thos. Hunter has also completed his assessments on and obtained Crown grants for three claims on Mill creek; the values are in gold and copper and are singularly uniform. There are a number of other isolated claims, concerning which I have not been able to obtain any information as to work done. Twelve locations have been made on iron ore, some of which is reported to be hematite.

I have to thank Mr. Arthur Potocki for information supplied by him.

OFFICE STATISTICS—KAMLOOPS MINING DIVISION.

Claims recorded	108
Certificates of work	187
Bills of sale registered	25
Mining leases issued	9

Revenue.

Free miners' certificates	$2,054 00
Mining receipts general	1,824 55
Tax on mineral returns and placer gold	34 31
Tax on Crown-granted mineral claims	266 97
	$4,179 83

ASHCROFT MINING DIVISION.

REPORT OF J. W. BURR, MINING RECORDER.

I have the honour to submit herewith my annual report of mining operations in the Ashcroft Mining Division for the year ending December 31st, 1903.

Placer Mining. As a consequence of the very low water in the early part of the season in the Fraser and Thompson rivers, the yield of placer gold from bars, etc., was much better than usual, Indians and Chinese taking out a large quantity of dust with sluices and rockers. Very few white men engage in this method of mining at the present time.

The Fraser River Gold Dredging Co., operating near Lytton, on the Fraser river, was late in getting to work this year, owing to the necessary overhauling of its large bucket dredge, which was sunk near Van Winkle bar early in the season. New and improved machinery was also required for it, but did not arrive till late in the summer, with the result that work was not begun until towards the last of November, although from that time on, until the end of December, the clean-up was most satisfactory. This company has also under

construction and nearing completion a new dredge of the latest improved style. The pontoons are built of steel, and will thus be able to withstand the float ice which comes down the Fraser in the winter and spring. The machinery, which is of the very best description, is now being placed in position, and it is expected that work will begin very early in the spring of 1904. The company has secured leases on the Fraser river, between Lytton and Lillooet, covering over 35 miles, and during the construction of the new dredge a large force of men was employed.

The total output of placer gold for the year from this division was $39,600

Mineral Claims. Very little beyond assessment work has been done on the various mineral claims in this division during the year. The various companies owning properties in the Highland valley have been awaiting the completion of the waggon road into that section to enable them to get in machinery, which it is almost impossible to do at the present time. The attention of capitalists has been directed to the possibilities of Highland valley, and it is expected that considerable development will be done in the near future, while the early completion in the spring of the road mentioned will greatly facilitate the opening up of this locality.

About 12 miles from Ashcroft, on the Savona road, some well-defined ledges, carrying good values in gold, silver and copper, have been discovered, and several claims have been located. The parties now operating these claims are sinking on the ledges and the ore is improving very much with depth. The owners are very well satisfied with the properties and eight claims have been recorded in all.

Office Statistics—Ashcroft Mining Division.

Free miners' certificates issued	68
Mining receipts general	56
Certificates of work	45
Mineral claims recorded	41
Placer claims recorded	2
Bills of sale, etc	13

Revenue.

Free miners' certificates issued	$ 542 75
Mining receipts general	1,337 80
Total	$1,880 55

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, 1903.

Placer Mining. The main source of output derived from the mineral resources of the division has, so far, come under this heading and of its three sub-divisions: (*a*) hand-work (rocker and sluice); (*b*) hydraulicing; (*c*) dredging. The first and most primitive has up to the present supplied a greatly preponderating amount of the large sums contributed by this district since 1858.

The number of Chinese bar-miners diminishes slowly but steadily, as does also the yield from this branch of the industry, and making the usual allowances for the defective sources of

information through which our estimates are compiled, a sum of $10,800 may be given as the total output from this source. Of this figure no less than $1,500 was gained by the "Castle" local syndicate, which located on the old Saw-mill Riffle, above Hill's Bar and opposite Yale, at extreme low water on the 21st March, 1903. The Fraser had then dropped to its lowest point since 1859, and although there were still a few inches of water over the space of 50 by 50 feet which was worked, and the shovelling was therefore indifferent, results to the individual approached more nearly than ever before to the period of the first discovery of gold. The gravel covers, at this part, a ridge of bed-rock, which projects across the river and which could be touched by the miners' shovels. The rising waters permitted operations for some nine days only. August Castle is said to have taken out $75, the best day's work for one man. The maximum number of hands at work on any one day was 15, most of them working on a "lay-out." The best pans on the pay-streak went as high as $2, and the heaviest pieces of gold obtained were worth a dollar.

The owners have now on the ground material, cars and track, and the construction of a wing-dam will be started, immediately on the river becoming low enough, the length of which is to be 300 feet and height 4 feet, by 3 feet 6 inches in breadth. Efforts will be made to make it of such strength that it will last for more than one season. Should the river lower sufficiently to allow of building, and it is found practicable to get near bed-rock, a good return may be hoped for. Unfortunately, the present indications do not point to even normal low water, and on that the matter hinges.

This ground had been skimmed over before by a dipper-dredge, but, so far as I am aware, no knowledge was obtained of the exceptional pay existing, which leads to some conjecture as to what may reasonably be expected from really efficient types of that class of machinery under efficient management. Should no new placers be discovered in the remoter and partially unexplored districts of West Yale, it may be assumed that the future of alluvial mining in this district will be confined to dredging and, possibly, steam-shovel work. At the present moment there are no dredges at work in the Division, although considerable areas are held by lease, and three new dredging leases have been taken up between Kanaka bar and Boston bar. Generally speaking, a good deal depends on the results obtained by some of the newer and thoroughly equipped machines about to be put in operation in Lillooet district and elsewhere, and good returns in those vicinities will quickly lead to a resumption of operations in other parts.

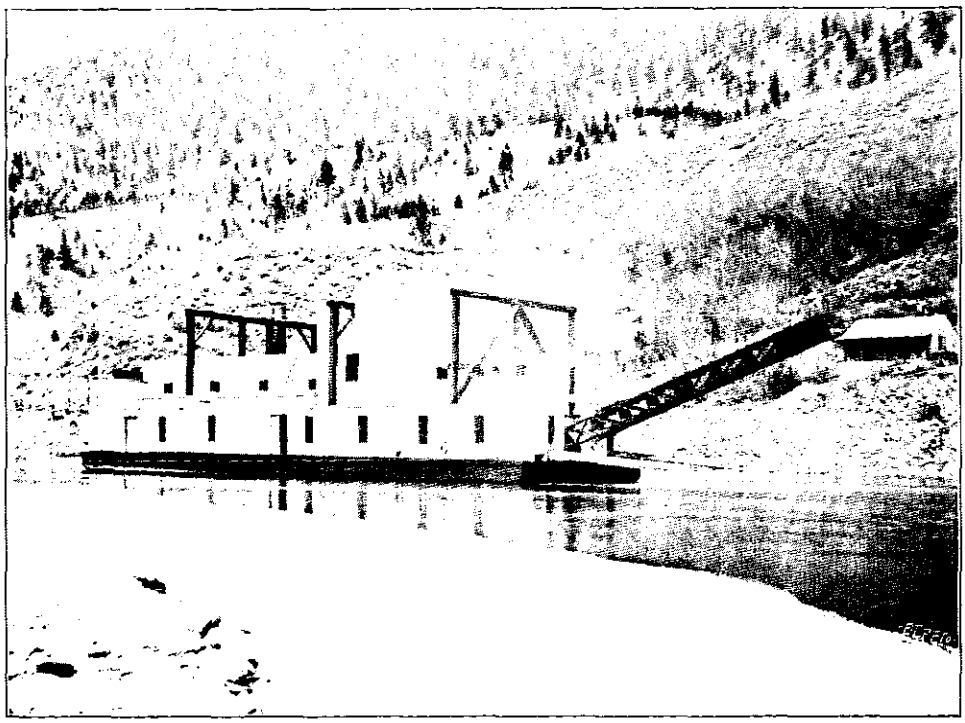
The Yale Hydraulic Co. has recently placed a large quantity of 18-inch pipe on its ground (three leases), two miles east of the last mentioned ground. The water is obtained from Siwash creek, and gravel will be piped above the present channel of the river.

The Pacific North-West Mining Co., on Siwash Creek, continues advancing its operations towards the bed-rock, working up from the 300-foot tunnel, which is being run in the bed-rock of Siwash creek, and is provided with 4-foot sluices, block riffles, etc. It is hoped to strike the pay gravel in 125 feet. The drainage and sluice tunnel taps the creek 40 feet below the bed, and during the freshet season is closed by iron sluice-gates, which on resumption of work are lifted by gear, whereupon the accumulated débris is swept down and through, leaving the workings in condition for piping; the face of the bank is 800 feet distant, and 1,200 inches of water are available under favourable conditions. Some $40,000 have been expended altogether on this property, on which there is also a small saw-mill. Occasionally coarse gold with quartz attached is met with, in value as high as $3.50 the piece.

Mineral Claims.

With two exceptions in the immediate vicinity of Yale, little lode mining is being done in this Division. The usual reasons are given, but the original locators might often do a good deal more to help themselves by

TOWN OF LILLOOET, B. C.



IOWA-LILLOOET GOLD MINING COMPANY'S DREDGE AT LILLOOET, B. C.

developing, to the best of their powers, the ground they occupy, instead of waiting for assistance from the outside capitalist. There is nothing to report in the way of operations on the *Murphy Group*, or the several old claims on Eureka mountain, at Hope. Both mines have had large sums expended on them in past years. Somewhat lower down the river assessment work has been done on the *King Group* and also on the claims staked two years ago, a couple of miles from the village of Hope. These last have a ledge of arsenical pyrites, the clean ore from which runs not less than $20 and up to $60 per ton in gold, with additional values in copper and silver. As they are only two miles from navigation and waggon road, the owners hope to get out a car-load of ore for a smelter test this summer.

In that part of the Summit City camp which lies in West Yale Division (the line divides it, leaving one-half in the Similkameen Division), Messrs. Stevenson and Shannon did their annual work, as an excellent bridge was built this year at the Coquihalla crossing; it will, in future, be possible to reach this promising silver lead camp in a day's ride from Hope, irrespective of freshets. The principal owners, the Star Mining Co., of Terra Haute, Indiana, U. S. A., state that it is expected to resume operations in 1904, the litigation of the last few years having been adjusted.

Messrs. Allan and Gisby continue to develop their group at Keefers, and have in the aggregate performed a large amount of exploration.

Marked activity is shown in connection with the operations of the two American companies on Siwash creek. The Mount Baker and Yale Co. has six claims on the North Fork of the creek, about 1,500 feet above sea-level, the principal locations being the *Old Puss*, *British Queen*, *Captain Jack* and *Louisabelle*. The mineralised area is of an average breadth of 150 feet, and has been prospected by an 80-foot tunnel and many shorter ones, as well as being developed naturally by numerous water-courses. There is at present a good pack-trail leading from the new cable-cage ferry, built this year to the mines by the company. There has now been taken across the Fraser a ten-stamp mill, and the foundations are being graded for the same. It is of Denver manufacture, and is to be increased, it is stated, to forty stamps during the coming season. Power will be supplied by a Pelton wheel, and it is expected to begin crushing about the middle of July, 1904. The water supply is derived from the Middle Fork of Siwash creek. A saw-mill is also being erected.

About three quarters of a mile away are the claims of the International Gold Mining Company, which is also erecting a six-stamp battery on the *Ward* claim, on the South Fork. The mill is of San Francisco manufacture, and Pelton wheels, saw-mill and buildings are in course of construction. Both concerns expect to be able to quarry the ore, which they assert is free-milling and is said to run from $4 to $10 per ton, according to the particular claim.

Note by the Provincial Mineralogist.—Actual prospecting and development have been in progress on Siwash creek during the past year, with results which have led to the erection of a small stamp-mill to accurately determine the practical value of the deposits by a working test.

The Mount Baker and Yale Mining Co., of Whatcom, Washington, has acquired some eight claims (about 244 acres) on Siwash creek, near the junction of the South Fork and some six miles from Yale, from which latter point a good waggon road has been built.

What is described as a large "dyke or ledge of quartz-porphyry" has been uncovered at the forks of the creek, and is reported as carrying free gold in small quantities disseminated through it; the company's engineers, who have sampled it, claim an average of $3 per ton in free gold. It is so difficult to sample an ore-body of this sort by hand sampling that the Company has decided to put up a 10-stamp mill to prove the value of the deposit, and, if satisfactory, a large stamp-mill will be erected.

Several placer leases have been taken up on Siwash creek by Frank and William Richards, the Pacific N. W. Mining Corporation, Henry Stanislawsky and others, and are reported as giving good prospects, but no actual mining operations have as yet been started.

OFFICE STATISTICS—YALE MINING DIVISION.

Mineral and placer claims recorded	30
Placer leases	7
Grants of water rights recorded	8
Bills of sale and permits	11
Powers of attorney	2
Certificates of work issued	24
Dredging and hydraulic leases in force	17

Revenue.

Free miners' certificates	$ 326 00
Mining receipts general	1,234 10
Miscellaneous	823 00
	$2,383 10

SIMILKAMEEN MINING DIVISION.

REPORT OF HUGH HUNTER, MINING RECORDER.

I have the honour to forward my annual mining report on the Similkameen Mining Division for the year 1903.

Placer Mining. The past year has not been favourable for placer mining on account of a late spring and an unusually wet season, which kept the streams almost to high water mark, and so prevented wing-damming. In consequence, the yield of gold and platinum was small in comparison with previous years. A few Chinese were mining on the upper part of the Tulameen river, near Champion creek.

Mineral Claims. There has not been much development done on mineral claims, the owners merely satisfying themselves with doing sufficient work to hold them. The Boulder Mining Company, Limited, owns five claims in one group, situated between Boulder and Elliot creeks. An incline shaft was sunk 80 feet deep to prospect the ground, and an average sample of ore sent to the Trail smelter, returning $55 per ton in all values, chiefly gold. A working tunnel was also started and was driven 95 feet. It is intended pushing the work this season until the hanging wall is struck.

On Bear creek Charles F. Law is developing two gold-copper claims, known as the *St. George* and *St. Lawrence*. On the *St. George* a shaft has been sunk 45 feet by 5 feet by 7 feet, and a vein of high grade copper and gold has been found.

On the *St. Lawrence* a shaft has also been sunk 53 feet by 6 feet by 6 feet in arsenical iron and rock, and contains high grade copper and gold with an 8-foot well-defined ledge. Mr. Law intends to continue this work so soon as the spring opens.

The *Liverpool* and *London* are adjoining claims with similar ore, but have not sufficient work done to prove them.

On Copper and Kennedy mountains most of the important claims have been Crown-granted, and the owners are waiting for transportation facilities to develop them.

On Roche river and in Summit camp assessment work only has been done.

Several free milling ledges have been struck during the past season on the upper portion of Granite creek, but as little or no work has been done on them it is impossible to give any accurate description thereof.

OFFICE STATISTICS—SIMILKAMEEN MINING DIVISION.

Free miners' certificates	147
Location records	310
Certificates of work	350
Conveyances, etc.	117
Certificates of improvement	35

Revenue.

Free miners' certificates	$ 912 00
Mining receipts general	3,087 00
	$3,999 00

LILLOOET DISTRICT.

CLINTON MINING DIVISION.

REPORT BY F. SOUES, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on the Clintion Mining Division, together with mining and office statistics, for the year ending December 31st, 1903.

I regret to have to report that mining in all its branches has been almost at a standstill in this Division during the past year. The total yield of placer gold is placed at $7,100, this amount being based on the total ascertained output for the year and an estimate of that which undoubtedly passes from the itinerant Chinese miner to the Chinese merchants at Ashcroft and the Coast cities, to precisely what extent cannot be determined. Placer mining is represented by a hydraulic lease at Big Bar, which paid good wages during the year, placer claims elsewhere having been abandoned; the other sources of the season's yield are the bars and benches of the Fraser river, from which gold is obtained by the Chinese and Indians.

Other than a little development work, nothing has been done on the mineral claims of the Division, nor has any further prospecting for coal been carried on.

OFFICE STATISTICS—CLINTON MINING DIVISION.

Mineral claims recorded	5
Placer claims re-recorded	2
Certificates of work	12
Certificates of improvement	2
Crown grants issued	2
Mining leases in force	2
Dredging leases in force	10

Revenue.

Free miners' certificates	$113 50
Mining receipts general	220 50
	$334 00

LILLOOET MINING DIVISION.

REPORT OF C. PHAIR, GOLD COMMISSIONER.

I have the honour to submit my annual report of the progress of mining in Lillooet Mining Division during the year 1903. The depression in mining matters in this Division has not been removed much during the year.

MINERAL CLAIMS.

Assessment work only has been done on the claims now held, with the exception of four properties, viz.:—

The Anderson Lake Mining and Milling Company's claims on McGillivray creek were worked during the season with a force of 9 men; 40 feet were driven on the lower tunnel with an upraise of 60 feet and 3,500 tons of ore were milled, yielding $1,495.

The *Lorne Group*, on Cadwallader creek, was worked the greater part of the season by 4 men; 152 tons of ore were crushed by an arastra and yielded $3,045.

On the Bend 'Or mines, Cadwallader creek, development work was carried on with 4 men during the whole year by Mr. A. Abbott, M. E., who has a bond on the property. No. 2 tunnel has been driven 220 feet, showing a continuous vein of low-grade ore two feet in thickness. A new cross-cut tunnel is now in 225 feet, and will explore the ore body below the present workings at a depth of 250 feet from the surface. It is expected that this tunnel will be completed next April and will be about 600 feet long. Mr. Abbott spent the greater part of the season at Cadwallader creek and he kindly gave me the following notes:

"From personal observation I conclude that the gold-bearing veins of the Cadwallader Creek district are contained in a diorite dyke several hundred feet in width, flanked on the north by slate and on the south by a narrow belt of serpentine. I have traced this dyke for about six miles, and I am credibly informed that it can be followed to within the vicinity of Anderson lake. To my mind, these facts contradict the view taken by some that this section has been materially disturbed, or that it is a slide from the adjacent mountain. While the veins are not large, they are singularly free-milling, and the ore of uniformly good quality. Considering the small portion of this country that is not covered by soil and drift, I am surprised at the number of claims on which pay-rock has been exposed."

Last July Mr. W. W. Brown, representing eastern capitalists, took a bond on the *Peerless*, *Imperial*, *Evening Star*, *Royal* and *Eclipse* mineral claims, known as the *Royal Group* and situated near the North Fork of Bridge river. Energetic work commenced at once and a tunnel of 110 feet was driven to cross-cut the main ledge at a depth of about 600 feet; this it is expected to strike in another 30 feet. The ledge has been opened in three different places above the tunnel, and in no place shows less than six feet in width. Good values in gold silver and copper were obtained from all the openings. Two preliminary cyanide tests have been made, and if the ore at depth is the same as on the surface, it can be treated by this process, in which case this will prove a promising property.

Placer Claims.

The Bridge River and Lillooet Gold Mining Company's and the Pacific Development and Improvement Company's claims on Bridge river were worked during the season, under the joint management of Mr. W. W. Brown, with an average force of 14 men and an expenditure of about $13,000. The pipe-line was changed and a cut washed out 700 feet in length by 250 feet in depth. Numerous large boulders were encountered and it was found necessary to instal a hydraulic hoist, which worked satisfactorily, removing about 25 boulders, of from 1 to 5 tons, in an hour. The hoist can lift 10 tons. The season ended before all the boulders were removed, so that very little gold was obtained.

The Lillooet Hydraulic Company's lease at the Fraser river bridge was again worked by 6 Chinese.

Four claims were recorded on the South Fork of Bridge river, near the *Forty Thieves Group* of mineral Claims, and from these $1,500 was taken.

The traders at Lillooet report purchasing $15,515 worth of placer gold during the year.

Dredging. A dredge, the largest of the kind in Canada, is being built on the Fraser River, at Lillooet, by the William Hamilton Manufacturing Co., for the Iowa Lillooet Gold Mining Company, and will be completed next February (1904). The intention was to have it finished last November, but a labour strike in the East delayed the manufacture of the machinery. The hull is 100 feet long and 34 feet wide, built of Douglas fir; the bow is sheeted with steel plate; the main gantry, which

supports the ladder, is constructed of steel, and the ladder, which is 72 feet in length, weighs 90,000 lbs., and has a continuous chain of steel buckets, each of which is capable of carrying six cubic feet of gravel. The gravel will be discharged into a revolving steel screen, 5 feet in diameter by 24 feet in length, perforated with holes. The gravel, in passing through the screen, will be washed by water pumped into it at the rate of 3,500 gallons per minute, and the small gravel and gold will filter through the screen to the tables, while the larger material passes on to the elevator, or stacker, which delivers it 40 feet from the stern of the dredge. The tables, having a fanning motion, are so designed as to save all the gold, but, for greater safety, the gravel afterwards passes through an undercurrent quicksilver trap. The dredge will be operated by five engines. The main engine will operate the buckets, screen and gold tables, and is a 116 horse-power marine; the pumping engine is 35 horse-power marine; the ladder engine is 30 horse-power horizontal; the dynamo engine is 6 horse-power, directly connected with the winches which handle the two head cables and the four side ones. The total weight of the machinery is 230 tons. If the result of this dredge be satisfactory, others will be built near Lillooet in the immediate future.

OFFICE STATISTICS—LILLOOET MINING DIVISION.

Mineral claims recorded	30
Certificates of work recorded	64
Conveyances recorded	27
Water grants issued	2
Placer claims recorded	8
Mining leases in force	25
Dredging leases in force	2
Water grants in force	19
Free miners' certificates issued	115
Company "	5

Revenue Collected.

Free miners' certificates	$ 987 50
Mining receipts general	2,051 90
Mineral tax	42 66
Total	$3,082 06
Total revenue, Lillooet office	$16,929 65.

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, 1903.

On the *Constitution*, situated on Constitution creek, eight men have been employed during the past season, the work performed consisting principally of tunnelling on the lead for about 200 feet, this development showing a continuous ore body 4 feet in width, with a reported value in gold and copper of $20 per ton. There is also a quantity of lower grade ore, and as soon as a road is built to deep water, a distance of about a quarter of a mile, and a wharf constructed, the property will be in a position to commence shipping. The ore is also in demand for fluxing purposes by the local smelters of the coast.

The *Southern Cross*, situated on Uchucklesit harbour, one-half mile from Alberni canal and 250 feet from deep water, has been worked since the 1st of April, 1903. Development consists of an open cut 20 feet long and 16 feet wide, which is the width of the ore body, while a shaft 30 feet deep has been sunk. Two men were employed until the 1st of November, while at present 12 men are at work and a chute is being constructed to send the ore to deep water for shipment. There are about 300 tons of shipping ore on the dump, averaging $25 per ton in gold, silver and copper, the copper values predominating. This property will be making regular shipments during the winter months, as there is a considerable quantity of ore exposed on the surface.

On the *Happy John Group* considerable work has been done during the past season, consisting chiefly of stripping the lead at different points throughout the property. A very large ore body has been discovered on the *Happy John No. 2*, and is distinctly traceable through the adjoining claims.

Development has been carried on on the Alberni Copper Company's claims at Nahmint, and a considerable amount of assessment work has been done on Copper mountain and in other parts of the division.

Mining operations have been suspended at the Nahmint mine (Hayes mine) and at the Monitor mine, both properties situated on the northern side of the Alberni canal, near its outlet.

Office Statistics—Alberni Mining Division.

Free miners' certificates issued	$ 376 75
Mining receipts general	3,120 20
Mineral tax	42 10
	$3,539 05

CLAYOQUOT MINING DIVISION.

REPORT OF W. T. DAWLEY, MINING RECORDER.

I have the honour to submit my annual report of the mining operations in the Clayoquot Mining Division for the year ending December 31st, 1903.

As compared with other years, there has been a large falling off in work, only a few of the properties having had more than their annual assessment work done.

Among the promising prospects in the district are the following:—

ELK RIVER AND KENNEDY LAKE.

The *Rose Marie Group*, owned by the Boseco Mines, Ltd., of Vancouver, has had, during the greater part of the year, further work done on its claims, viz., *Rose Marie No. 1, 2, 3, 4, 5, 6, 7* and *8*. This is a free-milling property, with a concentrator plant and good buildings erected on the ground.

The *Grizzly* and *Cinnamon Bear*, on Elk river, a little above the *Rose Marie Group*, are owned by John Irving, of Victoria, and C. Sundvall and A. Spittall, of Clayoquot. These claims were located in July, 1902, and work was commenced on them some months afterward, five certificates of work having been issued in favour of each location.

The *Edith Group* comprises three claims on Elk river, the property of T. Stockham and L. Grant, both of Clayoquot. Development work was performed on this group last spring and summer, with very promising results, over 100 feet of tunnelling, besides other development work, having been done.

The *Ironsides*, the property of G. I. Dunn, is a comparatively new find and from work done the showing is most satisfactory.

Other properties in the Elk river vicinity are the *Leora Group* and *Island Belle*, owned by J. Irving and W. Wilson, of Victoria; the *O. K. Group*, owned by T. G. Norgar, of Clayoquot; the *Poet Group*, owned by W. H. Porter and W. Kershaw, of Clayoquot, and the *Climax* and *Victoria*, owned by Paul and Antone Wollan, of Clayoquot.

BEAR RIVER.

The British Pacific Gold Property Co., Ltd., of Victoria, owns the *Seattle Group*, on Bear river, and has had men employed working and developing it for the best part of the year.

The *Corona* and *Belvidere Groups* are the property of Messrs. Hovelaque & Waterhouse, of New Alberni, and from year to year their assessment work has been done.

On the *Big Interior*, owned by Messrs. J. A. Drinkwater and Frederick Nichol, there is a large body of ore, but owing to its distance inland it has not received the attention and notice that it would have had if situated nearer to the sea coast.

SIDNEY INLET.

The *Indian Chief Group* is owned by the Dewdney Canadian Syndicate, and is a copper proposition. There are some tons of ore on the dump, and a large wharf was built during the year ready for shipping ore out in the early part of 1904.

The *Prince Group*, owned by a Scotch syndicate (Dr. T. R. Marshall, Mgr.), consists of eight claims, which are all Crown-granted. No work was done during the year, but it is understood that operations will be resumed during 1904.

Messrs. J. A. Jones, J. McInnis and J. Beck have promising properties close to and adjoining the two above-mentioned groups.

OPEN CUT, PEERLESS MINERAL CLAIM-QUATSINO SOUND.

OPEN CUT ON JUNE GROUP QUATSINO SOUND.

Deer Creek.

Among the properties that are worked each year are the *Hettie Green Group*, which is under the management of James Thomson, of Alberni. This group, of about seven claims, was among the first locations made in the district and considerable work is being done each year, developing some yellow copper ore.

The *Crow*, owned by Messrs. Drinkwater and F. Jacobsen, is another property in this section which has good showings.

The *Sunrise Fraction*, owned by Messrs. Young Bros., of Saanich, also shows up very well.

Trout River.

The *Good Hope Group*, owned by the Helga Gold & Copper Co., of Seattle, has had a large amount of work done on it in tunnelling to strike the lead. At the expiration of the last contract which was let, a large body of ore was uncovered.

Hesquoit Lake.

The *Brown Jug Group*, owned by Messrs. A. Norris and partners, of Alberni, the *Thelma Group*, the property of F. Jacobsen, Port Essington, and the *Agnes* claims, owned by Messrs. J. Eik and F. Jacobsen, are all situated on or near Hesquoit lake, and receive considerable attention.

Nootka Sound.

The large iron deposits at Head Bay, owned by Messrs. Dawley, Poole and Grant, as well as those owned by Messrs. Haugen and Netherby, have very favourable indications, outcrops running from 8 to 40 feet wide. Little development, with the exception of surface work, has been done, but the close proximity to deep water and the present showings give great encouragement for further operations.

Ahousat.

Iron and copper outcrops are found on Matilda creek, and the properties owned by Messrs. Watson and Sullivan, of New Alberni, by Messrs. J. Beck and T. T. Gardhouse, of Ahousat, and also by Messrs. J. Irving, Poole and Dawley, have had considerable work done upon them.

The *Ormond* claims, owned by Messrs. Beck and Gardhouse, have recently been bonded to a Victoria syndicate, and will be worked in the early part of 1904.

Disappointment Inlet.

The *Kalappa* mineral claim, owned by Messrs. Chesterman, Jensen and Jacobsen, yields samples of ore giving high gold values.

The mineral claims mentioned are all within easy reach of salt water, and the district abounds in good streams which could be utilised for power in developing the various properties, while first-class timber for mining purposes is everywhere to be found.

Office Statistics—Clayoquot Mining Division.

Free miners' certificates issued	48
Mineral claims recorded, 1903	33
Certificates of work recorded	134
Bills of sale, bonds, etc., recorded	29

Revenue.

Free miners' certificates	$220 25
Mining receipts general	501 55
	$721 80

QUATSINO MINING DIVISION.

REPORT OF B. W. LEESON, MINING RECORDER.

I have the honour to submit my report of mining operations in the Quatsino Mining Division during the year 1903.

There were 72 mineral claims in good standing at the end of 1902. The principal mining operations and mineral claims of the division are nearly all situated adjacent to the waters of Quatsino sound.* This fine body of inland water has a shore line of probably 300 miles. The mineral bodies are diversified, and are found on all the arms of the sound. On the West arm iron and coal deposits have been discovered, while on the South-east arm copper and gold ores exist. On the north side of the main sound and on Forward inlet coal formation occurs, some small croppings of a fine quality of coal being known on Winter harbour, although none of sufficient size to work. Timber is plentiful, a number of fine water-powers are available, and the nearness to the sea renders the transportation problem an easy one. These natural conditions offer the mining investor advantages worthy of serious consideration, a fact which is shown by the number of mining companies now operating in the district.

INGERSOL RIVER.

Claims have been located in nearly all parts of the division this present season, but principally in the neighbourhood of Ingersol river, to which quite a rush took place.

This river comes into the main sound from the south, opposite the south shore of Limestone island, and drains the same range of hills that the *Yreka* and *Edison* properties are on, being in the same mineral zone.

In May, 1902, the *Blue Bird* and *Mystic* mineral claims were located by P. Cramer and O. Strandwald, on Ingersol river, about half a mile from its mouth. The ore was magnetite carrying gold values. A tunnel was run in 30 feet, tapping the lead at 40 feet depth and showing the same class of ore, whereas copper was expected to be found. On further prospecting up the same river this year, Messrs. Erickson and Hanson found the lead some 40 feet wide, well defined, crossing the stream. The *Ingersol*, *Stella* and *Olga* mineral claims were located. Hearing of this, a number of prospectors went in and the lead was traced over 15 claims. A total of 19 claims were recorded in the vicinity. Assays of the ore show 58 % metallic iron, and as high as $9 in gold to the ton. A group of 13 claims located this year are about to be bonded by a Mr. Frank for a company which will exploit the deposit and endeavour to ascertain the extent of the iron.

Yreka Mine. * This mining property represents the principal mining operations in the district. The Yreka Copper Co. owns 16 claims, situated on the south shore of the South-east arm of Quatsino sound. The company shipped about 2,500 tons in the early part of the season, the bulk of the ore being quarried out of the "Clyde Cut." In May the North-western Smelting and Refining Co. assumed control of the property, since when about 1,500 feet of drifting has been done. In August operations were suspended for lack of water to run the compressor. In the beginning of October work was resumed and some promising ore is said to have been found. The company is applying for a Crown grant. The property is fully equipped with wharf, bunkers, aerial trams and an air compressor run by a Pelton wheel, there being a fine water-power available.

June Group. * The *June Group* is operated by the Copper Mountain Mining and Development Co., and consists of five claims about five miles from the shore of the South-east arm. The ore is a copper sulphide carrying values

* *See* Provincial Assayer's Report on Quatsino Sound, p. 196 *et seq.*

in gold. The principal development work on the property is an open cut on the *June* claim, exposing a large body of ore, while a number of exposures along the strike of the vein show the same class of ore over three claims. Owing to the quality of the ore and the extensive showing, the company is holding the property at a high value. The principal work this year has been on the trail from salt water, which is now in fair condition. This trail connects the South-east arm of Quatsino sound with Victoria and Alice lakes, and has been a great advantage to prospectors this year. Some zinc ore has been found near the foot of Victoria lake, four claims being recorded by Messrs. Satra, Leeson and Bryce. The claims will require considerable development work to prove the value of the deposit.

Edison. * This claim, owned by the Edison Mining Co., of Tacoma, joins the Yreka Co.'s property to the north and higher up the mountain. The road of the Yreka Co. is used part of the way up, whence a trail has been built to the workings, with a heavy grade. The improvements this year have been principally on this trail, besides the building of two log-houses at the workings and the driving of a tunnel in on the lead. The ore is of similar nature to that of the *Yreka*.

West Arm.

Iron. * The 13 claims owned by Messrs. Frank, Croft and others on the West arm have received some development work this year. The deposit is a bog ore carrying a good percentage of iron. The owners appear to be well satisfied with the result of this year's work.

The coal property owned by the West Vancouver Coal Co., located on Coal harbour, has not been worked this year.

Teta River.

Considerable work has been done on all the properties along this river, which comes into the South-east arm from the south, about five miles above Yreka. On the *Paystreak* claim 50 feet of tunnelling has been done, and the *Teta Group*, owned by Messrs. Nordstrom, Sorenson and others, is being steadily developed by the owners, another 30 feet of drift being expected to tap the well-defined lead showing above. Substantial buildings have been put up and trails made, showing the owner's good faith in the future of the property.

Klaskeno Inlet.

The *Mexican Group* of claims, owned by Messrs. Clark, Gwin and Lea, have received some work upon them this year, a large body of iron pyrites, with some copper, having been developed. Klaskeno inlet is about 15 miles to the south of the entrance of Quatsino sound and is well nigh inaccessible for small boats in the winter season, so that, until a sufficiently large camp is established to induce the regular steamer to call, the district cannot progress to any extent. Some new claims have been recorded in this vicinity.

Office Statistics—Quatsino Mining Division.

Free miners' certificates issued, individual	74
Free miners' certificates, companies	2
Mineral claims recorded	99
Certificates of work	58
Transfers	20

Receipts.

Free miners' certificates	$550 00
Mining receipts general	342 50
	$892 50

* *See* Provincial Assayer's Report on Quatsino Sound, p. 196 *et seq.*

QUATSINO SOUND.

REPORT OF H. CARMICHAEL, PROVINCIAL ASSAYER.

This sound is the most northerly of the deep inlets on the outer coast of Vancouver Island, and penetrates the latter in a north-easterly direction for upwards of 25 miles. The breadth at the entrance of the inlet is nearly 6 miles, narrowing to less than a mile at 5 miles within; the sound then runs in a north-easterly direction (magnetic) nearly straight for 13 miles, when it branches off in two arms, one extending to the south-east for 12 miles and terminating in low land, while the other arm lies to the north-west of the sound and is connected with it by a straight narrow pass (Quatsino narrows), some two miles long by one quarter wide. This latter, innermost branch of the sound runs in an east and west direction and is 22 miles long by some 2 miles wide. To the west of the narrows mentioned it is called the West Arm and runs to within 12 miles of San Josef bay, on the west coast of Vancouver Island, while that portion lying to the east of Quatsino narrows is named Rupert arm, its eastern extremity being only 6 miles in a direct line from the eastern shore of the island, with which it is connected by a trail 9 miles long. This trail runs through practically level country and affords an easy means of communicating with the steamers which ply on the East Coast.

The late Dr. Dawson made an examination of Quatsino Sound in 1885, principally to determine the extent of the coal-bearing area; his remarks, in so far as they apply to the metalliferous section, are here given:—

"CHARACTER OF SHORES.

"The shores of Quatsino sound are in general rocky and bold, with mountains, or high rocky hills, rising steeply from them. There is, however, a somewhat greater extent of sandy and gravelly beach than occurs in most of the inlets of the coast, and the mountains are not so closely crowded together as in many parts of Vancouver Island, there being considerable intervening tracts of low land, and wide valleys of which the terminations are not known, running back from its shores. Somewhat extensive areas of low country border the shores of Winter harbour, at the head of Forward inlet, and a wide tract of country, characterised by low rounded hills, exists on the south shore of the main inlet west of Limestone island, while other important low areas are found near Hecate cove, Coal harbour and Rupert arm. The quantity of good timber on these must be very considerable, and toward the upper part of the sound the Douglas fir—which is not seen along the outer coast of Vancouver Island—re-appears.

"The shores of Forward inlet are chiefly composed of rocks of the Vancouver series, but in part also of Cretaceous sandstones. On the east side of Robson island, and on the shores of the point to the north which separates the main inlet from Browning creek, there are extensive exposures of the flaggy argillites, which, though much crumpled and confused, and penetrated by a number of grey felspathic dykes, appear in the main to assume an anticlinal form, overlying a greenish-grey compact volcanic rock, and being overlaid by agglomerates, which are often well bedded, and sometimes have a rather tufaceous appearance. The argillites themselves present their usual black, flinty appearance, with regular and thin bedding where undisturbed, and are frequently more or less calcareous. The general strike of these and the associated altered volcanic rocks, is about north-west by south-east, but there are, doubtless, several folds and possibly other complications, as the argillites recur at two places on the shore to the east of and opposite the point above mentioned, and also at two places on opposite sides of Winter harbour, further up the inlet. The exposures of these argillites in Forward inlet afforded a considerable number of specimens of the Belonites, for which Mr. Whiteaves, in the appendix, proposes the name *A. Vancouverensis.*

"The north shore of Quatsino sound, from Forward inlet to Koprino harbour, exhibits a great series of the altered volcanic rocks of the Vancouver series. These show persistent south-westward dips, at angles of from 35° to 60°, but are probably repeated either by folding or faulting, as the thickness indicated would otherwise be enormous. The materials are principally agglomerates, of greenish or grey tints, but, occasionally, conspicuously red in colour. Amygdaloids also occur, but do not form so important a part of the whole. These rocks have been subjected to somewhat less alteration than usual, and the agglomerates frequently weather out into rough surfaces, with a scoriaceous appearance. The rocks of the south shore of the inlet, from Bold bluff to the west side of Koskeemo bay, of the chart, are similar, with similar dips. The west side of Koprino harbour is composed of similar greenish rocks, probably agglomerate, but on the east of the north-west cove a massive grey limestone, with a minimum thickness of about forty feet, appears, and is associated with hard sandstones and flaggy argillites of the same series, considerably disturbed and irregular. Beyond the next little cove, or creek, to the east the rocks of the shores and islands of Koprino harbour belong entirely to the Cretaceous series.

"Similar agglomerates and amygdaloids compose the south shore of the inlet, south of Limestone island, with the exception of the east side of Banter point, of the chart, where a small outcrop of limestone again occurs. Altered volcanic rocks of the same general character, and with similar persistent westward dips, form the greater part of the entire south shore of the inlet eastward to Village islands opposite Koprino harbour, together with Brockton island. On the east side of Village islands, the flaggy argillites re-appear, overlying well-bedded, fine-grained, felspathic rocks. The exceptional points on this shore consist of small outliers of Cretaceous sandstones, which may be regarded as portions of the southern edge of the Koprino Cretaceous area previously alluded to. The largest area of these rocks extends along the coast between Limestone and Brockton islands, for nearly two miles, with low dips generally off shore. The rocks are greenish-grey sandstones, and may extend for some distance to the south, as the land in that direction is all low. The exposures at the east end of this area show the sandstones passing into conglomerates, and in actual contact with the older volcanic rocks, filling hollows and crevices in their surface, which has been very irregular.

"The south-east arm of Quatsino inlet clearly follows the general strike of the rocks of the Vancouver series, and occupies a depression which has been worn out along the outcrops of the same bed of limestone which is noted in connection with Quatsino narrows and the east end of Limestone island. The bed dips in general south-westward at high angles all along the arm. Limestone is frequently seen along the east shore, and appears to rest on a green amygdaloid. At Long island, near the southern extremity of the arm, there are large exposures of flaggy argillites, which follow the limestones in ascending order and are often more or less calcareous. Obscure casts of Monotis or Halobia were seen in them in a few places. Further exposures of these argillites are found skirting the west shore of the arm nearly to its north end.

"The existence of the transverse hollow now occupied by Quatsino narrows is pretty evidently due to the softer character of a thick bed of limestone, which nearly follows the course of the narrows. A second bed, or possibly a repetition of the same bed, runs across a low country from Hecate cove to the south shore of the West arm, parallel to the first. The same limestone appears on the opposite side of the West arm, in large exposures to the west of Hankin point.

"The rocks of Rupert arm, with the exception of the Cretaceous previously alluded to, are generally reddish or grey felspathic materials, of somewhat doubtful origin, but referable to the Vancouver series. Limestones again outcrop at the points to the east of the entrance to

Quatsino narrows. All the western part of the south shore of this arm show no rock exposures, and from the low character of the country it is possible that the Cretaceous rocks of the Coal harbour area are continued in this direction."

SOUTH-EAST ARM OF QUATSINO SOUND.

All the mineral locations immediately adjacent to the South-East arm have been made on the range of hills which rise abruptly from the west shore of the arm, attaining a height of 2,000 feet. With the exception of Teta river, where quartz veins exist, the mineralisation seems to occur along the contact between large felspathic dykes and the limestone which forms a large portion of these hills. Along these contacts there are occurrences of garnetite, which usually marks a zone mineralised with copper and iron pyrites, and often of considerable breadth. The mineral would appear to have come up with the felspathic material and to have been deposited at or near the limestone contacts in a similar manner to the ore deposits at the north end of Texada island. The east shore of the South-East arm is largely limestone in which no mineral has been found, but on crossing the divide, on the slope towards Alice lake to the east, felspathic dykes are again seen, and here an extensive body of mineral has been found and located as the *June Group*.

Quatsino sound forms an inland body of water affording splendid facilities for prospecting, and after crossing an easy divide eight miles eastward from the South-East arm, two large lakes are reached, opening up a means of communication which penetrates into the very centre of the northern portion of Vancouver Island. These lakes have been named respectively, Alice lake, lying to the north and about 11 miles long, and Victoria lake, lying to the south and some 12 miles long. They have never been surveyed and their shores only partially prospected.

Yreka.

Some four miles up the South-East arm, on the west shore, is the wharf and post office of Yreka, where is also situated the Mining Recorder's office for the Quatsino Mining Division. A townsite has been laid out by the Yreka Copper Company, Ltd., which also has a store, saw-mill, blacksmith shop, large bunk-house, etc. Rising above the townsite, at an angle of 40°, is a peak, somewhat higher than the range, which has been named Comstock mountain and on which have been located two groups of claims, viz.:—the *New Comstock Group* and the *Superior Group*, both owned by the Yreka Copper Co., Ltd. The head office of this company is at Tacoma, Washington, and its Canadian office at Yreka. The properties mentioned are now being worked by the Northwestern Smelting and Refining Company under a tonnage contract, Mr. Long being the superintendent.

The *New Comstock Group* consists of eight claims, viz.: *Mountain Queen, Mountain King, Eva, New Comstock, Asa, Thor, U. S. Fractional, Yreka Fractional* and *Edith Fractional* mineral claims. The principal work has been done on the *New Comstock*. The *Superior Group* also consists of eight claims, viz.: the *Superior, Pocohontas, Tuscarora, Quatsino Chief, Mohican Fractional, Hiawatha Fractional, Ready Cash Fractional* and *Omega Fractional* mineral claims. Both groups have been surveyed and Crown grants are being applied for. The *Superior Group* lies further up the mountain than the *Comstock*, the principal work being done on the *Superior* claim, where a tunnel has been driven for 125 feet into a mineralised garnetite. Since these properties have been taken over by the Northwestern Smelting and Refining Company, work has been confined to the *New Comstock Group*. From the wharf a waggon road zig-zags up the mountain to the mine camp, which is reached at an elevation of 1,050 feet above sea level. At this point is also located a ten-drill air compressor, operated by a arge size Pelton wheel under a head of 400 feet. Three machine drills were being run

when the property was visited in July. An aerial tram runs from the level of the camp to the bunkers near the beach, and from the upper terminal two baby trams run to the workings, some 200 feet higher.

The ore, which is copper pyrites carrying small gold and silver values, occurs largely in a mineralised garnetite, forming a zone about 150 feet wide with an approximate strike of N. 40° W. and dipping 45° to the south-west, the country rock being a light-coloured * felsite, and it is probable that the mineral came up with these felspathic dykes and was deposited in contact with limestone, at the same time decomposing the latter and forming garnetite; this seems more probable since limestone was noticed in several places in the drifts and also further down the mountain, as well as on the *Edison Group*, adjoining to the north; there is also a large quantity of secondary calcite to be seen in the drifts.

About 400 feet behind the camp and 200 feet above it, a body of ore has been stoped out near the surface, leaving a chamber about 60 feet long by 30 feet wide. This represents the bulk of the ore which has so far been shipped from the mine. The ore supply at this point having been worked out, a prospecting shaft was sunk for 30 feet just outside the stope, but as this was still in the felsitic country rock it was decided to abandon it and run in a long drift further down the hillside. This was accordingly done and No. 1 tunnel has been run directly into the hill 186 feet below the upper stope and tunnel, which is known as No. 2.

No. 1 tunnel was run in for 140 feet through felsite, when a bunch of ore 25 by 20 feet was struck and mined. The drift then turns with a deflection of 40° to the left and runs for 100 feet through felsite, when it takes a turn of 36° to the right and continues for 170 feet to the face. This latter portion of the drift has been driven along a slip fissure, filled with crushed rock cemented together with calcite. Forty-five feet from the face a small cross-cut was run to the right for 20 feet and is in felsite. The general direction of No. 1 tunnel is S. 50° W., running directly into the hill, and at the face it is nearly vertically below No. 2 tunnel.

When the property was taken over by the North-west Smelting and Refining Co., a drift was started from the point in No. 1 tunnel where the small body of ore was struck and was run at 90° to the right to get below a showing of ore seen on the surface 200 feet to the right. When the property was visited this drift was being worked by a machine drill and was in 100 feet, having still another 100 feet to run before ore could be expected. For the first 45 feet the right wall of the drift is a garnetite mineralised with copper pyrites, the rest of the drift being in felsite.†

Above No. 1 tunnel, from the stope referred to, No. 2 tunnel is being driven in the same direction as No. 1, and is in 111 feet from daylight, running through felsite with lime showing in places.

Some 20 feet above No. 2 tunnel and 111 feet to the right, a short tunnel, No. 3, was run to prospect a surface showing of fairly well mineralised garnetite 150 feet wide and dipping at an angle of 45° into the mountain. To prove this ore body with depth, a drift is being run from the stope in No. 2 tunnel to the right, and early in July was in 100 feet, being worked by a machine drill; it was estimated that 30 feet further would require to be driven before ore would be reached. At 60 feet in a small patch of ore was cut, passing into felsitic rock, in which the machine was still working.

To the right of the waggon road and a short distance below No. 1 tunnel, an open cut was made into ore similar to that mentioned above.

* *See* Rock Samples 20, 21, 22, 23 (8A, 8B and 9A, 9B), Appendix.
† *See* Rock Sample No. 16 (No. 4), Appendix.

There is a considerable mineralisation on the surface of the property, which will prove valuable if shown by the development work now in progress to continue with depth.

Edison Mineral Claim.

The *Edison* claim adjoins the *Superior* claim of the *Yreka Group* to the east, and is reached by trail from the Yreka wharf. The property is owned by the Edison Mining Co., Ltd., having its head office in Tacoma, with an agent in Victoria. The property has been surveyed and a Crown grant will be applied for in the fall. The claim is situated on the same range as the *Yreka Group*, sloping into the south-east arm at an angle of 40°, and being reached at an altitude of 2,275 feet. A gulch running down the mountain side cuts through a zone more or less mineralised for 100 feet wide and having a strike of N.E. and S.W. On the northerly side of the gulch several open cuts and some surface stripping show a mineralisation of the rock matter, with pyrrhotite and copper pyrites, for a width of six or eight feet, the gangue matter being a dark green igneous rock. Outside of this gangue there is a felsitic* rock much altered and vitrified by heat. Ninety feet below the open cuts a tunnel is being run in from the gulch to strike the ore shown by the cuts, and it has only a few feet to run before it gets below the surface work above. The country rock in the tunnel is slightly mineralised with copper pyrites, and appears to be of the same general character as on the *Yreka* claim, but lime occurs 500 feet further down the gulch and is traversed by igneous dykes. There is a small showing of good ore on a contact between blue limestone and one of these dykes.

TETA RIVER.

Teta river is a small stream flowing into the south-east arm on its western shore, five miles south-east from Yreka.

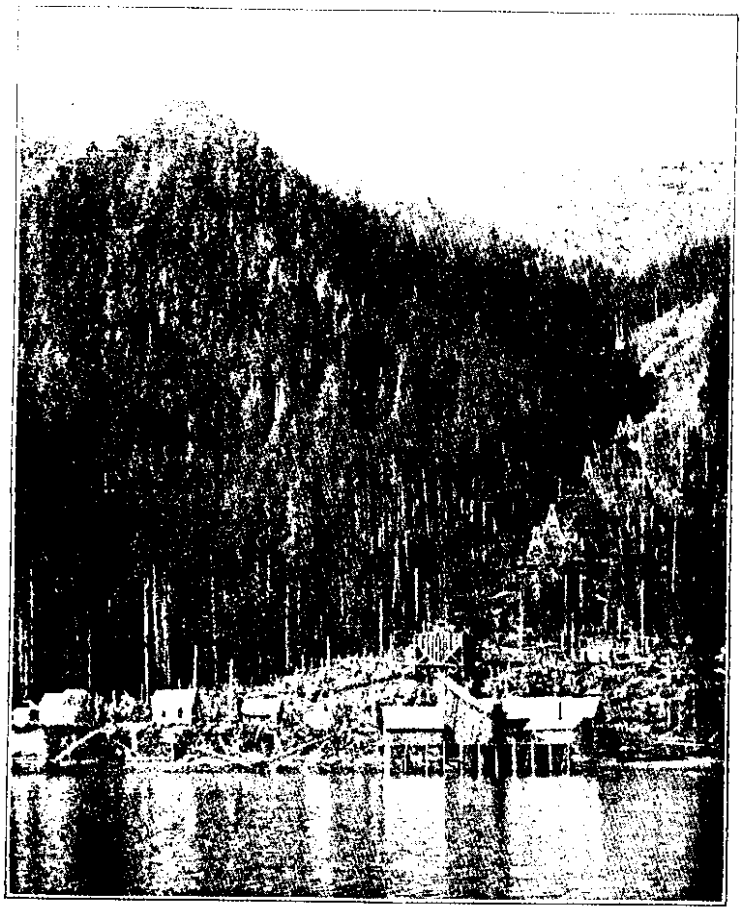
The *Red Rock* mineral claim has been located near the mouth of the Teta river, a quarter of a mile back from salt water and at an altitude of 100 feet. The owners are Paul Cramer, Fred Pollock, *et al.* A few shots have exposed 10 feet in width of solid pyrrhotite, occurring between diabase walls, the rock in the creek bed being, however, more felsitic in character. An assay of the ore only showed traces in gold, silver and copper.

The *Paystreak* mineral claim is situated three-quarters of a mile up Teta river, at an altitude of 125 feet. The creek at this point flows through a narrow canyon with perpendicular walls. On either wall is seen a small quartz vein, with a strike N. 80° W. and nearly vertical dip. From the west wall of the canyon a tunnel has been run in on the vein a distance of 50 feet, showing a lead, in places 8 or 9 inches wide, mineralised with copper pyrites. The country rock,† which is a quartzless porphyry, is much altered near the vein and is frozen to the quartz. An assay of the ore gave:—Gold, .01 oz.; silver, 1 oz.; copper, 10.88 %. The owners are Paul Cramer, Fred. Pollock, *et al.*, Yreka.

White Quartz Mineral Claim.

The *White Quartz* claim is on the Teta river watershed, a short distance up the right bank of the stream, being reached at an altitude of 1,050 feet, and about one mile back from salt water. The owners of the claim are G. Sargison and Chris. Nordstrom, of Quatsino. An outcrop of brecciated white quartz, about 21 feet wide, is seen on the surface, having an approximate strike of N. 25° E. and dipping nearly vertical. About 30 feet below this outcrop, a tunnel 100 feet long has been run into the hillside, and at 24 feet in cuts diagonally a small quartz stringer 3 inches wide, clearly defined, with gouge on either wall, and fairly mineralised with copper and iron pyrites. For the next 12 feet the tunnel is in felsitic country rock,‡ when another

* *See* Rock Sample No. 19 (No. 7), Appendix.
† *See* Rock Sample No. 13 (No. 1), Appendix.
‡ *See* Rock Sample No. 14 (No. 2), Appendix.



YREKA MINE, QUATSINO WHARF AND LOWER TERMINAL.

YREKA MINE, QUATSINO MINE BUILDINGS.

small quartz stringer is crossed, having about the same strike as the former. The tunnel is then for 10 feet in country rock until a quartz vein about 2 feet wide is reached, dipping 55° northward. The ground at this point shows much movement and twisting. The tunnel then swings around to the left, brecciated quartz being noted on the right side, while at 50 feet in it cross-cuts a dyke of fine-grained rock. From this point the tunnel continues to swing to the left until it is nearly semi-circular in form, and from the dyke to the face, some 27 feet, is in country rock. At the face the same brecciated quartz noted on the surface is to be seen, though in the tunnel generally it does not show up to nearly such an extent as seen above. The quartz is mineralised with some copper pyrites, but the principal values are said to be in gold. Though the samples assayed in the Government laboratory showed low gold values, it is stated by the owners that payable quantities of that metal are to be obtained.

June Group.

The *June Group* consists of five claims, namely:—*Amazon*, *Helen*, *June*, *Olga* and *Iron Knob*, owned by the Copper Mountain Mining and Development Company, of Tacoma, Washington. This group is reached by a trail starting from the north-east shore of the south-east arm of Quatsino sound, about 3 miles above Yreka. The trail is some 6 miles long in an easterly direction, gradually rising to a height of 800 feet, then dropping down again to the camp, at 400 feet altitude, in a distance of 1½ miles. Except for the rapid descent to the camp, there would be no difficulty in putting in a tramway from salt water. The *June* camp is the centre from which trails branch off to other claims. The few rock exposures seen on the trail were of blue limestone. The claims run east and west, the principal work being done on the *June*. In the centre of the claim the ground rises in a rather rounded ridge. On the western end of this ridge two prospectors located an outcrop of magnetic iron. The property was bonded from these prospectors by the Copper Mountain Mining and Development Company, of Tacoma. This company started development by an open quarry at the western end of the ridge mentioned. This has now exposed a face 48 feet wide by 36 feet high. The mineral-bearing material is a porphyritic hornblende granite,* mineralised with copper pyrites and bornite, and also mixed with solid magnetic iron, while copper pyrites and bornite are also finely disseminated through the iron ore. The ore occurs irregularly on the face of the bluff, and in places has a brecciated structure, having streaks of crystalline quartz and calcite through it; in fact, the vein-matter is more silicious than has been noted in other deposits of a similar nature on Vancouver Island.

While not proven by continuous work, outcrops were seen some 250 feet to the north of the quarry, which would place the probable width of the mineralised zone at 300 feet, though it is likely that the amount of mineralisation might vary considerably in this distance. The mineralised ridge extends to the end of the *June* claim and through the *Helen* claim adjoining, being proved by a number of open cuts and prospect holes, some 20 in all. These, in all cases, have shown magnetite, generally impregnated with a little copper pyrites. This gives a length for the mineralised zone of about 3,000 feet. At the face of the quarry the rock on the right or south is silicious, while that to the north is more basic. Near the centre of the quarry felsite about 6 feet wide is seen. The ore and vein-matter show irregular cooling fractures all through the mass. Above the quarry, 37 feet back from the face and a little to the left, an open cut has been run in from the north side of the ridge a distance of 18 feet, attaining a depth of 12 feet. This cut is all in ore, which is magnetite with a considerable mixture of copper pyrites and bornite.

In this part of the country there are very few rock exposures to be seen, but the mineralisation appears to occur between lime on the north and granite to the south, a comparatively

* *See* Rock Sample No. 18 (No. 6), Appendix.

narrow band of felsite or felsitic dyke intervening between the granite and the ore body, the latter probably being formed at the time of the granitic upheaval.

Flowing through the *Amazon* claim, which adjoins the *Helen*, is Link creek, which has a fall of 70 feet from Victoria lake, affording ample power for mining operations. There is also an unlimited supply of suitable timber for mining purposes. There is undoubtedly a large mineralised area on this group, and its value as a workable property will depend on the nature of such mineralisation shown by further development work. The general country rock of the district is a hornblende granite.*

The management state that an assay of an average sample of the ore taken from the face of the quarry gave gold $1.80, silver 1 ounce, and copper 3.3 %, which appears to be justified by the look of the ore and sample assayed in the Government laboratory, though picked ore would run much higher. The value of the ore is helped considerably by the gold content, which is probably carried by iron pyrites in a quartz vein matter, which was noted at different points on the property.

Peerless Mineral Claim.

The *Peerless* mineral claim is situated to the east of the *June Group*, on Murray creek, on the western end of the range separating Alice lake from Victoria lake. Link creek flows round the north-western base of the mountain from Victoria to Alice lake. After crossing Link creek from the *June Group*, and at the eastern end of a slight ridge, open quarry work has exposed an ore body 30 feet wide of nearly solid zinc blende, mixed with a little quartz vein matter. The lead runs N.W. and S.E., dipping 60° to the north; the hanging-wall is diabase and the foot-wall limestone. The quarry shows a face of ore from 9 to 10 feet high. Some prospect holes have been sunk on the ridge 200 feet to the west of the quarry, the mineral at this point being principally arsenical iron in a quartz, with some blende. The claim is owned by Julian Sutro, of Quatsino.

Elk Mineral Claim.

Adjoining the *Peerless* to the east is the *Elk* mineral claim, owned by J. L. Leeson, of Quatsino, and located in the spring. A small prospect hole shows some blende and galena occurring between lime and diorite.

The *I. X. L.* mineral claim adjoins the *Elk* claim to the east and is owned by Samuel Bryce, of Quatsino. The lead is an extension of the *Elk* lead and shows the same mineralisation.

WEST ARM OF QUATSINO SOUND.

A number of claims were located for copper on the West arm and some little work done, but now all have been abandoned, with the exception of the iron properties. One or two of the former were visited, but nothing seen worth noting.

Iron Ore.

The deposits of iron ore* are situated on the north side of the West arm, nine miles west from Coal harbour; the deposits are owned by the Iron Mountain Syndicate of Victoria. The property consists of eight claims containing limonite, and five containing bog iron. A series of bogs, one and a half miles long and extending back from the north shore of the arm, form the basin where these deposits of bog iron occur. The bogs are drained by a small creek flowing into the arm and named Indian creek. These deposits have been prospected by holes sunk at different points.

On a range of hills to the north-west of the bogs lie the limonite deposits, one of which, on the *Sunrise* claim, one mile back from salt water and at an altitude of 400 feet, was

* *See* Rock Samples Nos. 24 and 25 (Nos. 10A and 10B), Appendix.
**See* Rock Sample No. 15 (No. 3), Appendix.

examined. On this claim a small creek runs through a limonite deposit, exposing it for a considerable distance. The deposit has also been prospected by a number of open cuts and holes.

To get an intelligent idea of the extent of these deposits, or to form any estimate as to the probable tonnage, would require a detailed survey of the whole property, together with careful prospecting; but there is enough ore on the surface to warrant parties interested in the iron industry making a careful examination of the property; the ore is well situated for easy and cheap transportation to navigable waters.

Marble Creek.

An examination was made for a short distance up Marble creek, by which Alice and Victoria lakes drain into the West arm of Quatsino sound.

At the mouth of the river a series of grass flats extend for a mile; above this the stream flows through a narrow canyon of blue limestone for over half a mile, the walls rising perpendicularly on either side for from 50 to 150 feet in height, out of the dark water of the river, by which they are cut into small caves and fantastic shapes, clothed with maiden-hair fern and hanging cedar, making this canyon of Marble creek as beautiful a spot as is to be found on Vancouver Island. The river is navigable for canoes nearly to the head of the canyon, but from this point there are several rapids and a waterfall, giving a head in all of 20 feet. A rough estimate of the flow of water was made on the 18th of July, and it was placed at 21,000 cubic feet per minute. The creek does not appear to be suitable for the development of power, owing to the difficulty and expense of construction offered by the canyon. There is another fall near Alice lake, about six miles from the sea, the total elevation of Alice lake above salt water being estimated at 100 feet.

NANAIMO DISTRICT.

NANAIMO MINING DIVISION.

REPORT OF MARSHAL BRAY, GOLD COMMISSIONER.

I have the honour to submit my annual report on the mining operations in the Nanaimo Mining Division for the year ending the 31st of December, 1903.

There were 514 mineral claims in good standing at the end of the year, and while less locations were recorded for 1903 than in previous years, a good deal of development work has been done, giving in many instances very gratifying results. This Mining Division and the Coast mines generally are easy of access, and, consequently, are convenient for personal examination, while the low cost of working, the cheapness of labour, fuel and supplies, and the permanent nature of the deposits, as inferred from development work done, are all good and sufficient reasons why capital should find a remunerative investment in this extensive area.

TEXADA ISLAND.

Marble Bay.

The *Marble Bay* mines have shipped during the year to Ladysmith and elsewhere about 15,000 tons. The development work done for the year consists of sinking the shaft 100 feet deeper, making the lowest level 460 feet from the surface, with drifting and cross-cuts 376 feet. New plant installed includes one Lidgerwood hoisting engine, new sorting tables and ore-bin at the mine, while a new machine shop has also been erected. The average number of white men employed for the year was 36, with 4 Chinese ore sorters. Labour troubles interfered with the operation of the mine and delayed development work for some time. A large body of ore has been exposed at 140 feet from the shaft on the 460-foot level, and in the main north level the ore is of high-grade, and it is very encouraging to learn that the copper values have steadily increased with depth.

Van Anda.

The properties held by the Van Anda Copper & Gold Co., Ltd., have been exploited during the year and the *Cornell* and *Copper Queen* mine are now steadily shipping ore to the Ladysmith smelter. The main shaft of the *Cornell* has been sunk from the 360-foot level to the 560 foot level, and development comprises 636 feet of drifting, 71 feet of winzes and 200 feet of raises. A tramline has been built connecting the mine with Van Anda bay, where a 200-ton bunker has been built. Ore shipments began in July, the total output for the year being 3,279 tons. The ore in this mine is also improving with depth.

On the *Copper Queen* the development work done includes drifts, 103 feet; raises, 25 feet; winzes, 124 feet. A new hoist has been installed at the surface and the old hoist lowered to the head of the winze at the 500-foot level. A small Cameron pump has been placed at the 100-foot level and a sump cut there to catch the surface water; an auxiliary vertical boiler has been placed in the boiler-house, and a two-compartment bin and ore-chute, to hold 180 tons, has been built and connected by a spur line with the main tramline from the *Cornell* mine. Ore shipments began in July, and the total shipments for the year were 806 tons. The average number of men employed for the year in these two mines was 35.

The Puget Sound Iron Company's mines have shipped 2,290 tons of iron ore to Irondale, and have shipped 125 tons of copper ore to the Ladysmith smelter. This latter ore gave good values in gold and silver. The development work done for the year was 300 feet of tunnel driven into the hill, and the average number of men employed was 10.

The *Loyal* mine has been leased to an American syndicate, which has installed a small hoisting plant and has done considerable development work on the property, taking out some very rich bornite and chalcopyrite ore from the shaft. It is the intention to fully develop the property this coming year.

The *Nutcracker* claim was worked during the fall months and some very rich ore containing free gold was taken out.

The Cordillero Company, of Seattle, has run a tunnel 120 feet on its properties during the year, and intends to push the same forward to the objective point. Some fair returns were got from the rock cut through by the tunnel.

Many other claims have had considerable development work done during 1903, and the coming year promises to be a prosperous one for Texada island.

The mineral claims situate on Phillips and Frederick arms and Thurlow and Valdes islands have not had much more development work done during the year than was necessary to keep them in good standing.

Considerable work has been done in Dunsmuir, Bright and Oyster Districts during the year, with gratifying results.

The mineral claims located and recorded during the year ending 31st December, 1903, are situate in the following places throughout the Nanaimo Mining Division, viz. :—

Texada Island	101	claims recorded.
Valdes Island	14	"
Harbledown, Maud, Thurlow and Gowland Islands	8	"
Tatlaco Lake	1	"
Knights Inlet	1	"
Loughborough Inlet	4	"
Pryce Channel	2	"
Horne Lake	2	"
Robson's Bight and Port Neville	2	"
Bright District	10	"
Dunsmuir District	4	"
Oyster District	2	"
Nelson District	7	"
Kla-anch River	1	"
Menzies Bay	2	"
Total	161	"

OFFICE STATISTICS—NANAIMO MINING DIVISION.

Individual free miners' certificates issued	227
Companies " "	6
Mineral claims recorded	161
Certificates of work recorded	183
Certificates of improvements recorded	26
Crown grants applied for and issued	26
Bills of sale recorded	29
Permissions given to re-locate	2
Rental for mining lease	1

The revenue collected for the above free miners' certificates and mining receipts generally for the year ending the 31st December, 1903, was $4,532.85, being $198.70 in excess of what was collected for the year ending 31st December, 1902.

VICTORIA DISTRICT.

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 ending 31st December, 1903.

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 work on the property of the Tyee Copper Company, Ltd., at Mount Sicker has been very extensive during 1903. The 100-foot level has been extended a further 504 feet, making a total of 896 feet. The 165-foot level has also been extended 494 feet, and is now 695 feet in, and the 300-foot level 611 feet, making 636 feet. The work done during the year has been of a most satisfactory character, and the ore reserves have been largely added to. At the present time the known ore reserves are sufficient to ensure a supply of 5,000 tons per month for the next two years, and simultaneously with the work of extracting the ore, heavy and continuous development is being carried on. The underground workings at the *Tyee* mine now exceed two miles in extent, and the ore bodies have been proved to exist right through, from the west to the east boundary lines, a distance of 1,500 feet. The average width of these ore bodies is over 20 feet, and some of the stopes have shown a width of 45 feet of clean, solid ore. Since the erection of the aerial tramway, in October, 1902, over 50,000 tons of ore have been shipped to the Tyee smelter at Ladysmith, and recently the capacity of the tram has been doubled, so as to keep pace with the output of the mine. Further timber lands have been purchased from the E. & N. Railway, and the company now holds 600 acres, conveniently situated for hauling the timber to the mine. The smelter at Ladysmith has worked most successfully during the year under review. During the 12 months 42,000 tons of *Tyee* ore were treated, producing 4,498 tons of matte, containing 3,604,474 lbs. of copper, 121,932 ozs. of silver, and 6,620 ozs. of gold, the value of which, after deducting refining charges, amounts to $562,890; and in addition to this a large tonnage of custom ores has been treated.

NOTE BY THE PROVINCIAL MINERALOGIST.—A full report of this company's mine and smelter will be found in the Report for 1902. The following extracts from the report of the mine superintendent, Mr. E. C. Musgrave, to the Directors in April, 1903, give an idea of the cost of mining in this camp:—

Wages paid.

Under-ground:—			
Machine miners	$3 50	per day of	8 hours.
Miners (hand drillers)	3 00	"	"
Timbermen	3 25	"	"
Muckers and trammers	2 50	"	"
Above-ground:—			
Carpenters & timber framers, loggers, mechanics, hoist-engineers and blacksmiths	3 50	"	9
Surface hands (white)	2 50	"	10
" (Chinese)	1 00	"	10

Cost of Mining per Ton of Ore Shipped.

Stoping	$1.359 per ton.
Proportion for exploration	.499 "
Surface work	.124 "
Ore sorting	.041 "
Transportation to railway (aerial tram)	.150
Total cost of ore delivered at E. & N. Railway	$2.173

The total amount of development work done during the (fiscal) year has been: Drifting, 1,095 feet; cross-cutting, 511 feet; sinking, 193 feet; upraising, 319 feet. The average costs per lineal foot have been: Drifting, $9.15; cross-cutting, $6.77; sinking, $18.31; upraising, $11.59.

The total tonnage of ore delivered to the smelter during the period under review was 21,565 tons, of which 20,688½ was first-class ore, and 877 tons copper-bearing schists (for flux). Of the ore, 2,930 tons were sent from the dump and 17,758½ tons from the mine. The assay values of the ore are given in the report of the smelter.

Smelter Report. The report of the manager of the smelter at Ladysmith, Mr. Thos. Kiddie, is exceedingly interesting from a metallurgical standpoint, as showing the practical results obtained in smelting an ore carrying over 35 % of barium sulphate, a problem, as far as can be learned, not met with outside of this camp. The following figures show the results of the first few months run on this ore, which, as just intimated, is unique in character, and concerning which no previous results were obtainable as a guide; consequently, as must be recognised, the work was largely experimental:—

Ore Receipts from September 22nd, 1902, to April 30th, 1903.

Copper-bearing ore (roughs)	15,060.725 tons.
" (fines)	5,173.785 "
Total	20,234.510 "

The average assay of this ore was:—

Copper (wet assay)	4.43 %
Silver	2.76 oz. per ton.
Gold	0.12 "

Other receipts were as follows:—

Schistose flux ore	1,340.9 tons.
Sandstone	396 "
Iron ore	551 "
Coke	2,346 "

Burnt Ore.—The average analysis of the burnt ore delivered to the smelter was as follows:—

Iron	10.44 %
Zinc	8.14 "
Alumina	3.61 "
Barium sulphate	34.08 "
Magnesia	trace.
Lime	3.46 %
Silica	22.51 "
Combined sulphur	7.42 "
Total sulphur	13.86 "

During the last quarter of the year (fiscal) the burnt ore showed on analysis an increase of:—Iron, 1.86 %; zinc, 0.93 %; barium sulphate, 7.66 %; lime, 0.5 %; combined sulphur, 0.54 %; and a decrease in silica of 11.49 %.

Smelting Operations.—The furnace "blew in" on the 16th December, 1902, and had run 107 days (of 24 hours) and smelted as follows:—

Burnt ore	13,853.841 tons.	16,091.465 tons.
Green ore	2,237.624 "	
Schist		539.636 "
Silica flux		774.687 "
Slag		338.108 "
Iron ore		301.653 "
Matte		963.818 "
Total mixture		19,009.367 "
Coke used		2,116.313 long tons.

Showing an average per day of 150.387 tons of ore, or 177.657 tons mixture. The ratio of coke to ore was 1 to 7.428, or of coke used to burden 1 to 8.775.

The matte produced in 107 days' run amounted to 1,394.3 tons, showing an average assay of: Copper, 41.95 % (dry); silver, 29.67 oz. per ton; gold, 1.483 oz. per ton. The yield per ton of ore was:—

Copper (dry)	3.63 per cent.,	valued at	11.5 cents per lb. =	$8.349
Silver	2.57 oz. per ton,	"	50.82 " oz. =	1.306
Gold	0.128 "	"	$20.00 " oz. =	2.576
Yield value per ton of ore				$12.215

Slags.—The following is the average analysis of the slags produced:—

Copper	0.65 %
Iron	15.71 %
Silica	28.79 %
Alumina	11.51 %
Zinc oxide	10.43 %
Barium oxide	30.55 %
Calcium oxide	3.38 %

Experience and experiments with the ore have materially improved the practice. Mr. Kiddie has kindly furnished me with the following absolute average figures of the results of the last six months' work. He says, under date 29th April, 1904:—

"Answering yours of the 27th instant, I herewith enclose a statement covering the smelter operations during the last six months. During this time the furnace was in blast 123 days of 24 hours each, an average of 20 days per month, and smelted 30,703 tons of material, of which 28,290 tons were ore, making a daily average of 249.6 tons of material and 230 tons of ore per day, from which we shipped in the form of matte, 2,275,997 pounds of copper, 72,207.8 ozs. of silver, and 4,592.18 ozs. of gold. A general analysis of the burnt ore used during this period is as follows:—

Fe %.	SiO_2 %.	Zn %.	$BaSO_4$ %.	S (in Sulphides) %.
11.45	19.36	6.97	38.87	6.56

While the general analysis of the slags produced during this period, which also includes custom ores, was as follows:—

Cu %.	Au. oz. per ton.	Ag. oz. per ton.	FeO %.	ZnO %.	BaO %.	CaO %.	SiO_2.	Al_2O_3 %.	MgO %.
.37	.12	Trace.	17.68	6.44	26.16	7.92	33.34	10.75	Trace.

"The improvement in the slag assays for copper over the previous year is due in part to the increased settling capacity of the receivers at the furnace; in part to a reduction in the specific gravity in the slags by the admixture of suitable fluxing ores, which were not procurable in the earlier stages of our operations; in part to the lesser amount of ZnO in the slags, as a result of the admixture of other ores referred to; and in part to altered furnace practice, as a result of experiment with such ores. The specific gravity of the mattes was between 4.7 and 5.0, and of the slags between 3.6 and 3.8.

"Of the total ore smelted, 62.8 % was burnt ore, 22 % raw sulphide ore and 15.2 % raw custom ore—or 62.8 % burnt ore and 37.2 % raw ore, from which a shipping matte of from 40 to 45 % copper was produced in one smelting operation. Comparing the furnace work of the past six months, as shown above, with the last annual statement (the figures previously given), it will be seen that the capacity of the furnace has been raised from 177 tons to 249.6 tons, an increase of 72.6 tons per day."

The Vancouver Island Mining and Development Co., Ltd.

This company, the offices of which are in London, Eng., has recently secured the option for two years on a large group of claims on Mount Sicker to the east of the *Tyee*, and work has been commenced on the *Westholme* claim. Suitable machinery has been purchased, including air compressor and drills, hoisting engine, &c., so that the development of the property will be pushed forward with expedition and economy. It is the intention to sink a shaft to a depth of at least 500 feet, and to thoroughly explore the ground. The necessary buildings, &c., are now being erected, and the coming spring should see the work in full swing.

Richard III.

The Richard III. Mining Co.'s property, which lies to the east of the Tyee mine, has been vigorously developed during 1903, with most encouraging results. The president and manager is Mr. C. H. Dickie, and the superintendent, Mr. W. C. Rannalls. During the year the shaft, which has two compartments, has been sunk to a depth of 500 feet, with a 10-foot sump. Five levels have been run, the amount of driving being 1,180 feet, with 354 feet of cross-cuts, and upraises 137 feet, making a total of 2,181 feet. This work has been done at a cost of under $10 per foot, including buildings, hoisting engine and boiler, and all executive expenses. Ore has been found on each level, but the best values so far have come from the 500-foot level, from whence a ton of ore was taken and shipped to the Tyee smelter, at Ladysmith, as a trial shipment. This gave a result of 3.29 % copper, .66 gold and 25.85 ozs. silver per ton. The work is being energetically pushed on, and the executive hope to commence shipping ore to one of the local smelters by the middle of January (1904).

The *Lenora* mine will be found fully reported on in last year's Report, since which time there are no new developments of importance. A large proportion of the dump was sent to the Crofton smelter and work has been carried on in a small way.

Koksilah River.

A number of promising claims have been staked in this district, and on some a fair amount of work has been done on iron-capped, copper-bearing material. The copper-bearing zones appear to run along the contact of an eruptive rock and limestone, the latter containing in places considerable quantities of volcanic breccia and ash.

The *W. A. E.* claim, on the Koksilah river bank, has been prospected by two large open cuts, put in on a vein of quartz carrying zinc and copper, apparently at the contact of the chert and limestone, as shown in the No. 1 cut by the river. In the No. 2 cross-cut, however,

about 600 feet distant, a dyke of very decomposed eruptive rock has been exposed, lying parallel and close to the vein, which in this cut shows hardly any quartz, the copper being found in garnet rock with actinolite and epidote. An assay of this ore gave a result of 26 % copper and $1 gold per ton. ⊕. 0497 02/4m

The *Wallace* and *Copper Hill* claims are situated to the west of the *W. A. E.*, away from the river, but on parallel lines, and show copper at chert and grano-diorite contacts.

The *Blue Bell* claim lies about one mile west from the Koksilah river, and is owned by Messrs. Maclay & Ryan. More work has been done on this claim than on those previously mentioned, a tunnel having been driven in a distance of about 60 feet. This was commenced on a strong iron capping, which, on being broken into, disclosed a small but very rich vein of chalcopyrite lying rather flat. This forms the roof of the tunnel for some distance, but appears to be dipping easterly, as at the end of the tunnel, which is not carried straight but has a bend towards the east, the vein is nearly perpendicular on the east wall. Assays from here have given 29 % copper, with low values in gold and silver.

Another claim, the *Solomon*, held by the same parties and adjoining the *Blue Bell* on the west, also shows a rich outcrop of chalcopyrite, covered by an iron capping.

The *Dora* and *Mabel* claims lie to the north-west of and adjoining the *Blue Bell*, and are both located on a large showing of deep red and brown decomposed iron-bearing rock, in places covered with an iron cap composed of soil and gravel cemented together with the iron, and in other places decomposed for 2 feet in depth into soft limonite-looking material. Limestone outcrops are found on the *Mabel* claim, near the contact of the grano-diorite; pyrolusite and specular iron, both float and in place, are also found on this claim. A small open cut on the *Mabel*, through the iron cap and near the limestone, shows copper-bearing rock, but a considerable amount of work would be required to prove what underlies this extensive outcrop of mineralised rock. The face of the mountain here is very steep, and one foot in two could be gained by tunnelling. Assays of ore from this claim have given 12.32 % of copper.

The prospects so far opened up in this district have been most encouraging, and fully warrant further expenditure of labour and money.

QUEEN CHARLOTTE ISLANDS.

NOTE BY THE PROVINCIAL MINERALOGIST.—Mr. W. D. Verschoyle has kindly supplied the following notes on the Queen Charlotte Islands. The information was not received until the printing of this Report was nearly completed, and therefore could not be put in its proper place under the Skeena Mining Division. As, however, the latter division is under the jurisdiction of the Victoria Gold Commissioner, Mr. Verschoyle's notes are inserted here. He says:—

"*Coal.*—An offer has been made for the coal lands near Skidegate by American capitalists, who wish to begin active boring operations at once. It is doubtful, however, whether satisfactory arrangements can be made with the owners.

"*Mineral Claims.*—Sheldon's claim, situated about 12 miles south of Skidegate, on the east side of the islands, shows up well in gold and silver, with small copper values. It appears to be essentially a gold ore, and is different in character to most of that observed. Active work is contemplated.

"Heino's mine, on Copper island, has had considerable work done upon it, and a tramline and small wharf have been erected to facilitate shipping. A trial shipment of about 25 tons has been made, and if the results are satisfactory shipping will be continued. The ore is a large body of limestone, containing considerable chalcopyrite and iron pyrites.

"The Skincuttle island mine (Law's mine) has had a good deal of development work done in the way of shafts and open cuts, showing up some nice chalcopyrite in a calcite matrix, while on the south side there is considerable garnetite.

"On the Burnaby island mine (Law's) there are some large low-grade ore bodies containing chalcopyrite, on which a shaft has been sunk and some open cuts made. There is also a smaller vein of nice-looking chalcopyrite, which follows a diorite and limestone contact.

"The George island mine (Law's) is a recent discovery and but little work has been done on the property. There are several large blocks of ore showing, containing chalcopyrite, malachite and azurite in a calcite matrix.

"On the Rose harbour claim (Law's) chalcopyrite occurs in a calcite matrix at a limestone and diabase contact. Active operations are in progress for the purpose of testing the body of ore by means of a 50-foot shaft and cross-cut.

"Other small ore veins have been found both on the east and the west side of the islands, but little has been done to test their value. Yonal's claim, near Skedan, on the east coast, contains a preponderance of zinc blende, but sufficient work has not been done to prove whether this will be characteristic of the whole vein or whether its width and continuity will justify its operation for the production of zinc alone.

"*Slate.*—Overlying some of the earlier Cretaceous rocks there is a bed of shale or slate, which is easily cut when mined, but soon hardens on exposure to the air and takes a fine polish. It is much used by the natives for making small totem poles and other curios, for which there is a ready sale. This rock should have considerable value for interior decorative work and as mantelpieces and panelling."

Office Statistics—Victoria Mining Division.

	1901	1902	1903
Free miners' certificates issued	874	1,029	667
" " special	12	5	16
Mining claims recorded	345	273	150
Placer claims recorded	5	5	4
Certificates of work issued	277	462	344
Certificates of improvements issued	15	41	59
Grants of water rights for mining	5	3	4
Conveyances recorded	145	142	114
Abandonments recorded	4	1	...
Placer leases issued	2	4	3
Permits recorded	3	7	6
Lay-overs recorded	..	2	2
Revenue derived.			
Free miners' certificates	$6,488 65	$7,307 10	$5,518 75
Mining receipts general	2,892 35	5,244 05	3,878 85
	9,381 00	12,551 15	9,397 60

NEW WESTMINSTER MINING DIVISION.

REPORT BY D. ROBSON, MINING RECORDER.

I have the honour to forward for your information the following report of mining operations in the New Westminster Mining Division for the year 1903.

The claims recorded during the year were distributed over a wide area. On Howe sound and vicinity there were 69; on Capilano, Lynn and Seymour creeks, 48; Chilliwhack and vicinity, 18; Harrison river and vicinity, 15; Pitt lake and river, 13; Lillooet river, 6; Jervis inlet, 3.

It is to be regretted that there have been no new developments in the district worthy of special report. As far as has yet been ascertained, the ore is all low-grade and cannot be profitably worked except on a large scale and with the most economical plant and equipment. This would necessarily involve the investment of a larger amount of capital than has heretofore been obtained. The quantity of ore existing is practically unlimited, and it was hoped and expected that before this time some of the properties would be in active operation as shipping mines.

The *Britannia Group*, on Howe sound, is the only property on which any considerable expenditure has been made during the year. The stock of this property (having a par value of $250,000) has been consolidated and is now entirely owned by the Britannia Copper Syndicate. During the year upwards of $20,000 has been spent in exploratory and other work. It has been determined to construct an aerial tramway from the mines to the shore of Howe sound, a distance of 3 miles, by which to convey the ore to the wharf for shipment or treatment. The route of this line has been cleared, and it is the intention of the syndicate to proceed with the erection of the necessary plant and equipment in the spring. The townsite, comprising about 150 acres, has also been partly cleared.

Exploratory work on the *South Valley Group*, near the *Britannia*, has demonstrated that this property is on the same lode as the latter. There are, therefore, three very extensive copper properties adjacent to each other in this region, namely, the *Britannia Group*, the *Goldsmith Group* and the *South Valley Group*, all showing large bodies of similar ore. As soon as it has been proved by actual operation that any of these properties can be profitably worked, the others will almost certainly be opened up and the manipulation of this vast body of ore will give employment to hundreds of men. There are many other similar properties in this region, as well as on Lynn creek, Pitt lake and elsewhere, the development of which is dependent upon actual proof that this class of ore can be worked at a profit.

OFFICE STATISTICS—NEW WESTMINSTER MINING DIVISION.

	1902.		1903.
Free miners' certificates issued	1,038	....	855
Quartz claims recorded	188	....	173
Certificates of work recorded	256	....	192
Certificates of improvements recorded	5	....	13
Conveyances recorded	53	....	32

Revenue.

	1902.		1903.
Free miners' certificates	$6,181 56	....	$5,384 85
Mining receipts general	2,581 50	....	2,912 05
Total	$8,763 06	....	$8,296 90

INSPECTION OF METALLIFEROUS MINES.

Report of James McGregor, Inspector.

I have the honour to submit my annual report for the year 1903, with respect to the condition of the metalliferous mines in my District.

Trout Lake and Lardeau. Considerable mining has been accomplished in these districts during the year, and also a great amount of prospecting and developing. Where timbering is required it is well placed. The law regulating the thawing of powder is strictly carried out. I find upon inspection of the bunk-houses, that they all appear to be in a sanitary condition.

Slocan. The principal work during the year in this district has been development, all of which has been carefully attended to, with regard to the safety of the workmen, by timbering where necessary and using the safest methods of thawing powder; also all travelling ways and means of escape are well laddered and guarded. I have not in any instance found the Act being violated.

Nelson. The shipping mines in this district have operated the entire year with the exception of the *Poorman*, which suspended work a few weeks ago. There has been a considerable amount of development and prospecting, all of which is being carried on in accordance with the Act.

Trail. The mines in this district have progressed very rapidly during the year, both in output and development. As they are the deeper mines, they require to be worked principally by what is known as the square set system of timbering. This system requires a large quantity of timber, carefully framed. The framing is done by machinery, insuring a perfect and uniform fit, and upon inspection I found the timbers properly placed. In operating these mines a large amount of machinery is necessary, which is kept in splendid condition. The ropes, cages, catches, and signals are all in compliance with the Act. The safety catches, I might say, are frequently tested. The thawing of the powder is done outside of the mines at a safe distance, and all blasting is done at night, with the exception, when necessary, of breaking a few boulders in the daytime to clear the way, in order to facilitate the work. All ladder and travelling ways are kept according to the Act, thus insuring safety.

Boundary. The mines in this district have greatly increased their capacity, thereby entailing a much greater amount of machinery and timbering than last year. The principal mines in this district are worked partly by open cuts or quarries and partly by shafts. The machinery, I find upon inspection, in all of these mines, together with the ropes, cages, catches and signals, in splendid condition. Many new properties in this district have been opened up during the year.

In the Vernon district there has been a slight increase over other years in development work.

In the Ainsworth district there is very little development work being done.

REPORT OF ARCHIBALD DICK, INSPECTOR.

I have the honour to submit herewith my annual report on the metalliferous mines of the East Kootenay District for the year 1903.

Very little has been done in this section during the year. I visited many of the mines but found that no work was in progress, with the exception of the *North Star*, near Kimberly, where a small force of men has been employed. On the property of the Sullivan Mining Co. a few men were also at work for two months, when operations were suspended. This company has done nothing further to its partially finished smelter at Marysville, but it is said that it will be completed next summer.

I was unable to leave Fernie long enough to visit the *Ptarmigan* and other mines in the Windermere Division.

Of the four accidents reported (*see* list), three were caused by drilling into missed holes and one by the fumes of gas from the powder after blasting. All of them could have been avoided, although I am aware that the men did not know they were working so close to charged holes. I would suggest that a hole that has missed fire should not be unrammed, nor should another hole be drilled except at a safe distance away.

REPORT OF THOS. MORGAN, INSPECTOR.

I have the honour to submit my report for the year 1903, as Inspector of Metalliferous Mines for Vancouver Island and Texada island.

Lenora. This mine is situated at Mount Sicker, and was last inspected by me on November 23rd, 1903. No accidents were reported for the past year. The mine is well ventilated by natural ventilation and compressed air, and everything is in a safe condition. The ore from this property is taken to the smelter at Crofton, a distance of 13 miles.

Tyee. This mine is also situated at Mount Sicker, and my last inspection was on November 23rd, 1903. No accidents occurred during the year. It is well ventilated by natural ventilation, assisted by a small fan. During the past year considerable improvements have been made. New ropes have been put on for the aerial tramway, the loaded track-rope being $1\frac{3}{4}$-inch and the light track-rope $\frac{7}{8}$-inch. A saw-mill has been installed to supply the mine with the necessary timber. New bunk-houses have been built, and a reading room and many other improvements made for the comfort of the men employed. Everything in connection with the property is kept in first-class order.

Marble Bay. This mine, situated on Texada island, was last inspected by me on October 8th, 1903. Everything was in a safe condition and well ventilated by natural ventilation and compressed air. No accidents have happened during the past year.

Cornell. My last inspection of this mine, situated on Texada island, was made on the 8th of October, and my official report forwarded. The workings of the mine are safe and the ventilation, by both natural and compressed air, was very good. The management has neglected to put in a cage, as they promised to do some time back; I again notified them about it and received an answer stating that it would be done about the first of the year. A tramway has been built from the mine to the bunkers at deep water, a distance of about two miles.

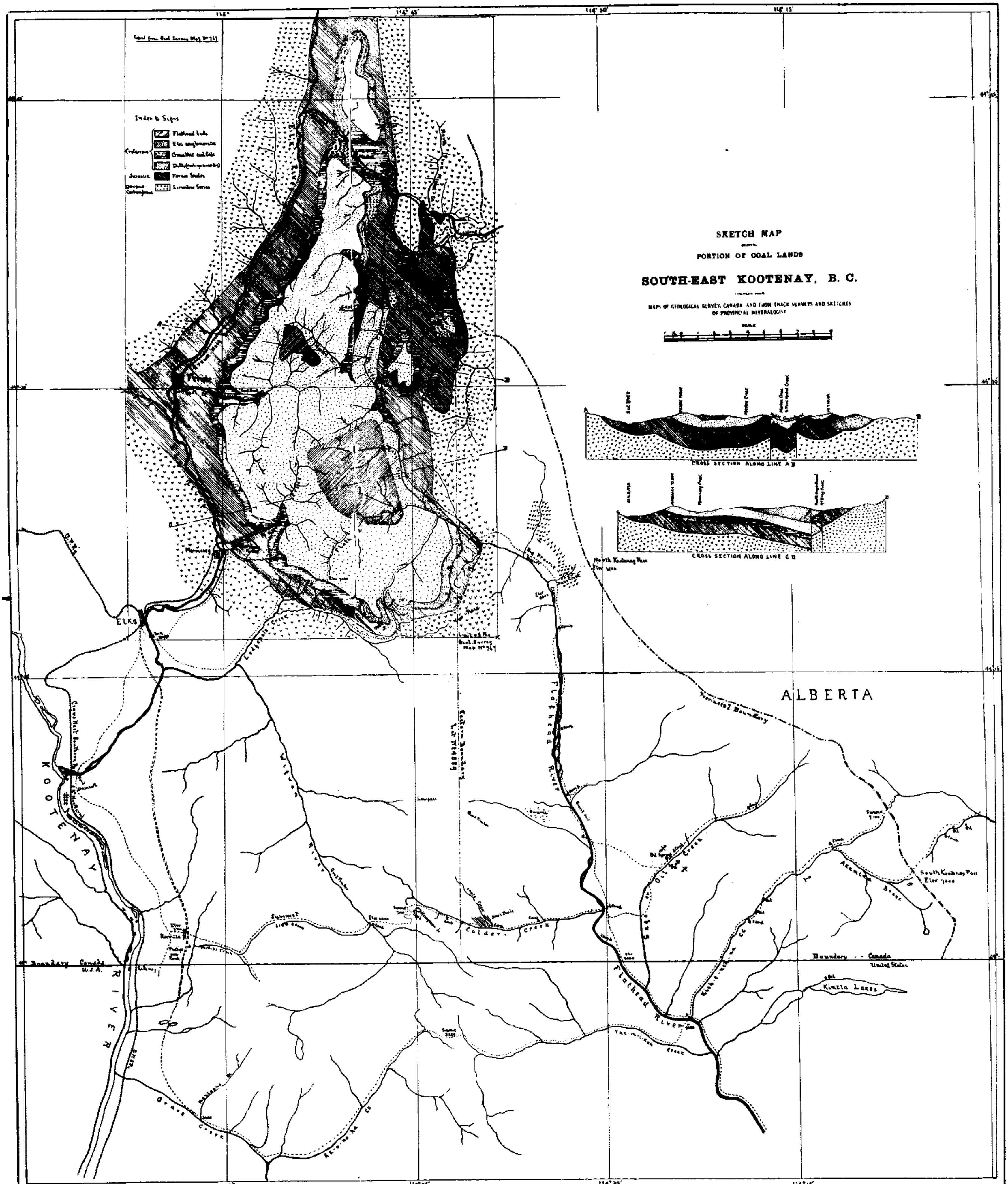
Copper Queen. This mine is also situated on Texada island and was inspected by me on the 8th of October, 1903. It is ventilated by natural ventilation and compressed air. No accidents occurred during the year. The mine is in good condition, with the exception of not having a cage, but this is to be put in immediately.

Rose Group, or Newton Mine. I did not make any inspection of this mine, situated in Renfrew district, but a fatal accident was reported as occurring under the following circumstances. Two men, named Oswyn D. S. Scholefield and E. Jenkins, were blasting six holes. Just as Scholefield lit the last hole the first hole exploded, knocking them both down. Jenkins got outside the tunnel before the second hole exploded, but Scholefield was in the tunnel when the rest of the shots went off. Scholefield got outside the tunnel himself and was carried to a cabin, where he died one hour and thirty minutes later.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1903.

January	1—William Chegwedder, miner, working in the North Star mine, Kimberley, was seriously injured, and lost the sight of both eyes, by drilling into a missed shot.
"	5—Fred. Tartan, blaster, Knob Hill mine, Phœnix, severely crushed by ore pile rolling down upon him.
"	10—Moses Jackson, miner, Venus mine, Nelson, killed by a fall of rock.
"	26—W. F. Wilton, miner, working in Ptarmigan mine, Wilmer, got slightly bruised on the legs by rocks, through drilling into a missed shot.
"	26—Edward Wills, miner, working in the Ptarmigan mine, Wilmer, was killed by drilling into a missed shot. Wills and Wilton were working together.
February	9—John Haven, miner, Le Roi mine, Rossland, bone of leg fractured by falling rock.
"	19—Archie Love, skip-tender, Le Roi mine, Rossland, killed in shaft.
"	19—August Feig and Gus Oleson, miners, Columbia-Kootenay mine, Rossland, killed by gas in shaft.
March	2—Samuel Ward, timberman, Centre Star mine, Rossland, killed in shaft by cage.
"	3—William Watson, miner, Knob Hill mine, Phœnix, killed by blast, through drilling into missed hole.
"	3—John Salmon, miner, Knob Hill mine, Phœnix, injured severely by drilling into missed hole; died in hospital on the 4th.
"	7—Ben Colnon, timber trammer, Le Roi mine, Rossland, slightly bruised by timber falling on him.
"	7—Patrick Crichly, shift boss, R. Savage, Otto Bloom, Allen Calder and Edward Gagnon, miners, asphyxiated by gas in Nettie L. mine, Ferguson.
May	9—C. A. Peterson, carman, Old Ironsides mine, Phœnix, finger smashed.
"	15—John Rivers, miner, Le Roi mine, Rossland, hand slightly cut by machine handle.
"	19—Bert Perry, miner, Payton tunnel, Rossland, slightly cut on head by falling rock.
"	30—Ralph Leslie, Superintendent, Le Roi mine, Rossland, slightly injured about the head by falling timber.
July	2—W. Nicholson, timberman, Le Roi Mine, Rossland, slightly bruised on head and shoulders by rock falling from floor above.

"	7—A. Campbell, shoveller, Le Roi mine, Rossland, badly bruised on head and shoulders by falling down ore chute.
"	15—J. W. Wilkenreid, miner, Snowshoe mine, Phœnix, finger crushed by rock rolling upon it.
"	25—H. N. Peterson, miner, Le Roi mine, Rossland, slight cut on the neck by falling rock.
August	15—W. Caumbe, miner, Centre Star mine, Rossland, thigh broken by fall of rock.
"	28—John Kraft, blacksmith's helper, Le Roi mine, Rossland, injured on face and eyes by cap or powder exploding in forge.
September	10—Robert Curtis, mucker, Ymir mine, Ymir, killed by fall of rock.
"	22—Archie Conners, miner, Emma mine, Eholt, killed by falling down shaft.
October	11—Oswyn D. S. Scholefield, miner, Newton's mine, Vancouver Island, killed by premature explosion of shots while blasting.
"	23—James Crabb and Thos. Malloy, muckers, Knob Hill mine, Phœnix, killed by cave of rock.
November	5—P. H. Beach, pipeman, Le Roi mine, Rossland, toe broken through his falling from floor above.
December	11—E. Anderson, shoveller, Le Roi mine, Rossland, small bone broken through his falling down ore chute.



SKETCH MAP
PORTION OF COAL LANDS
SOUTH-EAST KOOTENAY, B. C.
MAPS OF GEOLOGICAL SURVEY, CANADA AND FROM TRACK SURVEYS AND SKETCHES OF PROVINCIAL MINERALOGIST
SCALE
Index to Signs
Flathead beds
Elk conglomerate
Crows Nest coal beds
Cretaceous
Jurassic
Fernie Shales
Devono Carboniferous
Limestone Series
CROSS SECTION ALONG LINE A B
CROSS SECTION ALONG LINE C D
ALBERTA
KOOTENAY RIVER
ELKO
Fernie
Morrissey
Flathead River
Calder Creek
Wigwam River
North Kootenay Pass
South Kootenay Pass
Boundary Canada
United States
Kintla Lakes
Grave Creek
114° 45'
114° 30'
114° 15'
115°

COAL MINING IN BRITISH COLUMBIA.

The coal fields of British Columbia actually working at the present time are those on Vancouver Island and the collieries of the Crow's Nest Pass Coal Co., situated on the western slope of the Rocky mountains. Coal is known to exist in many other parts of the Province and a good deal of prospecting has been done, but no serious development work has yet been undertaken, owing largely to the lack of transportation facilities. As has been already mentioned, there have been a good many inquiries as to the coal existing on Queen Charlotte islands and referred to in the Report for 1902 (*see* pages 54 to 58), and it is said that there is a probability of boring operations being started there this coming summer.

In the Yale district the known coal deposits near Nicola have been further investigated by surveys and boring during the past year. These further surveys and the prospecting work done have led to the discovery of extensions of the coal area not previously known. Extensive boring operations are planned for next year, but as yet no further available data has been obtained regarding these coal seams or the commercial value of the coal itself (*see* Minister of Mines' Report for 1901, pages 1,147, 1,156, 1,175, 1,183 and 1,184).

In the Bulkley valley and vicinity several new coal leases have been staked and further investigation has confirmed the previous reports of the existence of beds of excellent bituminous coal in this section. It is further reported that extensive beds of anthracite have been discovered and partially developed.

From the Peace river there are authentic reports of the existence of coal, just to the east of the Rocky Mountain range, but still in British Columbia, while discoveries are also reported in the vicinity of the Findlay river, Omineca. In Cariboo, too, as has been elsewhere noted, coal has been discovered on the Horsefly river and near Quesnel lake, and it is expected that the latter occurrence will be more fully investigated during the coming year.

In the eastern part of the Province, near the Crow's Nest coal area, further coal fields have been proven and coal lands have been located for many miles up the Elk river.

For the purpose of showing the quality of the coals of British Columbia, a series of analyses were made recently at the Government Laboratory of samples taken from coal seams actually being worked, and full tables of these analyses will be found in the Minister of Mines' Report for 1902 (pages 261 to 264).

Vancouver Island Collieries.

A decrease of 346,036 tons of coal and 4,399 tons of coke took place in the production of Vancouver Island Collieries in 1903. As already pointed out (*see* page 18), a large proportion of the output of the coast mines is used in California, and the market of that State has been so largely invaded by local fuel in the form of oil as to, at least temporarily, lessen the demand for coal. On the other hand, the local market has consumed more coal and the whole production of coke, a favourable indication as to increase of home industries. A detailed description of the Vancouver Island Collieries is found in the report of the Inspector which follows (page 219).

Crow's Nest Pass Collieries.

The gross output of coal from the Crow's Nest Pass Collieries is 195,927 tons in excess of the production of last year, an increase of 50 %, which has been made despite many adverse

circumstances. The production of coke also shows an increase, amounting to 41,927 tons, or nearly 40 % more than in 1902. The report of the Inspector follows on page ....

The following table shows the production of coal and coke by British Columbia collieries and the distribution of the output, together with the number of men employed and the wages paid for each class of labour, etc. :—

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	527,114	16			141,504	17		
" export to U. S.	546,723	10			27,757	14		
" " to other countries	2,725							
Total sales			1,076,563	06			169,262	11
Used in making Coke	282,469							
Used under colliery boilers, etc.	137,915	13						
Total for colliery use			420,384	13				
			1,496,947	19				
Stocks on hand first of year	54,415	15						
" last of year	8,130	14						
Difference taken from Stock during year			46,285	01			3,719	
Output of collieries for year			1,450,662	18			165,543	11

By-products, fire clay, 1,833 tons.

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	77	$4 30	49	$4 75	126	$4 52
Whites—Miners and Miners' helpers	1,920	3 72			1,920	3 72
Labourers	539	2 72	257	2 32	796	2 52
Mechanics and skilled labour	143	2 75	258	3 20	401	2 97
Boys	106	1 40	18	1 33	124	1 36
Japanese	64	2 12	34	1 25	98	1 68
Chinese	288	1 62	511	1 81	799	1 71
Indians						
Totals	3,137		1,127		4,264	

REPORT ON THE INSPECTION OF VANCOUVER ISLAND COAL MINES.

THOS. MORGAN, INSPECTOR OF VANCOUVER ISLAND COLLIERIES.

I have the honour, as Inspector of Coal Mines for Vancouver Island, to submit the following report for the year 1903.

The output of the Vancouver Island collieries for the year 1903 amounted to 860,775 tons, while the previous year's output was 1,247,665$\frac{1}{10}$ tons. The constant demand for the excellent product of the Vancouver Island mines still continues, showing that it is yet holding first place on local and foreign markets. The collieries operated on Vancouver Island during the year 1903 were as follows:—

The Nanaimo Colliery, owned by the Western Fuel Company, consisting of No. 1 Shaft, Esplanade, in Nanaimo; Protection Island Shaft; and Harewood Mine.

Wellington Colliery, in Cranberry District, comprising Nos. 1, 2 and 3 Slope Mines, and the Tunnel Mine, worked by the Wellington Colliery Company, Limited.

Wellington Colliery, in Comox District, comprising No. 4 Slope, Nos. 5 and 6 Shafts, and No. 7 Slope, also operated by the Wellington Colliery Company, Limited.

AGGREGATE SUMMARY OF RETURNS FROM VANCOUVER ISLAND COLLIERIES FOR THE YEAR 1903.

	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	353,165	16		
" export to United States	400,713	—		
" " other Countries	2,725	—		
Total sales			756,603	16
Used in making Coke	32,918	—		
" under Colliery Boilers	117,538	3		
Total for Colliery use			150,456	3
			907,059	19
Stock on hand first of year	54,415	15		
" last of year	8,130	14		
Difference taken from stock during year			46,285	1
Output of Collieries for year 1903			860,774	18

NUMBER OF MEN EMPLOYED IN VANCOUVER ISLAND COLLIERIES.

CHARACTER OF LABOUR.	NUMBER EMPLOYED.		TOTAL NUMBER EMPLOYED.
	Underground.	Surface.	
Supervision and clerical	40	33	73
Whites—Miners	919	.....	919
Miners' helpers	488	.....	488
Labourers	276	66	342
Mechanics and skilled labour	23	178	201
Boys	92	13	105
Japanese	64	34	98
Chinese	288	479	767
Totals	2,190	803	2,993

The State of California has received the greatest part of the coal exported from Vancouver Island, but it has also been sent to Alaska and the Hawaiian islands, while the Pacific mail steamers have been regular consumers. The following statement shows the relative position of British Columbia coal exports in the market of California :—

	1902.	1903.
	Tons.	Tons.
British Columbia	591,732	289,890
Australia	197,328	276,186
English and Welsh	95,621	61,580
Scotch	3,600	3,495
Eastern (Cumberland and anthracite)	24,133	13,262
Seattle (Washington)	165,237	127,819
Tacoma (Washington)	209,358	256,826
Mount Diablo, Coos Bay and Tesla	111,209	84,277
Japan and Rocky Mountains (by rail)	47,380	102,219
Total	1,445,598	1,215,554

ACCIDENTS.

(For Statistical Tables of Accidents and Full List *see* pages 234, 235, 236 *et seq.*)

It is my painful duty to report the number of 71 accidents for the past year ; 28 of these proved fatal, while 43 men received injuries of a serious and slight character. Referring to the fatal accidents, 17 were caused by explosions of gas, and, as already exp ained in my report, were due to negligence on the part of the sufferers, and if proper care had been taken would not have happened. Three fatalities were due to falls of coal, two of these being purely accidental, but the third was due to the miner not having his place timbered properly, after being told to do so by the fireman. Falls of rock accounted for four deaths, the blame of which can hardly be attached to anyone. Giant powder exploding resulted in two deaths, both happening while the men were preparing the charge and deemed accidental. Another fatality was caused by a locomotive running over a Chinaman, through his own fault. The remaining fatality was a pure accident, a link breaking and allowing part of the trip to run back, resulting in a Chinaman being run over. Of the serious accidents, 5 were caused by falls of coal, and 7 by falls of rock ; 5 were due to mine cars ; 2 by men being struck with a rope ; 4 by powder in the mine ; 1 by being struck with a post, and 1 by a shot blowing through, making a total of 25. Slight injuries were suffered by 18 men ; 12 of them were caused by explosions of gas ; 1 by fall of coal ; 2 were occasioned by falls of rock ; 2 resulted from mine cars ; while a rope striking a man accounted for the remaining accident

The detailed statement accompanying this report contains full particulars of all these accidents ; and in each and every case the most careful possible inquiry has been made, in order to ascertain the cause, and such measures adopted as appeared necessary to prevent a recurrence of these incidents. Monthly examinations of all the Vancouver Island mines have been regularly made by me, and special examinations whenever necessary.

COAL MINES OF THE WESTERN FUEL COMPANY.

(This Company has not authorised the publication of its Official Returns.)

The Western Fuel Company, successors to the New Vancouver Coal Mining and Land Co., Limited, has been working the following mines at the Nanaimo Colliery during the year, under the superintendence of Mr. Thomas Russell.

No. 1 Shaft, Esplanade, in Nanaimo, Joseph Randle, Manager.
Protection Island Shaft, Thos. Mills, Overman.
Harewood Mine, Thos. Budge, Manager.

The following additions and alterations have been made during the year:—

No. 1 Shaft, Nanaimo.

The levels off the diagonal slope have been extended during the year, the workings being pillar and stall and extraction of pillars. On testing the air on December 15th I found 22,000 cubic feet passing per minute for the use of 30 men and 5 mules in this district. On my last inspection of this district I found a little gas in three places, all others being clear.

No. 7 Level, off the main slope, forms a district of its own, and the workings are pillar and stall and extraction of pillars; 8 men and 2 mules working in this district received 7,000 cubic feet of air per minute.

No. 3 North Level is another district. The level off the slope to the dip of No. 3 has been somewhat extended during the year; the workings are also pillar and stall and extraction of pillars. There were 12,700 cubic feet of air passing per minute for 22 men and 4 mules. These districts all receive their air from No. 1 Shaft.

In No. 1 North Level the workings are the Big Incline, Spear's Incline, and Lamb's Incline. The Big Incline workings are pillar and stall and extraction of pillars. There were 17,000 cubic feet of air passing per minute for the pillar workings on the right side of the Big Incline and the pillar workings of Spear's Incline, for the use of 30 men and 7 mules. The air test for the left side of the Big Incline showed 10,500 cubic feet per minute for 15 men and 3 mules. These places are damp. The air supplied to the workings in Lamb's Incline was 14,000 cubic feet per minute for 30 men and 8 mules. The intake for the workings of No. 1 North Level is by way of Protection Shaft.

Protection Island Shaft.

Upper Seam.

Pillar and stall work and extraction of pillars has been carried on during the year. The main slope workings received 18,900 cubic feet of air per minute for the use of 35 men and 3 mules. The diagonal is not working, but received 5,000 cubic feet of air per minute to keep the places clear.

Lower Seam.

The workings of this seam are longwall, and 34 men and 2 mules received 8,400 cubic feet of air per minute. The air for Protection workings comes down Protection Shaft and the upcast is No. 2 Shaft (Esplanade), Nanaimo.

Air returned by way of No. 2 (upcast) Shaft, Esplanade...160,000 cubic feet per minute.
" " Newcastle " ..... 45,000 " "

Total air for Protection and No. 1 Shafts.....205,000 " "

The total air supplied to workmen was 115,500 cubic feet per minute, which leaves 89,500 cubic feet per minute for 80 mules, roads and old workings. The motive power for ventilation is

two Guibal fans, one at No. 2 Shaft (Esplanade), Nanaimo, making 42 revolutions per minute, with 1¾-inch water gauge, and one at Newcastle, making 96 revolutions per minute, with 1½-inch water gauge.

HAREWOOD MINE.

This mine was idle until July, having been shut down for ten months. The work is pillar and stall and extraction of pillars. On my last inspection on December 24th there were 16,000 cubic feet of air passing for 22 men and 2 mules. The motive power for ventilation is a fan.

A slope is being driven from the Northfield point in a south-easterly direction under Newcastle channel, to reach the coal under Newcastle island. The slope is down 250 yards.

The company has made considerable improvements during the past year. A new washer has been put in, with a capacity of 400 tons per day, and two new tube boilers, of 253 horse-power each, have replaced some of the old boilers, while two return tubular boilers (133 horse-power), each 84 inches in diameter by 16 feet long with 108 4-inch tubes, and 1 Rand (class "B-3") air compressor, cross-compound steam, non-condensing, cross-compound air, capacity 2,513 cubic feet of free air per minute at normal speed, have been installed.

COAL MINES OF THE WELLINGTON COLLIERY COMPANY, LIMITED.

(This Company has not authorised the publication of its official returns.)

The Wellington Colliery Company, Limited, has been operating the following mines during the year 1903, under the general management of F. D. Little, M. E.:—

The Wellington Colliery, in Comox District; John Matthews, Manager.
The Wellington Colliery, in Cranberry District; Andrew Bryden, Manager.

No. 4 SLOPE (WELLINGTON), COMOX.

Richard Short, Overman.

On the west side of the old slope, which is a district of its own, the workings have been off Nos. 3, 4, 5, 6, 9 and 11 levels by pillar and stall; the present workings are Nos. 9 and 11. The air for this district was 20,000 cubic feet per minute for 60 men and 8 mules. On the east side of the slope 9,000 cubic feet of air were passing for 12 men and 1 mule; this is another district.

In No. 2 Slope, extraction of pillars is being carried on, and the opening up of the levels that caved after the mine was flooded; 12,560 cubic feet of air per minute were supplied to this district for 19 men and 2 mules at a test made in December.

In No. 3 Slope the workings have been off Nos. 3½, 4, 6, 7 and 8 levels, by pillar and stall. Nos. 3½ and 4 level workings received 14,400 cubic feet of air per minute for 11 men and 1 mule, while Nos. 7 and 8 levels received 11,200 cubic feet per minute for 24 men and 2 mules.

The total air in the return at the fan shaft was 100,800 cubic feet per minute, while the total air supplied to the workings was 67,160 cubic feet per minute, leaving a leakage of 33,640 cubic feet per minute for roads and old workings.

Considerable trouble has been experienced in this mine during the year with gob fire, caused by the flooding of the mine and the gob heating after the water was taken out.

No. 5 Shaft (Wellington), Comox.

James Strang, Overman.

The workings in the heading are all longwall, and received 12,500 cubic feet of air per minute for Nos. 2, 3 and 4 levels, where 40 men and 5 mules are working, while No. 5 level workings received 10,000 cubic feet of air per minute for 22 men and 2 mules, this being another district. The workings on the west side are by pillar and stall and extraction of pillars, and received 26,250 cubic feet of air per minute for 23 men and 3 mules. The total air in the return at the upcast shaft was 59,000 cubic feet per minute, while the air supplied to the working places was 48,750 cubic feet per minute, which leaves 10,250 cubic feet per minute for mules, roads and old workings. The motive power for the ventilation is a Guibal fan running 103 revolutions per minute, with 1½-inch water-gauge.

No. 6 Shaft (Wellington), Comox.

John Kesley, Overman.

The present workings of this mine are Nos. 1 and 4 inclines, and the work is pillar and stall. Nos. 1 and 4 inclines form one district, and received 14,400 cubic feet of air per minute for the use of 46 men and 3 mules.

Nos. 2 and 3 inclines have not worked since the explosion in July, but received 24,750 cubic feet of air per minute to keep old workings clear.

The total air at the intake was 48,200 cubic feet per minute, while total air supplied to working places was 39,150, which leaves 9,050 cubic feet per minute for roads, old workings and mule stables.

No. 7. Slope (Wellington), Comox.

This mine is situated about four miles in a westerly direction from No. 5 shaft. The work of driving two slopes (main and counter) was started a little over a year ago, but it was greatly retarded by the difficult nature of the ground to be driven through, *i. e.*, clay, sand and gravel, which, owing to its open nature, has given off a considerable quantity of water. The slopes were driven on a 1 in 8 pitch, reaching the coal at a distance of 700 feet. The seam proved to be about four feet thick, pitching about 1 in 10 in a north-easterly direction, and the coal, of good quality, being anthracite. This mine will open up a very extensive coal field, and, judging from the contour of the surface, should be comparatively free from faults and dislocations, which are unfortunately too common in this district. An air shaft is also being sunk near the main slope. Considerable work has been done in clearing a site for pit-head, chutes, side-tracks, etc.; it will, however, take a few months longer to complete this. The first shipment of coal was made from this mine on the first of the year.

No. 1 Slope, Extension.

This mine was finished in the month of August.

No. 2 Slope, Extension.

Alexander Shaw, Overman.

Nos. 2, 3 and 4 east levels have been working during the year, the work being extension of the levels, pillar and stall, and extraction of pillars. The slope to the dip has been somewhat extended and is still in good coal; the workings in the slope received 15,000 cubic feet per minute for 17 men and 2 mules. No. 4 east level workings received 18,000 cubic feet per minute for 22 men and 2 mules. No. 3 level workings were supplied with 7,000 cubic feet of air per minute for 13 men and 2 mules; while 20,000 cubic feet per minute were supplied to No. 2 level workings for 30 men and 3 mules. Total air in the return was 105,000 cubic feet

per minute. Total air supplied to working places was 60,000 cubic feet per minute, showing a leakage of 45,000 cubic feet per minute for roads and old workings. A Guibal fan, running 100 revolutions per minute, with 1½ inch water gauge, is the motive power for ventilation.

No. 3 Slope, Extension.

James Sharp, Overman.

The slope is down 380 yards in good coal, to the dip of No. 4, and forms a district of its own; it received 13,125 cubic feet of air per minute for 14 men and 2 mules.

In No. 4 west level, pillar and stall work and pillar work is being carried on and forms another district, which received 16,485 cubic feet of air per minute for 16 men and 3 mules.

No. 3 level is being extended, and pillar and stall work and pillar work being carried on; it received 46,000 cubic feet of air per minute for 35 men and 4 mules.

Nos. 1 and 2 level district received 19,200 cubic feet of air per minute for 33 men and 3 mules.

Total air supplied to the mine was 108,250 cubic feet, the working places receiving 94,810 cubic feet per minute, leaving a leakage of 13,440 cubic feet per minute for old workings and roads. A Guibal fan, running 100 revolutions per minute, with 1½-inch water gauge, is the motive power for ventilation.

Tunnel Mine, Extension.

William Jones, Overman.

In No. 1 level east the slope to the dip has been extended to 250 yards in good coal. In Nos. 1, 2, 3 and 4 levels east, pillar and stall work and extraction of pillars has been carried on, and received 10,500 cubic feet of air per minute for 26 men and 3 mules. In Nos. 2 and 4 levels, on the west side, the work has been extracting pillars; 23,000 cubic feet of air per minute were received for 3 men and 1 mule.

In Nos. 6 and 8 levels, pillar and stall work and extracting pillars has been carried on. This district received 21,000 cubic feet per minute for 40 men and 6 mules. The total air supplied to the mine was 77,000 cubic feet per minute, while the workings received 54,500 cubic feet per minute, which shows a leakage of 22,500 for roads and old workings. A Murphy fan, making 180 revolutions per minute, is the motive power for ventilation. All the coal from Nos. 2 and 3 Slopes and the Tunnel workings is brought out from the tunnel by a 14-ton motor.

REPORT ON THE INSPECTION OF CROW'S NEST COLLIERIES.

By Archibald Dick, Inspector.

I have the honour to submit my annual report for 1903, on the inspection of Crow's Nest Collieries, being a summary of the reports which have been forwarded monthly, together with the official returns from the Crow's Nest Pass Coal Company.

The Crow's Nest Pass Coal Co., Ltd.; head office at Toronto, Ont.

Officers.	Address.
Hon. Geo. A. Cox, President,	Toronto, Ont.
Robert Jaffray,	"
Lt.-Col. H. M. Pellatt, Vice-President,	"
G. G. S. Lindsey, Secretary and Managing Director,	"
E. R. Wood, Treasurer,	"
Thos. R. Stockett, Jr., General Manager,	Fernie, B. C.
R. G. Drinnan, Inspector of Mines,	"

Capital of 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 the C. P. Railway, with 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-east direction from Fernie.

Morrissey Collieries, situated on Morrissey creek and connected with the C. P. Railway and the Great Northern Railway. Morrissey Colliery is about 14 miles from Fernie, by rail, in a south-easterly direction.

In addition to operating the above producing mines, the Company is doing a lot of exploratory development work, opening up new mines in the extensive coal fields owned by it, as well as improving its system of working and handling of the coal.

The output of both coal and coke for 1903 shows a large increase over the previous year, as the following returns will show:—The total coal produced from the Crow's Nest Pass Collieries during 1903 was 589,888 tons, compared with 393,961 tons in 1902, being an increase of 195,927 tons. Of this 249,551 tons were converted into coke, 173,949 tons were sold in the Dominion of Canada, including 20,376.12 tons used under the company's boilers, and 145,010 tons were exported to the United States. The 249,551 tons converted into coke produced 149,764 tons, compared with 107,837 tons in 1902, being an increase of 41,926.07 tons in 1903. Of this coke 27,757.14 tons were sold in the United States, and 122,006.01 tons were sold in the Dominion of Canada, being an increase of 40,933 tons more than was consumed the previous year.

COAL CREEK COLLIERY.

Andrew Colville, Manager.

This colliery, better known as "The Fernie Mines," is about five miles, by a branch line, from the Canadian Pacific Crow's Nest Pass Railway. On this railway the coal company, by an understanding with the C. P. R. Company, runs four trains per day to and from the mines, without charge to any person who wishes to go. This is termed the workmen's train, as it runs to suit the men going on and coming off their work, many of whom have their homes at Fernie, the chief commercial town in this district. The Crow's Nest Company, with its usual forethought and liberality, provides a coach on each train for the accommodation of ladies.

At this colliery there have been great improvements made during the year, and some of the mines which were only started at the beginning of 1903 are now producing coal and have good prospects ahead.

No. 1 Mine.

The workings of this mine are into the mountain on the right bank of Coal Creek. Here the coal is 30 feet thick and of a very good quality. There is no powder used in this mine. An attempt is made to timber or hold up about 20 feet of the coal, but it is so loose and fine that it will run out at a very small hole. Much timber is required here, and it takes more day-men to keep the works in order than there are mining coal. For ventilation there were 119,500 cubic feet of air going through the mine the last time I was there.

No. 2 Mine.

This is the mine where the terrible explosion took place in May, 1902. There has been a large party of men working in this district for over a year, getting it in order for a tailrope haulage system, and it is now about ready to be put in operation. You will have seen in my monthly reports that everything here is in good order, with ventilation very good. There is no powder used in this mine, except in No. 1 district, near the outcrop of coal.

No. 3 Mine.

This mine is in very good order, well timbered and ventilated. It is the same seam of coal as that worked in No. 2 mine. No gas is seen here, but all the men use safety lamps.

No. 4 Mine.

This is one of the new mines mentioned in previous reports. It is in very good order, well ventilated, having a fan worked by electricity, and the coal is 22 feet thick.

No. 5 Mine.

This is also a new mine in which the coal is 10 feet thick. I may here say that the roof in both Nos. 4 and 5 mines is good, with attention. This mine is in very good order, and here also there is a ventilating fan worked by electricity, which gives satisfactory results. The coal from Nos. 4 and 5 mines is hauled along the side-hill road to the Nos. 1 and 2 tipples.

No. 9 Mine.

This is a new mine and has good prospects. The level is in a long distance, and the works are now being put in order previous to starting operations. The coal here is very hard.

The above six mines are all at present in operation at Coal Creek Colliery. There are no lights except in locked safety lamps (the Wolf).

The following are the official returns of the Coal Creek Colliery for the year ending 31st December, 1903 :—

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	73,127	08			60,021	19		
" export to U. S	1,810	14			24,299	01		
" " to other countries								
Total Sales			74,938	02			84,321	—
Used in making Coke	131,802	—						
" under Colliery Boilers, &c	9,050	18						
Total for Colliery Use			140,852	18				
Stocks on hand first of year								
" last of year								
Difference taken from Stock during year								
Output of Colliery for Year			215,791	—			84,321	—

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	$3.00 to $5.00	7	$3.00 to $6.00	20	
Whites—Miners	168	3.00 to $6.00			168	
Miners' Helpers						
Labourers	100	2.50 to 3.00	49	2.00 to 2.50	149	
Mechanics & Skilled Labour	63	2.50 to 3.00	29	2.50 to 4.00	92	
Boys	9	1.00 to 1.50	3	1.00 to 1.50	12	
Japanese						
Chinese						
Indians						
Totals	353		88		441	

The Crow's Nest Pass Coal Co., Ltd.,
Thos. R. Stockett, Jr.,
General Superintendent.

The Minister of Mines is hereby authorised to publish these Returns.

The Crow's Nest Pass Coal Co., Ltd.,
Thos. R. Stockett, Jr.,
General Superintendent.

MICHEL COLLIERY.

Arthur R. Wilson, Manager.

No. 3 Mine (Upper.)

I have been all through this mine thirteen times during the past year and duly reported on same. This mine is kept in particularly good order, although there are not many men working in it. I have not yet found gas, but at the same time all the men work by the light of the Wolf safety lamp.

No. 3 Mine (Lower.)

This is the mine at the back end of No. 5 Tunnel, where the accident occurred on the 8th January. It was always in order, and was not far in from the tunnel. I never found any gas there after the upraise was put through. Most of the workings are wet, and when I was there in December there were great columns of ice not far from the face. It is well ventilated and the Wolf safety lamp is used.

No. 4 Mine.

This is also a mine in connection with No. 5 Tunnel, and is kept in very good order, well timbered, and the brattice well attended to. Every place seemed to be kept in good condition. There is a large volume of air passing per minute in this mine and all the men use the Wolf locked safety lamp.

No. 5 Mine.

This is also in connection with and is the same tunnel as that mentioned at Lower Nos. 3 and 4 mines, but it is a different seam of coal. There is a ventilating fan with a separate intake and air return. This mine is in good order and I do not know that I have ever seen gas here. All the men use locked safety lamps.

No. 6 Mine.

This is a new mine and they have just got into the coal and taken the first cars over the road.

No. 7 Mine.

This is also a new mine, but although they have got to the coal it will be some time before they will be able to take the cars to the mine. Both of the above (6 and 7 mines) are well timbered with massive timbers.

No. 8 Mine.

This is the most extensive mine of this colliery. The seam of coal is 12 feet thick and in some places 30 feet. The mine is in very good order, and there has been very little gas seen here. All the men, except those in the level, work with open lights. Ventilation is good.

No. 9 Mine.

This is also a safe mine, although not very extensive. The coal is 10 feet thick. Everything in connection with this mine is in good order, and the ventilation is very good. These Nos. 8 and 9 mines are in different seams of coal and are ventilated separately from the outside, but return to the same fan. This fan is a large, new one, only started a few days ago, which passes 70,000 cubic feet of air, while working at reduced speed.

Nos. 10 and 11 Mines are waiting till spring before they resume operations again.

The following are the official returns of the Michel Colliery for the year ending December 31st, 1903:—

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	98,582	03			61,984	08		
" export to U. S	18,379	18			2,833	12		
" " to other Countries								
Total Sales			116,962	01			64,818	—
Used in making Coke	112,283	—						
" under Colliery Boilers, &c	6,101	—						
Total for Colliery Use			118,384	19				
Output of Colliery for Year			235,347	—			64,818	—

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	15	$3 to $5.00	5	$3 to $6	20	
Whites—Miners	202	$2.50 to $6			202	
Miners' Helpers						
Labourers	104	$2.50 to $3	95	$2 to $2.50	199	
Mechanics and Skilled Labour	37	$2.50 to $3	29	$2.50 to $4	66	
Boys	5	$1 to $1.50			5	
Japanese						
Chinese			32	$1 25	32	
Indians						
Totals	363		161		524	

The Crow's Nest Pass Coal Co., Ltd.,

Thos. R. Stockett, Jr.,

General Superintendent.

The Minister of Mines is hereby authorised to publish these Returns.

The Crow's Nest Pass Coal Co., Ltd.,

Thos. R. Stockett, Jr.,

General Superintendent.

MORRISSEY COLLIERY.

Charles Simister, Manager.

O Tunnel.

This tunnel is the highest in the coal measures worked here. The coal is three feet thick, hard and of good quality. This mine is in very good order but somewhat wet, which is more noticeable owing to the thinness of the coal. Everything here, ventilation, etc., is in good order. I have not yet seen any gas in this mine, but all the men work by the light of the safety lamp (Wolf).

No. 1 Mine.

Notwithstanding the repeated outbursts of gas, I am bound to say that this mine could scarcely be put in better order. I have examined it time after time, and whoever else did so would admit that it is the safest mine in the colliery. Everything is in good order, and every care seems to be taken to prevent accident. The seam of coal, as near as I can make it, is 40 feet thick, and they are working, in the first place, about 10 feet of the top. Ventilation is very good here; there are three connections with the outside and they are making another near the face where most of the men work, so that in case of an accident or outburst of gas, the men in the upper workings will be almost outside.

No. 2 Mine.

This mine has been in operation nearly all the past year. There are not any rooms yet, only the two levels. It is in very good order, well timbered and ventilation good.

No. 2 Water Level Mine.

This mine was in very good order and well timbered. It will eventually be part of No. 2 Mine.

No. 3 Mine.

I have reported frequently upon this mine during the year. The coal here is about 4 feet thick. The mine is in good order and ventilation is very good. Here, as in No. 2 mine, all the men work by the light of locked safety lamps (the Wolf). It is a rare thing to find gas in this mine.

No. 4 Mine.

I have been frequently through all this mine, which is in very good order. There are four ways out, all of them available. There is a large, open roadway up near the face, by which all the men working in the rise workings are expected to go in and out. Gas is rarely found here and the ventilation is very good.

No. 5 Mine.

This is abandoned for the present, but may be opened soon.

The above 20 mines of the Crow's Nest Pass Collieries will be in full operation, I expect, during the year 1904, and I am confident that the output of coal will go into seven figures.

The outbursts of gas in these collieries are of so remarkable a nature that a brief description of them may be of general interest:—

On August 6th, 1903, while the men were at work in the main entry of No. 1 Mine, Morrissey, the coal in the face began to make a noise as if the mine was going to close up, and it was thought desirable to let the men know. Before they were all out, however, the face of

coal burst, and the mine was full of gas in a short time. It came out to the level, where there was a velocity of air going in at the rate 550 feet per minute; but this was no resistance to the force of the gas, as it blew coal and dust out of the mouth of the tunnel for fully 100 feet. All the men were got out, but some of them had a very close call. With the ventilating fan running to its fullest speed, it was three days before the gas was cleared out so that the officials could get in. Upon entering, the sight was remarkable. The level was filled with coal for 200 feet out, and in the 100 feet nearest the face there was not a timber left standing and, to all appearances, it looked as if the mine had not been worked, save for the timber sticking out of the coal. Where the timbers were knocked out the level was 14 feet wide and 9 feet high, but was filled so quickly that the roof had not time to fall. All this coal was sent out and weighed, and amounted to 1,500 tons, leaving a hole in the place large enough for a locomotive to go in, the back of this hole being fully 100 feet further in than where the face was previous to the outburst. On the 14th October there was another outburst of gas, and though not so large as the other one, had a more serious result, as four men lost their lives by being suffocated. In this latter outburst there were over 800 tons of coal dislodged. The management is trying the best means they can suggest to avoid these outbursts and keep the men safe. After one of these blowers has come away, it is quite a time before gas can again be found in the mine.

The company has made a large addition to its machinery and plant at its several collieries during the past year, in ventilating fans, steam-engines, air compressors and electric plants. A large number of ovens have also been added to convert coal into coke, for which last there is a great demand, both in the Dominion of Canada and United States, as well as for all the coal that can be produced.

The following are the official returns of the Morrissey Colliery for the year ending 31st December, 1903:—

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	2,239	09						
" export to U. S.	125,819	18			625	01		
" " to other Countries								
Total Sales			128,059	07			625	01
Used in making Coke at Comox	5,466	—						
" under Colliery Boilers, &c	5,224	13						
Total for Colliery Use			10,690	13				
Output of Colliery for year			138,750				625	01

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	9	$3 to $5.50	4	$3.00 to $6.00	13	
Whites—Miners, Miners' Helpers	143	2.50 to 6.00	.....	.....	143	
Labourers	59	2.50 to 3.00	47	2.00 to 2.50	106	
Mechanics and Skilled Labour	20	2.50 to 3.00	22	2.50 to 4.00	42	
Boys	.....	.....	2	$1.50	2	
Japanese	.....	.....	.....	.....	.....	
Chinese	.....	.....	.....	.....	.....	
Indians	.....	.....	.....	.....	.....	
Totals	231		75	.....	306	

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

The Minister of Mines is hereby authorised to publish these Returns.

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

COKE OVENS.

There are 424 coke ovens at Fernie and 410 at Michel, where there are 54 more nearing completion. At Morrissey there are 148 ovens, with 92 more nearly completed; so that, from all appearances, the year we have now entered on will exceed any other in coal and coke production. The Crow's Nest Pass Coal Company has now 982 ovens, with 146 more nearing completion, which will bring the total up to 1,128 ovens.

ACCIDENTS IN AND ABOUT THE CROW'S NEST PASS COLLIERIES.

(*See* Tables of Accidents, p. 234 *et seq.*)

I may here record that two bodies of those killed in the explosion of the 22nd of May, 1902, were found on the 17th of April, 1903, namely: Angelo Federio, Gaetano Federio.

I deeply regret to have to report the following long list of accidents which have been reported to me during the past year, being a total of 30, which are divided into fatal, serious and slight.

There were 15 fatal accidents, as follows: One by a prop being knocked out and striking a man on the head; 2 by cars running over men while at work; 4 by falls of rock where the men were working; 1 by a fall of coal; 1 by the electric motor; 1 by the locomotive on the railway; 4 by men being suffocated in an outburst of gas, and one in which a man was found dead under his car, how he came there being a mystery.

Of the serious and slight accidents, 3 were with mine cars; 2 with ropes on incline; 4 were slight burns by explosions of gas, all of which occurred in mines where naked lights are

used; 1 was by a horse running away; 3 by falls of rock where the men were working; 1 by the premature explosion of a shot, and 1 by a falling prop. It will be observed that most of the accidents were single occurrences.

It will almost be needless for me to say any more in connection with the casualties about coal mines. All the men have to undergo an examination to see if they are qualified and understand the rules before they can get a certificate to work as a coal miner in British Columbia. The miners know the rules well and are required to comply with the same, as most of them do; but in all large collieries where there are hundreds of men employed there are some careless men who will take great risks, and are a danger to themselves as well as to their more careful fellow-workmen, as the following illustrates:—

Prosecutions under the "Coal Mines Regulation Act."

July 27—And Lasco; matches in Coal Creek mine; one month's imprisonment with hard labour.
" 27—Thos. Nelson; matches in Coal Creek mine; fined $5 and costs.
" 27—Pat Grayhan; matches and candle in Morrissey mine; one month's imprisonment.
" 27—John Olton; matches in Morrissey mine (did not appear).
" 30—Elijah Dudley; matches in Michel mine; fined $5 and costs.
" 30—Pete Mantabetta; matches in Michel mine; fined $5 and costs.
" 30—Thos. Johann; match in Michel mine (did not appear).
" 30—Louis Aquino; match in Michel mine; fined $5 and costs.
" 30—James Green; matches in Michel mine; fined $10 and costs.
" 30—Frank Durkin; match in Michel mine; fined $5 and costs.
" 30—Mike Williams; match in Michel mine; fined $5 and costs.
Nov. 12—Dennis Murray; pipe and match in Coal Creek mine; suspended sentence.
" 12—Mike Kipta; matches in Coal Creek mine; one month's imprisonment with hard labour.
" 12—Andrew Borsak; matches in Coal Creek mine; one month's imprisonment with hard labour.
" 12—Mike Conway; matches in Michel mine; one month's imprisonment with hard labour.
" 12—John Westley Wright; matches in Michel mine; one month's imprisonment with hard labour.
" 12—James Lennox; match in Morrissey mine; suspended sentence.
" 12—Andrew Smith; matches in Morrissey mine; one month's imprisonment with hard labour.
" 12—V. Verko; matches in Morrissey mine; one month's imprisonment with hard labour.
" 12—Frank Pilz; matches in Morrissey mine; one month's imprisonment with hard labour.
" 12—Frank Metha; matches in Morrissey mine; fined $10 and costs or two weeks' hard labour.
" 12—Frank Kurth; matches in Morrissey mine; one month's imprisonment with hard labour.
" 12—Jeo Kovack; matches in Morrissey mine; one month's imprisonment with hard labour.

There were quite a few other cases, but the parties concerned thought that it was best to get out of the way. The Magistrate told those in Court that the next men that came before him for having matches in their possession in any mine where only safety lamps are used would get the full penalty. I think if all precautions are taken by both mine officials and those working in the mines, accidents will be much fewer, and I cannot see why we should not be almost without any to report.

ACCIDENTS IN BRITISH COLUMBIA COLLIERIES DURING 1903.

Causes of Accidents and Nature of Injury.	Name of Colliery.												Total for 1903.			
	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																37
Fatal				17						*4			21			
Slight						11			1			4			16	
Falls of Coal																11
Fatal				1			2			1			4			
Serious		2			2			1						5		
Slight						1						1			2	
Falls of Rock																20
Fatal	1			2			1			4			8			
Serious		2			5						1			8		
Slight						2						2			4	
Mine Cars																14
Fatal				1						4			5			
Serious		1			2			2			2			7		
Slight									2						2	
Powder in Mine																6
Fatal	1												1			
Serious		4						1						5		
Shot																2
Serious								1			1			2		
Locomotive																2
Fatal							1			1			2			
Post or Timber																3
Fatal										1			1			
Serious					1						1			2		
Rope																5
Serious					1			1			2			4		
Slight									1						1	
Miscellaneous																1
Slight												1			1	
Total	2	9		21	11	14	4	6	4	15	7	8	42	33	26	101

* Suffocation.

SUMMARY—TABLE SHEWING ACCIDENTS OCCURRING IN B. C. COLLIERIES IN TEN YEARS—1894 TO 1903.

For the year	1894.				1895.				1896.				1897.				1898.				1899.				1900.				1901.				1902.				1903.				Total for 10 years.			
Output of coal—tons.	1,012,953				939,654				896,222				882,854				1,135,865				1,306,324				1,590,179				1,691,557				1,641,626				1,481,913				12,579,147			
No. persons employ'd	2,929				2,924				2,753				2,433				2,988				3,780				4,178				3,974				4,011				4,264				34,234			
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	..	..	..	..	189	..	..	189
Gas explosions	..	..	9	9	..	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	30	37	105	172
Falls of coal.....	2	7	..	9	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	24	58	14	96
" rock	..	8	..	8	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	40	83	22	145
Mine cars	..	4	1	5	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	25	68	23	116
" mules	..	..	..	..	..	..	..	..	..	2	..	2	..	1	..	1	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..	5
" timber	1	..	..	1	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	1	1	2	..	2	..	2	2	..	..	2	1	2	..	3	4	7	1	12
Hoisting, ropes, &c .	..	2	..	2	..	3	..	3	..	1	..	1	..	2	..	2	..	..	..	..	..	..	..	..	1	..	..	1	..	2	..	2	..	2	..	2	..	4	1	5	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	1	1	1	3	2	3	..	5	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	3	..	..	..	..	..	..	..	..	..	2	..	2	3	8	4	15
On surface — miscellaneous.	..	..	..	..	..	2	..	2	2	..	..	2	..	..	..	..	..	2	..	2	1	..	..	1	3	1	..	4	2	2	2	6	..	3	1	4	2	..	1	3	10	10	4	24
Fire in Mine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19	..	..	19	..	..	..	..	..	..	..	..	19	..	..	19
	4	22	11	37	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	347	310	186	843

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1903.

V. I. COLLIERIES, REPORTED BY THOS. MORGAN, INSPECTOR.

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
1	Nanaimo	Jan. 15th	R. Marsden...	Rope-rider ...	Leg broken in Protection Mine while jumping on the loaded car.
2	"	" 21st	Hugh Morrow.	Miner	Leg broken while mining in his stall in Protection Shaft, through fall of a piece of coal.
3	Extension....	" 22nd	Matt. Lonma..	"	Leg broken in No. 2 Mine through end of rope springing.
4	Union	" 22nd	Nam Chow....	Labourer	Leg broken in No. 7 Mine through fall of a piece of clay.
5	Extension.....	" 23rd	W. James	Miner	Slightly injured in No. 2 Mine by fall of a pulley.
6	"	Feb. 7th	W. J. McAlpine	"	Instantly killed while in the act of thawing giant powder with his naked light in his place. An inquest was held and the following verdict returned: "We, the undersigned, empanelled to give our verdict on the cause of the death of the late W. J. McAlpine, hereby state that he came to his death by the premature discharge of giant powder, being purely accidental."
7	"	" 14th	Ken. McInnis .	Roadsman	Fatally injured in No. 1 Slope through fall of coal and rock.
8	Union	March 4th	R. Hannah....	Miner	Slightly bruised by a fall of rock while working in his place in No. 5 Shaft.
9	Extension.....	" 5th	Thos. Dodd ...	"	Slightly injured in No. 2 Slope by being struck by a box of coal from which he had accidentally knocked the sprag.
10	Union	" 7th	Ah Sing	"	Killed by afterdamp in No. 6 Shaft, after an explosion of gas in No. 11 Stall.
11	"	" 7th	J. Johnny	"	Slightly burned in the above accident.
12	"	" 7th	Ton Kid	"	
13	"	" 7th	Jung	"	
14	"	" 7th	On	"	
15	"	" 7th	Fong	"	
16	"	" 7th	Han	"	
17	"	" 7th	Jack	"	
18	"	" 9th	R. Hodson....	"	Leg cut and bruised in No. 5 Shaft by fall of rock.
19	Nanaimo	April 3rd	James Jones ..	"	Had his foot broken by a fall of rock in his stall in No. 1 Shaft.
20	"	" 3rd	O. Jacobson...	"	Injured in the face by explosion of powder in the longwall, Protection Mine.
21	"	" 8th	Wm. Piper ...	"	Killed in No. 1 Shaft in his stall by fall of rock.
22	Union	" 9th	Sim Fin	Labourer	Killed in No. 7 Mine. A piece of clay fell from the face and knocked his head against a post, breaking his neck.

Detailed Statement of Accidents in B. C. Collieries during 1903.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
23	Union	April 10th	T. R. Anderson	Miner	Slightly bruised by a fall of coal while at work in his stall in No. 6 Shaft.
24	Nanaimo	May 12th	John Lawson	"	Killed by an explosion of Giant powder which he was preparing for a shot. It is not known how the accident occurred.
25	"	" 12th	A. Gartley	Pusher	Severely burned on hands and faces by same explosion.
26	"	" 12th	Geo. Churchill	"	
27	"	" 12th	H. Hasenfratz	Miner	
28	Union	" 23rd	Gee	Labourer	Severely injured about the head by a runaway car knocking out post in No. 7 Slope.
29	"	" 29th	Yuen Chung	Miner	Killed in his stall in No. 5 Shaft. A piece of rock rolled over, pinning him against a post and causing internal injuries which resulted fatally.
30	"	June 17th	Toy	"	Leg broken and head injured by a fall of top coal while at work in his stall in No. 3 North Level, No. 6 Shaft.
31	"	July 4th	Wong Foo	"	Fatally injured in his working place in No. 4 Level, No. 4 Slope, by a fall of top coal.
32	"	" 15th	Jung Bing	"	The first 16 named were killed, and the other 4 were slightly burned by an explosion of gas in No. 3 incline, No. 6 Shaft. This district was worked exclusively with locked safety lamps. On this date a big break occurred all over this district, liberating a considerable quantity of gas. When I arrived, on the evening of the 16th, the roof was breaking high up and considerable gas being given off. There were 15,000 cubic feet of air going through this district per minute, and there was half an inch of cap on the flame of my safety lamp in the return air course. This accident would not have occurred if there had been no other lights than locked safety lamps. Matches, tobacco and cigarettes were found in the working places and on the Chinamen that were killed; also an open safety lamp and one broken safety lamp in the place where the explosion occurred, showing negligence on their part. An inquest was held and the verdict of the jury is on record at the Attorney-General's office.
33	"	" 15th	Jung Bow	"	
34	"	" 15th	Jung B. How	"	
35	"	" 15th	Wong Tong	"	
36	"	" 15th	Ting Tah	"	
37	"	" 15th	Wong Yuen	"	
38	"	" 15th	Chong Chi	"	
39	"	" 15th	Mah Ching	"	
40	"	" 15th	Mah See	"	
41	"	" 15th	Mah Dow	"	
42	"	" 15th	Mah Lee	"	
43	"	" 15th	Chong	Driver	
44	"	" 15th	Mah Chong	Runner	
45	"	" 15th	Lan Doo	"	
46	"	" 15th	Chong Doo	"	
47	"	" 15th	Mah Lee	Miner	
48	"	" 15th	Mah Ming	"	
49	"	" 15th	Swan Yock	"	
50	"	" 15th	Ah Min	"	
51	"	" 15th	Ging	"	
52	Nanaimo	" 20th	J. Cartwright	"	Leg broken by a fall of coal while at work in his stall in Protection Mine.
53	Extension	Aug. 14th	Fred Chadwick	"	Leg broken by tripping over a rope and part of a motor trip of empty cars passing over him in No 3 Mine.
54	Union	Oct. 3rd	D. Potter	"	Leg broken by a fall of rock while taking down some coal in his stall in No. 4 Slope.

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1903.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
55	Union	Oct. 3rd	Chung	Miner-helper ..	Leg broken by a fall of rock in the counter Level No. 9, No. 4 Slope.
56	Nanaimo	" 3rd	David Williams	Miner	Small bone of his foot broken and injured about the back by a fall of rock in his place.
57	Extension.....	" 8th	James Sharpe .	Overman.....	Legs injured in No. 3 Mine while examining a place, through a shot fired in the next stall, which he thought was idle.
58	"	" 13th	(Chinaman) ...	Labourer	Fatally injured at the pit head by slipping in front of loaded train of cars.
59	"	" 13th	Daniel Colvin .	Miner	Killed by a fall of coal while at work in his place in No. 2 Mine.
60	Union	" 16th	Wong Don Yet	"	Leg broken and ribs bruised by a fall of rock in his place in No. 6 pit.
61	Extension.....	" 19th	S. Lavisone ...	"	Leg and arm broken in the tunnel through being caught by motor trip.
62	"	" 24th	Sam. Horrocks.	Driver	Slightly burned by gas near the face of No. 2 Slope.
63	Union	Nov. 4th	Sing Lee.....	Miner	Severely injured (compound fracture left arm and left leg fractured) by a fall of middle rock, while at work in his place in No. 5 Shaft.
64	"	" 9th	A. Marinella ..	"	Wrist broken by a car while at work in the Slope in No. 5 Shaft.
65	Extension.....	" 20th	Walter Hunter	"	Fatally injured by fall of coal while at work in his place in No. 3 Mine.
66	"	" 21st	Wm. Manuel..	Runner	Slightly injured by being squeezed between a box and a post, while at work in the Tunnel mine.
67	Union	" 27th	(Chinaman) ...	Miner	Leg broken by a fall of coal while working in his place in No. 7 Level, south of No. 2 Slope of No. 4 Mine.
68	"	Dec. 13th	Jos. Crosette..	"	Leg broken (making amputation necessary) and severely injured in No. 4 Slope through being run over by trip of cars.
69	Extension.....	Dec. 14th	John Swar....	"	Had his leg broken while at work in his place by a slip of coal falling from the face.
70	Union	" 18th	Kig (Jap)	"	Leg broken by a rope in No. 7 East Level of No. 2 Slope, No. 4 Mine.
71	"	" 24th	Chung.....	Labourer	Killed by a runaway trip. He was walking on the slope when a link broke, allowing part of the trip to run back, and it caught him at No. 7 Level, No. 1 Slope, No. 4 Mine.

Detailed Statement of Accidents in B. C. Collieries During 1903.—*Continued.*

Reported by James McGregor, Inspector of Crow's Nest Collieries.

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
1	Morrissey.....	Jan. 15th	Simon Ivey ...	Miner	Caught between two cars on the tipple and sustained fracture of right arm.
2	"	" 16th	John Kobus...	Back-hand	Had his right leg fractured by his being caught with McGinty rope in No. 4 Mine.
3	"	" 26th	John Krall....	"	Killed in No. 1 Mine, Morrissey, by a car going over the rails and knocking out a prop which struck him on the head.
4	Michel	April 9th	Elias Parke ...	Miner	Burned about the hand by gas in No. 8 Mine.
5	"	" 9th	F. Copolongs..	Back-hand	Burned about the face and hands by a slight explosion of gas in No. 8 Mine.
6	Coal Creek....	" 11th	Jas. Yuskh ...	Driver...	Was slightly injured by runaway horse in No. 2 Mine.
7	"	" 11th	Sam Armstrong	Shiftman	One rib fractured while helping to put a car on the track in No. 2 Mine.
8	"	" 24th	Robt. Ramsay.	Miner	May lose the sight of one eye through premature explosion of a shot in No. 2 Mine.
9	"	May 12th	Geo. Harding..	"	Fatally injured by being caught between a mine car and a prop in No. 2 Mine.
10	Morrissey.....	" 21st	Frank Burton .	"	Slightly injured by a fall of rock in No. 4 Mine.
11	Michel	" 27th	Walter Worthington	Pusher	Killed by a fall of rock in No. 5 Mine, through car knocking out the timber.
12	"	" 27th	Tony Micona..	"	Ankle injured in above accident.
13	Morrissey.....	June 26th	Jos. P. Horan.	Brakeman	Killed by the locomotive going over him on the high line railway.
14	"	" 28th	R. McKnight .	Loader	Was slightly bruised about the body by coal falling in No. 4 Mine.
15	"	" 29th	Jno. A. Savage	Driver.....	Injured above the eye and on back by a falling timber in No. 3 Mine.
16	Michel	July 18th	Jno. Powers ..	Miner	Burned on the back of hand by a small explosion of gas in No. 8 Mine.
17	Coal Creek....	" 23rd	Chas. Edgar ..	"	Left leg fractured by being caught in a rope in No. 2 Mine.
18	Michel	Sept. 27th	John Nuzzie ..	Rope-rider....	Found dead under the car in No. 4 Mine Slope, but how he came there not known.
19	Coal Creek....	Oct. 14th	Fred Scott....	Miner	Killed by a fall of coal in No. 1 Mine through the breaking of a boom in the face of the room where he was working.
20	Morrissey.....	Oct. 15th	A. Herbenaugh	"	Suffocated (and killed) by an outburst of gas in No. 1 Mine, Morrissey.
21	"	" 15th	Tony Micone..	"	
22	"	" 15th	John Rogers ..	"	
23	"	" 15th	Ignace Kenpa .	"	

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1903.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
24	Michel	Oct. 23rd	Jno. Edwards.	Miner	Legs broken and cut about the head by a fall of rock in No. 4 Mine.
25	Coal Creek....	Nov. 24th	Em. Bloomer..	"	Killed by a fall of rock in No. 2 Mine while at work in his stall.
26	Morrissey.....	" 24th	S. Kenbensick.	Rope-rider ...	Killed in No. 4 Mine by the mine car running over him.
27	Coal Creek....	" 16th	Wm. Quigg ...	Miner	Fatally injured by the motor in No. 1 Mine.
28	Michel	Dec. 11th	Chas. Lessen..	"	Slightly burned about the hand and face by an explosion of gas in No. 8 Mine.
29	Coal Creek....	" 22d	Steph'n Hunter	"	Killed by a fall of roof at the face in No. 1 Mine.
30	Michel	" 24th	Michael Zagara	Timberman ...	Killed by a fall of rock when he was repairing a road in Upper No. 3 Mine.

LIST OF CROWN-GRANTED MINERAL CLAIMS.

CROWN GRANTS ISSUED IN 1903.

CASSIAR.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Alvine	Atlin	Frank Laverdière	247	51.65	March 12
Butte	"	John Caplice	304	34.60	" 11
Discovery	"	C. Christopher and Nellie H. Runnalls	184	51.65	" 25
French	"	Tom Laverdière	246	48.87	" 12
Great Falls	"	John Caplice	306	40.15	" 11
Gold	"	Wm. Beavis	251	51.65	" 12
Gold No. 2	"	"	252	49.40	" 12
Helena	"	John Caplice	305	48.90	" 11
Holy Cross	"	Noel Laverdière	245	49.19	" 12
Rock of Ages	"	J. M. Ruffner, W. G. Mitchell *et al*	185	51.02	" 15
Sydney Fraction	"	Wm. Beavis	253	43.06	" 12

LILLOOET.

Cosmopolitan	Lillooet	Paul Santine and F. Richardson	584	40.34	March 13
Goodenough	Clinton	J. B. MacLaren	563	51.65	" 28
Last Chance	"	"	564	43.30	" 28
McKinley	Lillooet	D. Fraser, A. McDonald *et al*	648	23.85	Aug. 24

WEST KOOTENAY.

Ace of Diamonds	Trail Creek	Neville F. Townsend	3378	32.20	Feb. 11
American	Ainsworth	Henry Giegerich	5851	34.90	March 18
Acme	"	"	5852	38.94	" 30
Anaconda	Nelson	Frank Bowser	2071	49.50	May 13
Alexandria	"	L. J. D. Berg and Prudence Berg	2422	48.96	June 15
Annie L	Ainsworth	Ophir Lade Mg. Synd	4724	40.90	" 22
Arabian	Revelstoke	Florence McCarty	2733	51.65	Aug. 3
Alice No. 5	Slocan	Patrick McCue	4567	24.66	" 7
Andrew Jay	Ainsworth	"	5304	51.65	" 7
Aurora	Nelson	B. C. Standard Mg. Co., Ltd	6064	47.86	Dec. 22
Baltimore	Slocan	G. H. Dawson	5755	26.86	Feb. 12
Black Hawk Fr	"	American Boy M. and M. Co	4546	17.82	March 31
Buffalo	Nelson	Mike Morris and Rose McGlynn	3385	49.74	May 13
Balfour	Lardeau	C. Menhinick, J. J. Foley *et al*	4777	25.62	" 14
Beatrice	"	Jos. Boucher, F. F. Fullmer *et al*	4586	51.65	June 11
Blossom Fraction	Slocan City	A. B. Coleman	4774	13.31	July 3
Belcher	Revelstoke	Florence McCarty	2735	49.66	Aug. 3
Banner	Lardeau	W. B. Clark	3085	37.08	Sept. 10
Brow	Trout Lake	G. C. and W. H. Lembke	5687	49.80	" 15
Bonanza No. 2	Trail Creek	S. Barbora and S. J. Brailo	5718	49.00	Oct. 5
Bristol	Nelson	R. R. Burruss, T. Stout *et al*	4938	26.40	" 26
Bell	Slocan	J. D. Farrell, V. D. Williamson *et al*	2844	46.49	Nov. 25
Ben Bolt	Trail Creek	John Weir	4256	24.48	Dec. 21
Big Casino	"	"	4257	35.50	" 21
Black Prince Fr	Slocan City	J. Elliot, R. A. Bradshaw *et al*	584	5.60	" 23

WEST KOOTENAY.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Coeur d'Alene	Trail Creek	Jno. Powers	3418	51.65	Feb. 17
Cashier	Nelson	Arthur V. Powys	4399	48.74	" 17
Carmencita	"	Robt. C. Pollett	5201	48.13	" 17
Congress	Ainsworth	Geo. Alexander	513	45.93	March 24
Centenial	Nelson	Jno. Sibbald	5386	25.81	" 30
C. and K	Slocan	W. H. Brandon and C. Kloepfer	5974	30.39	April 16
Chieftain	Arrow Lake	J. Brown, P. Burns *et al*	5845	7.93	" 25
Cracker Jack	Lardeau	Great Western Mines, Ltd	4504	42.32	May 4
Clara G	Ainsworth	Duncan River Co-operative M. and D. Co.	4713	51.65	" 5
Coliseum	Nelson	Frank Bowser	2072	47.62	" 13
Criterion	Lardeau	Ophir Lade Mg. Synd.	5417	15.76	" 13
Copper Reef	Trout Lake	Great Western Mines, Ltd	4957	41.74	June 12
Colorado	Ainsworth	Patrick McCue	5308	27.13	Aug. 28
Culbert	Trout Lake	Wm. Nathaniel Brayton	1367	45.30	Sept. 12
Cameronian	Slocan City	Cameronian G. and S. Mg. Co	5976	40.65	Oct. 27
City of Cleveland	Trail Creek	Wm. A. Spilker	5853	49.00	Nov. 30
Comstock	"	Jas. R. Roaf	5864	46.47	Dec. 23
Diamond Flush	"	N. F. Townsend	3377	31.00	Feb. 11
Don Fraction	Trout Lake	Jas. M. Aikins *et al*	4583	9.57	March 12
Daisy	Ainsworth	King Solomon's Mg. Co	3351	28.40	" 17
Dixie Fraction	"	" "	4755	8.40	" 17
Dundas	Arrow Lake	Jno. Brown, W. G. Clark *et al*	5843	30.34	April 25
Duchess	"	" "	5846	20.72	" 25
Double Standard	Nelson	B. C. Standard Mg. Co	2213	43.56	Dec. 22
Dalkeith	Slocan	Wakefield Mines, Ltd	2603	41.67	" 23
Exchange	Slocan City	Horace G. Van Tuyl	1523	36.80	March 13
Emma	Ainsworth	Duncan River Co-operative M. and D. Co.	4714	48.80	May 5
Endora	"	" "	4715	51.65	" 5
Echo	Slocan	W. S. Drewry and T. Airson	4858	16.09	June 2
Edmond	Lardeau	Jos. Boucher, F. Fullmer *et al*	2634	51.53	" 11
Empress	"	Minnesota M. and D. Co., Ltd	5671	48.16	" 12
Ethel Fraction	Slocan	Robt. Ewin	5880	6.76	Aug. 20
Editor	Nelson	R. S. Lyons and W. H. Jones	5861	46.70	Sept. 15
Erie	Ainsworth	G. F. Cleveland, F. E. Archer *et al*	1029	50.68	Oct. 26
Florence M. Fract	"	King Solomon's Mg. Co	3350	38.10	March 17
Folsom	Lardeau	J. Boucher, F. Fullmer *et al*	4587	51.65	June 11
Foundation	Ainsworth	Ophir Lade Mg. Synd	4725	51.65	" 22
Fairview	Revelstoke	Florence McCarty	2767	51.65	Aug. 3
Falls View No. 2	Slocan City	J. F. Holden	6055	51.00	Dec. 22
Golden Gem	Nelson	Arthur V. Powys	4400	48.07	Feb. 17
Golden Eagle	Revelstoke	L. L. Graham and G. Lund	2725	34.44	March 13
Gold Finch	"	Northwestern Dev. Synd., Ltd	5654	40.45	" 17
Great Western	Lardeau	Great Western Mines, Ltd	4503	33.89	May 4
Gold Bug Fract	"	Ophir Lade Mg. Synd., Ltd	5419	32.50	" 13
Grace	Slocan	Selkirk M. and Mg. Co., Ltd	5532	44.92	June 15
Goldenville	Ainsworth	Ophir Lade Mg. Synd., Ltd	4720	48.52	" 22
Golden Hope Fract	Arrow Lake	Thos. Abriel	5415	35.36	July 3
Glengarnock	Trout Lake	Lardeau Valley Mines, Ltd	5897	51.30	" 3
Grey Eagle	Nelson	Campbell Sweeny	1488	45.09	Aug. 18
Gold Note	"	Aaron H. Kelly	616	28.81	" 20
Government	Goat River	Valparaiso Gold M. Co., Ltd	4908	43.70	" 27
Gibraltar No. 2	Arrow Lake	John L. Farwig, J. Z. Hall *et al*	5873	28.11	Nov. 26
Golden Rodd No. 2	"	J. R. Jamieson and T. Matthews	5877	46.55	" 26
Helena	Trail Creek	Jno. Powers	3417	51.65	Feb. 17
Home Rule	Slocan	M. McAndrews	2055	42.08	June 25
Hamilton	Slocan City	A. B. Coleman	4771	51.57	July 3
Hamilton Fr	"	"	5968	7.78	" 3
Hiawatha	Nelson	J. H. Moran, C. W. Greenlee *et al*	4770	51.31	Aug. 14
H. M. Fract	Lardeau	Imperial Synd., Ltd	5179	.24	" 27
Handy	Trout Lake	W. N. Brayton	1369	20.50	Sep. 12
Halifax	Arrow Lake	J. R. Jamieson and T. Matthews	5874	45.59	Nov. 26
Hailstorm	"	" "	5875	51.65	" 26

WEST KOOTENAY.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Highland Chief	Nelson	British Lion G. M. & Dev. Co., of Ontario	5620	44.60	Nov. 27
Hunter V	"	B. C. Standard Mg. Co., Ltd	2212	49.09	Dec. 22
Iron Age	"	Lorne A. Campbell	5129	35.57	Feb. 11
Imperial	Lardeau	C. Menhinick, J. J. Foley *et al*	4778	13.76	May 14
Interloper Fr	Trout Lake	Lardeau Valley Mines, Ltd.	2443	6.60	July 3
Iron Horse No. 2	Slocan City	Thos. A. Noble	5663	39.67	" 28
Iron Cap	Nelson	Campbell Sweeny	1487	37.29	Aug. 18
Iola	Lardeau	W. B. Clark	3084	42.35	Sep. 10
Iron Chief	Ainsworth	Anna K. Paulson	5669	34.72	Nov. 27
Jinnie	Slocan City	A. B. Coleman	4773	51.61	July 3
John L	Trout Lake	Lardeau Valley Mines, Ltd.	5898	3.00	" 3
Joker	Nelson	R. R. Shrum, H. A. Van Buskirk *et al*	5388	37.02	" 6
Joplin	"	Chas. W. Young	5571	39.63	Oct. 13
Jungle Fr	Trail Creek	Ephraim B. Sentell	3603	33.86	Dec. 21
Keewatis	Slocan	Monitor and Ajax Fract., Ltd	5761	46.68	March 31
Kitty	Lardeau	Minnesota M. and D. Co., Ltd.	5672	51.65	June 12
King Alfred	Nelson	Frank W. Lewis	3368	47.62	Nov. 2
King Solomon	"	"	3369	20.95	" 2
Kamloops	Trout Lake	Harry Abbott	3480	35.93	" 10
Kelso	Slocan	Wakefield Mines, Ltd	2604	40.47	Dec. 23
Lone Star	Trail Creek	Neville F. Townsend	3379	42.70	Feb. 11
Le Roi	Slocan	Geo. H. Dawson	5754	36.10	" 12
Lulu Belle Fract	Trout Lake	Gt. Western Mines, Ltd	4958	9.74	May 7
Ladysmith	Nelson	L. J. D. Berg and Prudence Berg	3415	51.65	June 15
Little Estella Fr	Slocan	Selkirk M. and M. Co., Ltd	5534	19.68	" 15
Liberal	Ainsworth	Erl Synd., Ltd., and D. J. Munn	2271	39.80	" 17
Liza Fract	Trout Lake	Lardeau Valley Mines, Ltd.	5900	18.30	July 3
London Fract	Slocan City	Thos. A. Noble	5664	26.73	" 3
Lone Star	Trail Creek	Andrew Daly	4675	47.97	Aug. 26
Lynch	Trout Lake	W. N. Brayton	1368	22.30	Sep. 12
Low	"	"	1370	51.30	" 12
Londonderry	Arrow Lake	J. B. Jamieson and T. Matthews	5876	51.65	Nov. 26
Monadonock	Nelson	Chas. Faas and W. H. Crawford	5743	42.05	Feb. 13
Morris	Slocan City	Arlington Mines, Ltd.	5273	34.43	March 16
Morning Star	Trout Lake	Jno. Abrahamson	4574	51.65	" 27
Mogul Fract	Ainsworth	C. W. Greenlee and J. H. Moran	5744	17.84	April 3
Mogul	"	" "	5745	50.93	" 3
Miller Creek Fr	Slocan	Gus Fandrey	5191	38.09	" 18
Mammoth No. 2	Arrow Lake	J. Brown, W. G. Clark *et al*	5841	33.82	" 25
Moscow	Lardeau	Double Eagle M. and D. Co., Ltd.	4500	28.23	May 4
Montreal	Slocan City	Pioneer Mg. Co., Ltd.	3328	42.50	" 21
Minnie	Slocan	Selkirk Mg. and Mg. Co	5535	39.39	June 15
Midget	Trail Creek	R. Marsh and C. F. Taylor	4936	23.96	May 27
Maggie May	Trout Lake	Lardeau Valley Mines, Ltd	2437	47.80	July 3
Maggie May No. 2	"	" "	2442	36.30	" 3
Mareyen Fract	"	" "	5899	4.30	" 3
Maple Leaf	Revelstoke	Florence McCarty	2766	35.93	Aug. 3
Mammoth II	"	"	2768	15.65	" 3
Minnehaha	Nelson	J. H Moran, C. W. Greenlee *et al*	4769	51.65	" 14
Maggie	"	J. W. Roof	617	21.06	" 20
Mountain Chief	Arrow Lake	P. McDonald, W. Ross *et al*	5848	39.67	Nov. 27
Mercia Fr	Nelson	B. C. Standard Mg. Co., Ltd	2224	18.37	Dec. 22
Norman	Ainsworth	C. W. Greenlee and J. H. Moran	5746	22.92	April 3
No. 1 Fr	Trout Lake	Gt. Western Mines, Ltd	5688	3.59	June 12
Nettie L. Fr	"	" "	5689	8.90	" 12
Nellie	Lardeau	Minnesota M. and D. Co	5670	51.53	" 12
Nellie Fr	"	" "	5674	4.09	" 12
New Bonanza	Trail Creek	S. Barbora and S. J. Brailo	5717	31.90	Oct. 5
North Branch	Ainsworth	King Solomon's M. Co. *et al*	5825	51.65	Dec. 11
Ore Hill	Nelson	Godfrey Birtsch	2073	51.65	March 12

WEST KOOTENAY.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Oom Paul	Slocan	W. H. Brandon and C. Kloepfer	5973	20.49	April 16
Oyster	Lardeau	Ophir Lade Mg. Synd	5416	42.51	May 13
Oregon	Ainsworth	Erl Synd., Ltd	2275	37.20	June 2
Oom Paul	Lardeau	Minnesota M. and D. Co., Ltd	5673	14.61	" 12
Olive Mabel	Ainsworth	Ophir Lade Mg. Synd	4723	32.28	" 18
Ontario No. 6	Slocan City	Chas. W. McMillan	5741	48.73	Aug. 15
Ophir	Ainsworth	Ophir Lade Mg. Synd	4721	50.60	Sep. 15
One Eye See	Trail Creek	Alivida Simpson	3390	25.89	Nov. 20
Port Hope	Slocan City	Julia Baty, H. L. Fife *et al.*	5493	41.20	March 13
Penobscot	Slocan	M. R. W. Rathborne and F. Culver	3367	51.60	" 17
President	Trout Lake	A. Abrahamson, F. H. Bourne *et al*	4578	37.39	" 27
Pocket Lake	Ainsworth	Adam Swencisky	5633	51.65	April 4
Prudence	Nelson	L. J. D. Berg and P. Berg	3416	48.37	June 15
Pay Ore Fr	Ainsworth	Pat McCue	5309	25.69	Aug. 7
Portland	Arrow Lake	M. E. King	5855	41.50	Oct. 23
Pamlico	Slocan	J. D. Farrell, V. D. Williamson *et al.*	2843	50.55	Nov. 25
Paru	Slocan City	George Brim	5662	41 22	" 17
Rosalia	Nelson	Jno. Sibbald	5385	26.55	March 30
Return	Slocan	Payne Consolidated Mg. Co., Ltd	1018	13.62	May 8
Rossland	Lardeau	Cory Menhinick and J. J. Foley	4775	21.86	" 13
Ruby Fract	Trout Lake	Lardeau Valley Mines, Ltd	2444	.08	July 3
Rock Bolder	Ainsworth	Patrick McCue	5305	27.13	Aug. 7
Robson	Arrow Lake	Geo. D. Brymner	5408	39.04	Sep. 8
Rey del Cerrerres	Trout Lake	H. Abbott	6038	49.72	Nov. 10
Silver Wedge Fr	Slocan	Geo. H. Dawson	5756	6.80	Feb. 12
Smuggler	Nelson	Chas. Faas, C. W. Greenlee *et al*	5742	51.65	" 13
Spotted Horse	"	C. J. Ditter, J. J. McMullen *et al*	5375	36.84	" 17
St. Elmo	Trout Lake	Jas. M. Aikins *et al*	4581	49.11	March 12
Silver Plate	Slocan City	Horace G. Van Tuyl	1524	47.00	" 13
Slug Ten	"	P. W. Ellis *et al*	5972	47.79	" 13
St. Anthony Fr	Ainsworth	King Solomon's Mg. Co	3349	17.30	" 17
Superior Fr	"	" "	4756	7.30	" 17
Spokane-Kaslo	"	Henry Giegerich	5849	40.71	" 30
Spokane-Kaslo No. 2	"	"	5850	34.64	" 30
Silver Queen	"	Robt. F. Dodd and J. L. G. Abbott	3374	51.65	April 16
Silver Queen Fr	"	" "	3375	51.65	" 16
Silver Tip No. 2	Arrow Lake	J. Brown, W. G. Clark *et al*	5847	51.46	" 25
Shepherd's Star	Nelson	J. B. MacLaren	3280	44.56	June 2
Spokane	Trout Lake	Lardeau Valley Mines, Ltd	1366	38.60	July 3
Shamrock	Revelstoke	Florence McCarty	2769	49.23	Aug. 3
Stockholm Fr	Lardeau	Imperial Dev. Synd., Ltd	5424	1.13	" 25
Side Line	Ainsworth	Jas. W. Smith	2366	28.42	Sep. 15
Silver Bullion	Nelson	B. C. Standard Mg. Co., Ltd	3421	47.15	Dec. 22
Tornado	Slocan	Selkirk M. and M. Co., Ltd	5537	44.12	June 15
Toronto	Slocan City	A. B. Coleman	4772	43.14	July 3
Two and a half	Trout Lake	Ophir Lade Mg. Synd	4722	36.55	Nov. 18
The Brothers	Trail Creek	Eph. B. Sentell	3602	47.95	Dec. 21
Tugalla	Nelson	B. C. Standard Mg. Co., Ltd	3419	22.19	" 22
Tamarack No. 2	Slocan City	Jno. F. Holden	6054	51.50	" 22
Utica	Ainsworth	Patrick McCue	4566	51.65	Aug. 7
Virginia May	"	Duncan River Co-operative M. and D. Co.	4712	51.65	May 5
Victoria IV	Revelstoke	Florence McCarty	2734	51.63	Aug. 3
Vulcan Fract	Trail Creek	Andrew D. Provand	3397	16.93	" 25
Virginia	Ainsworth	G. F. Cleveland, F. E. Archer *et al*	1028	50.34	Oct. 26
Vulgar Fr	Nelson	B. C. Standard Mg. Co	3420	2.78	Dec. 22
Wasa	Slocan City	New Gold Fields of B. C., Ltd	3887	31.14	March 11
White Quail	Trout Lake	A. Abrahamson and F. H. Bourne	4577	51.65	" 27
White Eagle	Ainsworth	J. D. Byrne	5634	51.65	April 8
Wales Fr	Trout Lake	Harry Abbott	6037	25.32	Nov. 10

West Kootenay.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Yankee	Trout Lake	Jas. M. Aikins *et al.*	4582	37.15	March 12
Young Canuck	Lardeau	Gt. Western Mines, Ltd	4501	51.65	May 4
Yosemite Fr	Ainsworth	Erl Syndicate, Ltd	2270	9.03	June 2
You Know	Lardeau	J. A. Magee	4493	18.98	Aug. 12
Zoa	Ainsworth	King Solomon Mg. Co	4753	37.60	March 17

East Kootenay.

Ashland	Fort Steele	Jos. H. Wright	5461	36.57	March 13
Alma	"	"	2078	47.78	Aug. 25
Ben d'Or	"	J. C. Green, J. L. Parker *et al.*	3773	43.03	March 19
Belleville	"	Wm. J. Hamilton	5253	51.65	May 16
Bracebridge	"	Jos. H. Wright, O. H. Burden *et al.*	5037	51.65	" 22
Buttercup	Windermere	R. S. Gallop *et al.*	5354	48.95	July 24
Copper King	Fort Steele	Jno. Swenson	6028	49.50	May 12
Denbigh	"	J. H. Wright, O. H. Burden *et al.*	5576	35.00	Nov. 25
Fisher	"	Fred Cogle *et al.*	5287	15.88	April 14
Gt. Northern	Windermere	R. S. Gallop *et al.*	5358	43.63	July 24
Hidden Hand No. 2	Fort Steele	Ed. C. McKinstry *et al.*	4086	37.37	March 17
Hot Boy	Windermere	R. S. Gallop *et al.*	5361	23.65	July 24
Hillside	Fort Steele	Jos. H. Wright	2076	37.71	Aug. 25
Jackson	"	J. H. Wright	2077	50.11	" 25
Kedive	"	David Griffith	5804	45.83	April 1
La Vida	"	Jno. Swenson	6027	48.34	May 12
Look Out	"	W. J. Hamilton	5254	51.65	" 14
Maple Leaf Fr	"	N. Star Mg. Co	2319	1.73	April 3
Mark Creek	"	Chas. C. Farrell	2043	51.65	" 4
Maid of the Mount-	"	Jno. Swenson	6026	51.65	May 12
Monitor [ain	"	R. S. Gallop *et al.*	5355	40.32	July 24
Old Abe	"	J. S. Parker, J. C. Green *et al.*	3774	49.35	June 15
Omdurman	"	David Griffith	5803	51.20	April 1
Prospector's Dream	"	J. C. Green and J. S. Parker	3772A	51.65	March 18
Phœnix	Windermere	R. S. Gallop	5359	50.23	July 24
Regina	Fort Steele	J. H. Wright, O. H. Burden *et al.*	5575	48.07	Nov. 23
South Side	Windermere	R. S. Gallop	5360	48.73	July 24
Sultan	Fort Steele	Jos. H. Wright	2075	49.23	Aug. 25
White Star	"	Fred Coyle *et al.*	5286	27.57	April 14
World's Fair	Windermere	R. S. Gallop *et al.*	5356	50.29	July 24
Wilderness	"	"	5357	30.79	" 24

YALE.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Alabama	Similkameen	Jno. Stillwell Clute	2429	51.65	March 16
Arlington	Grand Forks	Frank Asprey	2596	44.65	" 16
Ajax	Greenwood	Forbes M. Kerby	2367	51.46	" 17
Amandy	"	Jas. Hunter	2795	50.52	April 14
Ah There	"	Geo. D. Lyson	1960	17.75	June 2
Achme	Osoyoos	C. de B. Green	1074	49.00	July 2
Astoria	Greenwood	Sidney Rosenhaupt	3134	50.72	Nov. 19
Arcadia	"	"	3135	21.70	" 19
Alice	"	W. G. McMynn, D. McLaren *et al*	2579	51.65	Dec. 21
British	Osoyoos	British Lion G. M. Co., Ltd.	1987	51.65	Feb. 26
British Lion	"	" "	1988	41.50	" 26
Black Tail	Grand Forks	Geo. W. House	2284	45.10	April 3
Bertha (frac)	Osoyoos	Jacob Rink *et al*	2677	16.00	" 18
Bluebell	Grand Forks	Wm. Shaw, T. W. Stack *et al*	2136	48.40	June 9
Brigman	Similkameen	Mira Monte Mg. Co., Ltd	1102	49.37	" 18
Bank of England	"	John E. Bate	1130	29.80	" 18
Baltimore	Greenwood	J. A. Moody	2391	44.82	" 26
Blue Bell	Osoyoos	Geo. G. Powell and E. Morris	1902	51.65	Aug. 3
Best	Grand Forks	C. Hay and N. McCallum	1616	39.84	" 10
Bonanza	"	" "	1617	16.83	" 10
Bolton Fr	Greenwood	I. H. Hallett and Geo. R. Naden	1706	27.28	Oct. 27
Beaver	"	J. T. Bell, D. Murray *et al*	2342	38.31	" 28
Boston	"	F. Darragh and W. Lacy	5717	31.90	" 2
Betts	Grand Forks	C. J. Magee	3056	42.25	Nov. 24
Big Horn	Kamloops	Cinnabar Mg Co. of B. C	927	43.23	" 28
Brookline	Greenwood	R. J. Bayes and H. Reed	1032	45.75	Dec. 21
Bench Fr	Similkameen	H. McRae, J. McKay *et al*	119	3.55	May 22
Champion	Kettle River	C. D. Temple	2863	47.86	March 26
Carlotta	Greenwood	Andrew Poggi and F. J. Finucane	2943	51.65	June 1
Cincinnatti	Similkameen	Samuel J. Bate	1127	44.34	" 18
Copper Bntte Fr	"	"	1128	22.15	" 18
Covington	"	Portland Mg. Co., Ltd	1123	51.56	Aug. 3
Cleopatra	Grand Forks	C. Hay and Neil McCallum	1615	43.49	" 10
Cornwall	Greenwood	P. B. S. Stanhope	2571	47.32	Oct. 13
Copper Cliff	Similkameen	Peter E. Wilson	1939	39.52	" 26
Copper Bluff	"	"	1940	39.85	" 26
Caledonia	Grand Forks	Chas. Staynor Wallis	1756	49.20	Nov. 20
Copper Queen	"	Jno. Mulligan	1949	44.29	" 27
Climax	"	I. H. Hallett and J. F. Cunningham	2113	46.07	" 28
Civil	Kamloops	Wm. Buxton, R. Blair *et al*	1068	1.77	Dec. 14
Colorado	Greenwood	A. Waddell and W. G. McMynn	2641	34.22	" 18
Denver	"	C. D, Temple	2862	49.38	March 26
Deadwood	"	Geo. D. Leyson	1962	48.86	May 28
Daisy	Similkameen	S. R. Almond and J. Snowden	816	51.65	June 2
Denver	Grand Forks	Olive B. Jones	2410	51.22	July 3
Deerhorn	Greenwood	Rose C. Davey	1714	30.16	Nov. 12
Dandy	"	S. M. Johnson	1259	44.70	Oct. 9
Dominion Fr	Vernon	Henry G. Muller	2541	24.50	" 13
Denver	Greenwood	A. A. McIntosh and W. H. Spence	2875	50.70	Nov. 28
Excelsior	Grand Forks	Vancouver & Boundary Ck. Dev. & M. Co.	2609	46.37	Feb. 16
Exchange Fr	Osoyoos	Myron K. Rodgers	725	12.80	March 20
Eureka	Grand Forks	J. F. Miller	1145	42.82	Aug. 21
Elkhorn	Osoyoos	J. M. Sharp and W. J. Brewer	2057	51.65	Sep. 16
Excelsior	Kamloops	Cinnabar Mg. Co. of B. C	926	51.50	Nov. 28
Eureka	"	" "	928	51.65	" 28
Emeroy	"	Jno. Beaton	1050	43.28	" 30
Erin	"	W. Buxton, R. Blair *et al*	1066	34.57	Dec. 14
Elmer No. 2	Grand Forks	I. Robt. Jacobs and S. E. Lictenheim	2334	49.73	" 21
Fanny H. Fr	Greenwood	No. 7 Mining Co., Ltd	1643	13.61	Oct. 27
Fourth of July	"	Alex. Waddell and E. Sullivan	2638	50.75	Dec. 18
Fraser	Similkameen	H. McRae, J. Mackey, &c.	231	47.15	May 22
Fraser Fract	"	" "	226	8.75	" 22

YALE.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Gold Bug No. 2	Greenwood	Chris. W. Stack and T. W. Stack	1718	51.65	Feb. 13
Gold Finch	"	C. W. H. Sansom	820	39.07	May 7
Georgia	Similkameen	Mira Monte Mg. Co	1101	51.65	June 18
Grand Forks Belle	Grand Forks	Chas. Hay and N. McCallum	1618	37.26	Aug. 10
Gem Fract	"	Jas. F. Cunningham	2139	11.80	" 12
Galena	Osoyoos	Peter Scott	2667	38.11	Oct. 12
Golden Age Fr	Grand Forks	Arthur Jordan	3044	31.55	" 28
Gladiator	Kamloops	Jno. R. Hall and E. H. Jones	872	43.80	Dec. 11
Homestake	Greenwood	Syd. M. Johnson, A. Megraw *et al*	1892	49.26	Feb. 12
Hunter	"	Owen Mellon	2859	35.28	March 26
Honolulu	"	W. H. McMackon and T. R. McMackon	1572	43.59	April 8
Highland Chief	"	Fayette Harris	2345	51.65	May 7
Hamilton	Similkameen	H. McRae, J. Mackay *et al*	127	51.08	" 22
Hercules	Greenwood	Edw. L. Tate	926	22.58	June 25
Hastings	Grand Forks	Jas. T. McKenzie, Nev. Smith *et al*	2053	51.65	Aug. 27
Hillside	Osoyoos	J. M. Sharp and W. J. Brewer	2062	19.52	Sep. 16
Home Rule	Similkameen	Vermilion Forks M. and D. Co	1294	51.65	Oct. 23
Highland Lass	Greenwood	J. T. Bell and G. A. Rendell	2341	27.10	" 27
Highlander Fr	"	J. T. Bell and J. P. Anderson	2344	20.61	" 28
Humbolt	Similkameen	Wm. A. Cooper and A. J. Cooper	121	51.65	" 28
Halifax	Grand Forks	Arthur Jordan	3042	33.70	" 28
Hesperus Fr	"	Chas. J. Magee	3057	27.64	Nov. 24
Hiram Walker	Osoyoos	Dominion, Fairview and Golden Klondyke Synd., Ltd.	2065	25.02	" 25
Hairspring	"	Geo. A. Bemis and J. A. Greene	2056	45.68	" 26
Hackla	Greenwood	N. E. Peterson and A. E. Ashcroft	2847	48.16	" 28
Homestead Fr	Osoyoos	Jas. M. Sharp and W. J. Brewer	2061	37.16	" 30
H. R.	Greenwood	Robt. J. Bayes and H. Reed	1033	50.72	Dec. 21
Iron Duke	Osoyoos	Myron K. Rodgers	1600	23.00	March 20
Iron King	"	J. M. Sharp and W. J. Brewer	2060	16.68	Sep. 16
Iron Mask	Similkameen	Vermilion Forks M. and D. Co., Ltd	813	49.13	Oct. 23
Jefferson	Greenwood	Francis A. Doty	1997	51.65	July 21
Jubilee No. 2	Similkameen	Vermilion Forks M. and D. Co., Ltd	814	41.75	Oct. 23
Jennie Lind Fr	Grand Forks	Arthur Jordan	3043	20.00	" 28
Jennie Silkman	Similkameen	David Day, L. G. Barrow *et al*	810	22.66	Nov. 16
Jumbo	Kamloops	Wm. Buxton, R. Blair *et al*	1067	4.13	Dec. 14
Kentucky	"	Alex. S. McCarter and J. M. Harper	835	32.81	April 21
Knob Hill	Greenwood	Sidney C. Cosens	2659	51.65	Sep. 9
Keystone	Grand Forks	Jas. N. Paton and C. Frank	2729	51.63	" 12
Lucky Silverthorne	Similkameen	Mira Monte Mg. Co., Ltd	228	15.40	March 19
La Plaza [Fr.	Greenwood	Geo. F. Miller	1393	45.60	" 27
Lone Star	Similkameen	S. R. Almond, J. Snowdon *et al*	1935	38.58	June 2
Le Roy	Greenwood	Enos H. Shaw and J. D. Graham	2565	51.65	Aug. 12
Lizzie	"	" "	2566	49.19	" 12
Lillie May	"	H. R. Davidson	1285	51.32	" 13
La Reine	Similkameen	Vermilion Forks M. and D. Co., Ltd	233	44.96	Oct. 23
Lady of the Lake	Greenwood	No. 7 Mg. Co., Ltd	1642	51.36	" 27
Lone Tree	Kamloops	Robt. H. Lee	883	51.41	Nov. 30
Myrtle	Greenwood	H. Megraw, A. Megraw *et al*	1654	47.30	Feb. 13
Muldoon	Yale	Mira Monte Mg. Co	227	32.00	March 19
Mogul	Greenwood	Chas. D. Temple	2857	48.55	" 26
Monetor	"	J. Peterson and O. Mellon	2858	46.68	" 26
Mexico	"	John C. Farr	2867	27.30	" 27
Molka	Osoyoos	Jacob Rink *et al*	2675	45.20	April 18
Midway	Grand Forks	Chris. J. Lundy	1399	41.34	May 8
Mascotte Fr	Lardeau	Ophir Lade Mg. Synd., Ltd	5418	13.44	" 13
Myrtle	Greenwood	J. S. C. Fraser	1891	43.56	June 15
Mystic	"	Hal J. Cole	2396	46.87	" 25
Missing Link No. 2	"	G. R. Naden and J. E. Leckie	1474	9.63	" 25
Mayflower [Fr.	Grand Forks	C. Hay and N. McCallum	1619	35.31	Aug. 10
Moonlight	Greenwood	Spencer Benerman	1528	51.65	" 12

YALE.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Mayflower	Greenwood	H. R. Davidson	1284	51.15	Aug. 13
Morning Star	"	Sidney Rosenhaupt	2570	50.46	Nov. 19
Mountain	Kamloops	Cinnabar Mg. Co. of B. C.	929	21.21	" 28
Muldoon	Greenwood	Alex. Waddell and W. G. McMynn	2639	51.64	Dec. 18
Montana	"	" "	2640	50.62	" 18
Novelty Fr	Grand Forks	B. C. Chartered Co., Ltd.	949	6.90	March 24
No. 5	"	Mary Garland	1878	22.40	May 8
Newport	Similkameen	Jno. E. Bate	1129	47.26	June 18
Noble 5	"	R. J. Armstrong	1131	30.46	July 30
Napoleon Bonaparte	Grand Forks	Chas. Hay and N. McCallum	1614	43.76	Aug. 10
Napoleon	Greenwood	D. Smith, A. Smith *et al.*	2346	23.90	" 14
North End	"	Jacob C. Haas and S. M. Johnson	1291	37.35	Sep. 10
Nickel Plate	"	Pat A. Linberg, N. E. Peterson *et al.*	2843	30.48	Oct. 2
New St. Maurice	Grand Forks	Harry Johnson, August Garnier *et al.*	682	48.60	" 13
No. 15	Greenwood	Vancouver and Boundary Ck. Dev & Mg. Co.	2607	51.65	Nov. 20
No. 9	"	" "	2608	32.00	" 20
Norfolk	Grand Forks	Alice J. Dunlop, R. J. E. Leckie *et al*	2734	51.65	" 27
Oriole	Similkameen	S. R. Almond *et al.*	808	29.84	June 18
Olalla	Osoyoos	J. M. Sharp and W. J. Brewer	2059	37.95	Sep. 16
Oro Bastante	"	Geo. A. Bemis and J. A. Greene	2055	44.90	Nov. 26
Pinhook	Greenwood	G. R. Naden and J. E. Leckie	1469	32.75	Feb. 16
Portland	Similkameen	Portland Mg. Co., Ltd	1124	45.98	Aug. 3
Passayton	Kamloops	Smith Curtis and E. Brown	229	51.65	Nov. 30
Queen of the West	Similkameen	Julia A. Hinshaw	1132	26.30	July 31
Quebec	"	Portland Mg. Co., Ltd	1126	51.57	Aug. 3
Rob Roy	Greenwood	J. J. Warren	1556	51.65	Feb. 12
Rock Creek	"	Ainsley Megraw	2527	41.21	" 12
Rambler	"	Chas. D. Temple	2861	51.65	March 26
Rose	Grand Forks	DeWitt C. Beach, J. S. C. Fraser *et al.*	1035	39.38	June 4
Red Mountain	Osoyoos	C. deB. Green, T. Cory *et al.*	2666	45.38	Oct. 27
Redwood Fr	Similkameen	Mira Monte Mg. Co.	1103	31.40	June 18
Rohne Fr	Osoyoos	Jacob Rink *et al.*	2676	17.10	July 2
Rosie	Greenwood	A. M. Winston	1943	34.50	Aug. 14
Rearguard Fr	Osoyoos	W. J. Brewer.	2700	47.16	" 24
Spokane	Greenwood	Chas. E. Peterson	2796	43.70	Feb. 16
Syd. M. Johnson	"	Geo. D. Leyson	1961	49.29	May 28
Shamrock	Grand Forks	DeWitt C. Beach, C. S. Wallis *et al.*	1040	51.65	June 4
Spider Fr	Similkameen	S. R. Almond and Jas. Snowdon	811	25.93	" 18
Surprise	Osoyoos	J. M. Sharp and W. J. Brewer	2058	37.48	Sep. 16
Slamet	Greenwood	Lytton W. Shatford, W. Edwards *et al.*	2663	38.12	Oct. 22
Silver Dollar	"	Chas. Newman, J. Peterson *et al.*	2842	40.85	" 22
Scranton Fract	"	F. J. Finucane	1279	9.60	" 28
Skyline	Similkameen	Star Exploration and Mg. Co	94	44.50	Nov. 12
Starlight	Greenwood	F. B. Holmes, A. B. Coutts *et al.*	1889	39.50	" 14
Seven Thirty	"	H. R. Davidson	1459	51.65	" 19
Sunnyside	"	Michael McBean	2879	43.85	Dec. 21
Tiger	"	Wm. M. Law	2097	50.88	March 20
Thistle	Grand Forks	DeWitt C. Beach, C. S. Wallis *et al.*	1041	50.57	June 4
Tam O' Shanter	Kettle River	C. R. Forde, Geo. Kidd *et al.*	2405	39.77	" 10
Trapper	Greenwood	H. R. Davidson and H. B. Thoen	1467	51.65	Aug. 14
Tacoma	"	Annie Christinson and S. J. Jensen	1715	41.17	" 15
Treasury Fr.	Grand Forks	Henry P. Jackson	1422	19.63	Sep. 23
Toronto No. 2	Osoyoos	Peter Scott	2668	18.50	Oct. 12
Terrier	"	C. deB. Green and T. Cory	761	41.14	" 27
Three Tramps	Vernon	H. Seydell, B. F. Young *et al.*	525	45.88	Dec. 23
Utopia	Kettle River	Chas. D. Temple	2860	44.00	March 26
Vicksburg	Similkameen	Portland Mg. Co., Ltd.	1125	51.23	Aug. 3
Victoria	Greenwood	B. H. John and H. Cathcart	2523	51.65	Sep. 9

YALE.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Vancouver	Similkameen	Vermilion Forks M. and D. Co.	1295	44.00	Oct. 23
Waterloo Consol Fr.	Greenwood	Waterloo Consol. M. and M. Co.	2814	21.34	Feb. 12
White Horse	"	J. Graham, A. Hudson *et al*	2610	30.99	April 8
Winedot	"	E. H. Shaw and J. D. Graham	2567	36.19	Aug. 12
Warrior Fr	Osoyoos	W. J. Brewer	2749	43.52	" 24
Young George	Greenwood	Andrea Poggi and F. J. Finucane	2942	51.65	June 1
Yukon Fr	"	Nicholas Garland	1531	8.00	Dec. 22

COAST AND VANCOUVER ISLAND.

Alladin	Nanaimo	A. J. Milner and B. J. Tobin	189	51.65	March 20
Anoka	Victoria	Mt. Sicker and Brenton Mines, Ltd	16G	40.56	" 25
Ax	"	H. E. Newton	136	51.65	July 4
Ax Fract	"	"	144	34.36	" 4
Alpha	Alberni	Laurence Manson	535	32.00	Aug. 29
Alps No. 2	N. Westm'r.	Jas. Douglas	1792	49.35	Nov. 27
Alps	"	B. C. Standard Mining Co., Ltd	1786	51.65	Dec. 22
Black Prince	Nanaimo	M. R. Wells	318 R 1	42.08	Feb. 16
Bully Boy	"	Queen Bee Gold Mining Co., Ltd	324A	19.11	April 2
Bald Eagle No. 2	Alberni	E. V. Bodwell	459	51.65	" 3
B. C.	Nanaimo	Robt. Forbes	71	40.96	June 1
Blue Lead	N. Westm'r.	A. McDonald, P. Santine *et al*	2054	42.33	" 10
Balkis	Alberni	Wm. Watkins	383	48.00	Aug. 20
Belvidere	"	Laurence Manson	301	28.00	" 29
Big Bear	"	"	304	40.18	" 29
Black Prince	Victoria	A. Deakin, W. Lorimer *et al*	149	40.94	Oct. 28
Bessie	"	Margaret W. Melrose and W. Vanstone	2G	51.65	Nov. 23
Copper Queen	Nanaimo	H. W. Treat and L. Goodacre	40 T 1	48.64	Feb. 18
Copper Queen	Alberni	F. B. Pemberton	597	38.03	March 16
Cap Sheaf	Nanaimo	Cap Sheaf Copper and Gold Co., Ltd	180	47.00	" 23
Crown Point No. 5	Alberni	Homer H. Swaney	456	46.12	April 9
Cœur d'Alene	"	Wm. Watkins	306	26.58	Aug. 20
" No. 1.	"	"	307	22.56	" 20
" " 2.	"	"	308	34.42	" 20
" " 4.	"	"	309	33.91	" 20
" Fract.	"	"	310	5.91	" 20
Condor	N. Westm'r.	Jas. Ironside	1793	51.65	Nov. 27
Donald	Victoria	Tyee Copper Co., Ltd	63G	44.15	Feb. 18
Daisy	N. Westm'r.	Goldsmith Cop. Co., Ltd	1899	48.55	April 2
Dunsmuir	Victoria	Mt. Sicker and B. C. Dev. Co., Ltd	56G	49.75	Aug. 21
Defender Fr	"	" "	74G	7.42	" 21
Excelsior	Skeena	R. P. Rithet, J. Irving *et al*	9 R 4	45.30	March 5
Em	Nanaimo	A. J. Milner and B. J. Toben	192	47.14	" 20
Edna B	"	Cap Sheaf Copper and Gold Mines Co	188	41.84	" 23
Elmore Fr	Victoria	Mt. Sicker and Brenton Mines, Ltd	91G	4.38	" 25
Empress of India	Alberni	Robt. A. Newton	155G	51.65	May 12
Fizz Fract	Victoria	C. J. Newton	148	12.90	Feb. 11
Fizz	"	R. A. Newton	147	49.96	" 11
Fisherman	Alberni	Laurence Manson	299	29.06	Aug. 29
Golconda	Nanaimo	J. H. Hoare	244 R 1	51.56	Feb. 12
General Warren	Victoria	H. E. Newton	138	32.81	April 22
Hazel Ruth	Nanaimo	Albert J. Milner and B. J. Toben	191	43.51	March 20
Iron Chief	Alberni	E. V. Bodwell	374	50.75	April 3
I. X. L	"	R. T. Godman	156G	51.65	May 12

COAST AND VANCOUVER ISLAND.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Independence Fr	Victoria	Mt. Sicker and B. C. Dev. Co., Ltd	72G	25.20	Oct. 10
Ironclad	"	Sarah L. Bevins	80G	51.20	" 10
Iron Duke	Nanaimo	N. W. Dobeson	184	51.54	Nov. 27
Lucky Jack	"	Annie E. Forbes	79	49.24	June 1
Lynx Fr	Victoria	Mt. Sicker and B. C. Dev. Co., Ltd	75G	17.35	Aug. 21
Lubbe	"	Caroline A. Lubbe, Mary Phair *et al*	80	48.85	Sep. 23
Little Bantam Fr	"	E. Calder, S. T. Chapman *et al*	95G	9.88	Nov. 23
Morning Star	Nanaimo	Percy Jas. Chick	343 R 1	26.77	Feb. 11
Manx Fr	Victoria	H. E. Newton	145	8.43	" 11
Muriel Fr	"	Tyee Copper Co., Ltd	108G	12.33	" 18
Marmot	Alberni	F. B. Pemberton	599	14.70	March 16
Mountain Bear	"	"	600	20.45	" 16
Maxie Fr	Nanaimo	Cap Sheaf Copper and Gold Co., Ltd	185	6.31	" 23
May	Victoria	Mt. Sicker and Brenton Mines, Ltd	92G	32.15	" 25
Milner	Nanaimo	Jas. Forbes, Sr	77	39.63	June 1
Minneapolis	"	Robt. Forbes	78	38.29	Aug. 19
Mt. Skirt	Victoria	Caroline Lubbe, M. Phair *et al*	79	41.11	Sep, 23
Mona Fr	"	Margaret M. Melrose and W. Vanstone	119G	14.68	Oct. 10
Mildred	"	Ed. Calder and A. D. McKinnon	96G	45.17	Nov. 23
N. T. Fract	"	Tyee Copper Co., Ltd	43G	2.97	May 9
Nelson	Nanaimo	Robt. Forbes	73	50.10	Aug. 19
Nero	"	Maurice Gintzburger	328 R 1	21.56	Oct. 26
Old Ireland	Alberni	Wm. H. Flett	458	47.43	April 9
Orphan Boy	"	Laurence Manson	298	27.44	Aug. 29
Ocean Wave	"	"	303	31.50	" 29
Olivia	Nanaimo	N. W. Dobeson	179	46.10	Nov. 27
Phil Fract	Victoria	Tyee Copper Co., Ltd	110G	1.50	Feb. 18
Paystreak	Nanaimo	Robt. Forbes	75	51.65	Aug. 15
Pauper	Victoria	Henry Fry	31G	51.65	" 21
Phair	"	Caroline A. Lubbe, M. Phair *et al*	78	50.68	Sep. 23
Phair Fr	"	" "	5855	41.50	Oct. 23
Queen Bee	Nanaimo	Queen Bee Gold Mines, Ltd	345	49.11	April 2
Rose	N. Westm'r.	Geo. Wagg	1922	48.90	June 11
Ralph	Victoria	Caroline Lubbe, G. H. Burns *et al*	77	51.65	Sep. 23
Ralph Fr	"	" "	82	.73	" 23
Sadie	Skeena	R. P. Rithet, J. Irving *et al*	8 R 4	42.09	March 5
Silver King	Alberni	F. B. Pemberton	596	29.20	" 16
St. George	"	"	598	35.23	" 16
Shamrock	Nanaimo	A. J. Milner and B. J. Toben	186	40.58	" 20
Soverine	"	Cap Sheaf Copper and Gold Co	183	47.74	" 23
Star	Victoria	Mt. Sicker and Brenton Mines, Ltd	93G	42.78	" 25
Standard No. 6	Alberni	J. W. Ladd	392	47.57	April 9
Storneway	Nanaimo	Annie E. Forbes	72	48.42	June 1
Seattle	Victoria	Mt. Sicker and B. C. Dev. Co., Ltd	57G	30.76	Aug. 21
Santa Cruse	Alberni	L. Manson	302	33.85	" 29
Southern Cross	"	"	305	49.40	" 29
Toby	Victoria	Tyee Copper Co., Ltd	18G	49.00	Feb. 18
Tax	"	R. A. Newton	137	51.16	March 24
Two Dear	"	H. Fry and J. S. Bevins	32G	49.30	May 11
Tortilla	Alberni	L. Manson	536	20.50	Aug. 29
Tolmie	Victoria	C. A. Lubbe, M. Phair *et al*	86	48.65	Sep. 23
Victoria	N. Westm'r.	Harry Freeman	1727	30.75	March 24
Victoria	Alberni	W. H. Flett	457	49.90	April 9
Vanderbilt	Nanaimo	Jas. Forbes, Sr.	76	51.65	June 1
Vulture	N. Westm'r.	W. J. Kerfoot	1794	51.60	Nov. 27
Wax	Victoria	C. J. Newton	130	51.00	Feb. 11
X Ray	Nanaimo	A. J. Milner and B. J. Toben	187	46.00	March 20
Yankee	Victoria	Mt. Sicker and Brenton Mines	89G	51.65	" 25

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Fort Steele District	Fort Steele	J. F. Armstrong		
Fort Steele	"		Jas. Hislop	
Sub-office	Tobacco Plains			M. Phillipps.
"	Fernie			L. Forbes.
"	Cranbrook			F. R. Morris.
"	Kimberley			S. Hoskins.
"	Moyie			F. D. Hope.
Revelstoke District	Revelstoke	Fred Fraser		
Revelstoke	"		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	New Denver		Angus McInnes	
Sub-office	Sandon			E. M. Sandilands.
Slocan City	Slocan City		H. P. Christie	
Ainsworth	Kaslo		A. Lucas	
Sub-office	"			C. C. Daley.
"	Howser			W. Simpson.
"	Poplar Creek			J. Simpson.
Nelson District	Nelson	R. Renwick		
Nelson	"		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	"		J. A. Hooson	
Nanaimo District	Nanaimo	Marshal Bray		
Nanaimo	"		Marshal Bray	
Sub-office	Alert Bay			W. Woollacott.
Alberni District	Alberni	A. L. Smith		
Alberni	"		A. L. Smith	
Clayoquot	Clayoquot		W. T. Dawley	
Quatsino	Yreka		B. W. Leeson	
Victoria District	Victoria	W. S. Gore		
Victoria	"		G. V. Cuppage	
New Westminster	New Westminster		D. Robson	
Sub-office	Harrison Lake			L. A. Agassiz.
"	Vancouver			R. J. Skinner.
"	Chilliwhack			J. Pelly.

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	"		James Porter	
Liard	"		"	
Teslin Lake	"		"	
Sub-office	Atlin			E. J. Thain.
Atlin District	Atlin	J. A. Fraser		
Atlin Lake	"		E. J. Thain	
Sub-office	Wells			J. J. McKenna.
Skeena District	Victoria	W. S. Gore		
Skeena River	Port Simpson		John 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	
Omineca District	Manson Creek	F. W. Valleau		
Omineca	"		F. W. Valleau	
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		J. W. Burr	
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			J. T. Armstrong.
"	Hedley			F. M. Gillespie.
Golden District	Golden	J. E. Griffith		
Golden	"		F. C. Lang	C. E. Hamilton.
Windermere	Windermere		John Bulman	

DECISIONS

Of the Geographic Board of Canada, relating to Geographic Names in British Columbia.

By Order in Council dated December 18th, 1897, the Governor-General in Council was pleased to create a "Geographic Board," and was further "pleased to order and direct that all questions concerning geographic names in the Dominion which arise in the departments of the public service shall be referred to the Board, and that all departments shall use in their publications the names and orthography adopted by the Board."

At the request of the Dominion Government that the Provincial Government appoint a representative on the "Geographic Board," the Lieutenant-Governor in Council was pleased to appoint Wm. F. Robertson, Provincial Mineralogist, a member of the Board, representing British Columbia. The Fourth Report of the Board, containing a large number of rulings relating to British Columbia names, may be obtained from the Provincial Mineralogist, Victoria, and a General Report will be shortly issued.

APPENDIX.

PETROGRAPHY OF ROCK SAMPLES FROM BRITISH COLUMBIA.

The following samples were collected in the field by the Provincial Mineralogist and others, and the microscopical examinations were made by the kindness of the gentlemen whose names are mentioned. The running numbers (in black figures) are for reference; the other numbers refer to the duplicate samples retained in the Provincial Mineral Museum, Victoria:

TEXADA AND VANCOUVER ISLANDS.

Samples examined by Dr. Barlow (Petrographer to the Geological Survey).

1. 5052.—*Cornell Mine, Texada Island.*—Felsite near shaft, second level. The ore-bearing matrix. The hand specimen shows a fine-grained crystalline rock of greenish grey colour and earthy lustre. Under the microscope the rock has a distinctly porphyritic structure, and from the mineral content is an augite porphyrite. Finely twinned plagioclase, and colourless augite comprise the phenocrysts. The former occurs in lath-shaped and tabular form, while the latter is rather irregular. The base is in great part composed of augite, with which is associated turbid granular aggregates of epidote and calcite in the interstitial spaces. Pale brown garnet (almanditic) and colourless apatite are present as accessory constituents.

2. 5052.—As above.

3. 5053.—As above.

4. 5053-4.—More decomposed variety of 5052.

5. 5054-5.—*Cornell Mine, Texada Island.*—Ore-bearing matrix. The rock is a pale green granular pyroxenite, holding a large amount of accessory almandine garnet. Microscopically it consists principally of polygonal and rounded idiomorphic individuals of pyroxene. Saussuritized plagioclase and a pale brown garnet occupy angular spaces between the pyroxene individuals. The garnet shows well-defined optical anomalies. This rock, from its association, is a deep-seated basic phase—possibly a seggregation of the augite porphyrite.

6. 5057-8.—*Cornell Mine, Texada Island.*—Diabase porphyrite from 2nd level. The rock is fine-grained, greenish in colour, and has a somewhat sheared appearance. Under the microscope it is seen to be a much decomposed diabase porphyrite, and is evidently a deeper seated portion of the magma. The plagioclase is probably near the basic end of the series. Its well developed zonal structure shows a different composition for the interior and periphery, of which the former is the more basic and much saussuritized. The pyroxene has wholly altered to a pale green pliochroic actinolite, with a separation of turbid epidote and a little calcite. Some irregular aggregates of brown biotite, numerous grains of magnetite and a few of apatite complete the section.

7. 5060-11.—*Cornell Mine, Texada Island.*—Ore-bearing matrix; 3rd level. The non-metallic minerals composing the bornite matrix are pale green pyroxene and brown garnet. The microscopic section shows that the matrix is principally garnet—similar to that described in 5054—with a subordinate amount of colourless augite. The garnet is much cracked, and these cracks are filled with the sulphides, chalcopyrite and bornite, and these are connected with the larger grains.

8. 5058-9.—*From near Iron Mine, Texada Island.*—Augite porphyrite: (*See* Report 1902, pages 225 *et seq.*) The hand specimen represents a basic and much decomposed porphyritic rock. Under the microscope this rock is seen to be an augite porphyrite. The plagioclase feldspar occurs in stout, lath-shaped individuals, with irregular borders. It is very turbid, both from alteration products and inclusions, the former being principally zoisite. The augite has wholly altered to a pale green pliochroic actinolite, which preserves the form and twinning of the original mineral. Aggregates of pale brown biotite and grains of magnetite are associated with the actinolite, in part as inclusions. Secondary quartz occurs in the base as grains interlocking with the feldspar.

9. 5055-6.—*Iron Mine (Lee's Camp), Texada.*—Augite porphyrite occurring beneath the magnetite. Macroscopically the rock is a fine-grained porphyrite with a greenish base, which holds small stringers of iron pyrites. Microscopically the rock is composed of phenocrysts of colourless augite and brown pliochroic hornblende, imbedded in a turbid base consisting of a fine-grained aggregate of feldspar, augite, epidote and calcite. Both the augite and hornblende are altering to a fibrous and platy pale green chlorite. A few yellowish spheres occur as inclusions in the augite. The rock is a decomposed augite porphyrite.

10. 5056-8.—*Iron Mine (Lee's Camp), Texada Island.*—Dyke rock (diabase) on one side of rich copper lead. The hand specimen represents a medium-grained rock which shows on the weathered surface the structure of a diabase. The microscope shows the rock to be quite fresh and a typical diabase. The plagioclase occurs in lath-shaped individuals twinned according to the albite law, with a few showing additional periclin twinning. A pale yellow augite and brown biotite occupy interstitial spaces between the feldspars. The biotite holds rounded grains of augite and feldspar in a poihilitic manner. Magnetite is very abundant and is associated with the augite.

11. 5059-10.—*Iron Mine, Texada Island.*—Granitic rock. Quartz-augite-syenite. This rock is a highly feldspathic one, fine in grain and light coloured. Under the microscope the rock is seen to have a typical hypidiomorphic structure and to consist principally of feldspar with subordinate amounts of quartz and augite. The feldspar is of two generations, a plagioclase—albite or oligoclase—with rather good form, and orthoclase with poor form and irregular interlocking borders. The augite is pale yellow, and is considerably altered to actinolite and epidote. The quartz is hardly in sufficient amount to be essential, therefore the rock is a quartz-augite-syenite.

12. 5645.—*Esquimalt, V. I.*—Basic eruptive porphyrite. The hand specimen is a dark green, dull rock traversed by planes presenting chloritised and slickensided surfaces. The thin section consists of saussuritized phenocrysts of feldspar in a base of granular and fibrous chlorite and actinolite. Quartz and feldspar-actinolite veins traverse the rock. Iron ore and epidote are also present.

Quatsino Sound, V. I.

Samples examined by J. A. Dresser.

13. 1.—*Paystreak Claim, Quatsino.*—Country rock (altered quartzless porphyry) from *Paystreak* claim, situated three-quarters of a mile up Teta river, on the west side of South-East arm, Quatsino sound, four miles from head of arm. Altitude of tunnel from which rock was taken, 125 feet. This is a light grey rock showing a finely porphyritic structure. It weathers to a rusty brown, and has a hardness of 6, or more. By the aid of the microscope this rock is seen to be clearly of igneous origin. It consists of a finely crystalline groundmass containing phenocrysts of feldspar. Both phenocrysts and groundmass are generally quite turbid by alteration to kaolin and muscovite. One of the phenocrysts shows extinction parallel to a

principal axis, and hence is orthoclase, while another still displays lines of twinning according to the albite law, and so is plagioclase. The angles of extinction indicate that its original composition was about that of oligoclase. Orthoclase, however, seems more abundant. Bisilicates and other dark minerals are conspicuously absent. A little quartz is seen, but is evidently a secondary constituent. The rock is, therefore, an altered quartzless porphyry.

14. 2.—*White Quartz Claim, Quatsino.*—Country rock (altered granite porphyry), from *White Quartz* claim, about quarter of a mile south of *Paystreak* claim, one mile from salt water; altitude, 1,050 feet. A light grey rock with rusty weathering. It is holocrystalline, but has a rather fine texture. By the aid of a lens, specks of pyrite can be seen. In the microscopic section it is found to be an eruptive rock considerably altered by decomposition. Quartz and feldspar are present in distinct phenocrysts, and also in granophyric intergrowths of the two minerals. They doubtless, too, originally composed certain areas, now turbid from incipient alteration, of a microcrystalline ground mass. Frequent patches of epidote and other secondary constituents are results of the decomposition, now pretty complete, of primary ferromagnesian minerals. Grains of iron are numerous, some of which are primary. The latter are frequently altered in some degree to leucoxene, and hence are either ilmenite, or titaniferous magnetite. The rock is an altered granite porphyry.

15. 3.—*Iron Claims, Quatsino.*—Country rock (felsite) near deposits of bog iron on the north side of the West arm of Quatsino sound, 9 miles west of Coal harbour. This is a grey rock which shows no structure to the unaided eye. It contains numerous grains of pyrite. The specimen is a much decomposed one. By the aid of the microscope it is found to be volcanic and holocrystalline. The greater part of the slide is made up of a fine aggregate of quartz and feldspar. There are also larger grains of feldspar, which are rendered turbid in appearance by decomposition. It is probable that these originally crystallised as small phenocrysts in a glassy or cryptocrystalline base, which by devitrification has assumed its present microcrystalline condition. It carries a considerable amount of pyrite, as well as a little titaniferous magnetite, or ilmenite. The rock is correctly labelled "felsite," according to the general use of that term, and from the material at hand it cannot be more precisely defined.

16. 4.—*Yreka Mine, Quatsino.*—Country rock (porphyry) in upper drift, *Yreka* mine. This is a very light grey rock, uniform in colour, and extremely hard. It is seen to have a porphyritic structure, the phenocrysts being distinguishable only by their lustre. Under the microscope it is seen to be a volcanic rock, holocrystalline and porphyritic. The phenocrysts are all feldspar, the greater number being orthoclase. The plagioclase shows the characters oligoclase. The ground mass is microcrystalline in texture, and shows a little quartz along with the feldspar, of which it is largely composed. A light-coloured augite is present in considerable amount. As the amount of quartz is very small, the rock is best classed as a quartz-free porphyry, although in some measure intermediate between that class and quartz-porphyry.

17. 5.—*White Quartz Claim, Quatsino.*—Dyke rock (diabase) in tunnel of *White Quartz* claim. A rock of medium grey colour, crystalline structure, and fine, even texture. In the microscopic section it is found to be composed of plagioclase feldspar in lath-shaped crystals, a much decomposed pyroxene, which occupies the interstices amongst the feldspars, and a smaller amount of quartz, which also occur interstitially. Magnetite occurs as an accessory constituent. The decomposition of the pyroxene has produced large amounts of rhombohedral carbonate, either calcite or clolomite. The structure of the rock is ophitic, the pyroxene having crystallised either contemporaneously with or later than the feldspar. The rock is a typical diabase. It is without olivine, and is nearly quartz-free.

18. 6.—*June Group, Quatsino.*—Country rock (porphyritic hornblende granite), from face of quarry, *June Group;* ore occurs amongst this rock. The *June Group* of claims lies about six miles east from the centre of the South-East arm of Quatsino sound. In the hand specimen this rock presents the appearance of fine-grained granite, carrying noticeable amounts of pyrites. It is somewhat laminated, evidently due to the foliation of the rock. This is further shown in the microscopic section, where certain larger crystals show strain shadows, caused by the deformation of the rock subsequently to its solidification. The rock consists chiefly of fine grains of feldspar, quartz and chlorite, the latter representing primary hornblende, and it also contains larger crystals of orthoclase, plagioclase and quartz. Some of these are fractured, the cracks thus formed being filled with pyrites, which, consequently, is of later origin than the enclosing rock, having come into its present position after the foliation of the rock had begun. Pyrite and pyrrhotite thus occur. The rock is a porphyritic hornblende granite.

19. 7.—*Edison Claim, Quatsino.*—Rock (felsite) close to mineral contact on *Edison* claim, a quarter of a mile west of the Yreka mine, but higher up; altitude, 2,275 feet. To the unaided eye this is a fine-grained structureless rock of ash grey colour and having a rusty weathering. In the thin section it is seen to be an altered eruptive. In a few parts of the section laths of plagioclase are distinctly seen, but the greater part of the slide shows only a mass of secondary minerals, chiefly epidote, spotted by colourless areas of lower index of refractions largely made up of kaolinized feldspar. The latter probably represent phenocrysts in the original rock, the former an extremely altered groundmass. The metamorphism of the rock is so far advanced that it can scarcely be classed more definitely than as an altered volcanic. Its label indicates that it is a supposed felsite. This would be a correct determination from the present data, except that its chemical composition was evidently rather more basic than would mark a felsite. It was probably nearer to andesite in its original character.

20. 8A—*Yreka Mine, Quatsino.*—Country rock below a strata of garnetite carrying ore in *Yreka* mine. The hand specimens of this rock are only a few fragments, too small to afford reliable evidence of its general character. They are of a light grey colour and are fine-grained. By the aid of a lens, narrow veins, not exceeding .02 of an inch in width, are seen. They are distinguishable chiefly by their pearly lustre. In the microscopic section the rock is found to be so extremely metamorphosed that no primary minerals can be certainly detected in it. It is chiefly composed of epidote and patches of an indeterminable grey base. The veins referred to are found, under a high magnifying power, to be composed of a fibrous mineral, having rather high polarisation colours, and which extinguish with their longer axes parallel to the plane of the polariser. They are arranged with their longer axes sometimes parallel with, and at others transverse to, the sides of the veinlets in which they occur. It is apparently bastite or an allied mineral. The rock was originally a fine-grained basic eruptive. Its highly altered condition and the meagreness of the specimens make it impossible to determine it more precisely.

21. 8B.—*Yreka Mine, Quatsino.*—Country rock below a strata of garnetite carrying ore in *Yreka* mine. This is a greenish grey rock, massive, even-grained and of medium texture. A few grains of a grey mineral having a metallic lustre are seen, but are too small to admit of determination. They do not appear in the microscopic section. By the aid of the microscope this rock, like 8A, is found to be a highly altered basic eruptive, in which few, if any, of the original constituents remain. Epidote, calcite, pyroxene and a little feldspar can be discerned in it. It is a much altered basic eruptive, probably allied to 8A, to which it is essentially similar.

22. 9A.—*Yreka Mine, Quatsino.*—The general country rock (pyroxenic), in which the ore chutes occur in the *Yreka* mine. The *Yreka* is situated on the west side of the south-east arm of Quatsino sound, half-way from entrance to the head. Altitude from which samples were taken, about 1,050 feet. In the hand specimen this rock is quite similar to No. 8B. Under the microscope, too, it is found to agree essentially with Nos. 8A and 8B. Epidote and pyroxene minerals, with occasional grains of feldspar, comprise the rock. It is highly altered rock, probably of the pyroxenite class.

23. 9B.—*Yreka Mine, Quatsino.*—The general country rock (pyroxenic) in which the ore chutes occur in the *Yreka* mine. Altitude from which samples were taken, about 1,050 feet. This rock is greyish-green in colour, massive, and of medium texture. By the aid of the microscope it is seen to be an altered igneous rock, related to the last three described above. Pyroxene is the most abundant mineral; feldspar is present in subordinate amount, and a part of it can be seen to be plagioclase. A little brown hornblende also occurs, as well as a very small amount of quartz. It could not be satisfactorily ascertained whether or not the latter is a primary constituent. A few grains of magnetite are also seen. The rock is noticeably similar to certain acid phases of some of the pyroxenic rocks from the asbestos localities of the Province of Quebec.

24. 10A.—*Link Creek, near Quatsino Sound.*—This sample was taken from the rock in place in the bed of Link creek, between Alice and Victoria lakes, a short distance from the *June Group* in a south-east direction. The samples represent the general country rock (hornblende granite) of this district. This is a grey crystalline rock, showing a fine and, to the unaided eye, an even texture. In the thin section, however, it is found to have a somewhat porphyritic structure. The groundmass is a fine hornblende granite, consisting of feldspar, quartz and chlorite, the latter being evidently secondary after hornblende. Within this granite groundmass, which in places becomes altogether microcrystalline, there are numerous larger crystals of feldspar, chiefly orthoclase. A single grain of pyroxene was observed. Grains of pyrite and leucoxene, the latter representing original titianic iron ore, are also quite abundant. The rock is a hypabyssal type of hornblende granite.

25. 10B.—*Link Creek, near Quatsino Sound.*—This sample was taken from rock in place in the bed of Link creek, between Alice and Victoria lakes, a short distance from the *June Group* in a south-east direction. The sample represents the general country rock (hornblende granite) of this district. In the hand specimen this rock is essentially similar to the last. It may be slightly coarser in texture, but the specimens of both are rather small to admit of accurate comparison. By the aid of the microscope it is found to consist essentially of feldspar, which is largely orthoclase, hornblende, generally reduced to chlorite, quartz and pyroxene. There is considerable pyrite present as an accessory constituent. This rock is a hornblende granite, having a tendency towards porphyritic structure. It is clearly related to 10A.

WEST COAST OF VANCOUVER ISLAND.

Samples examined by Dr. Barlow.

26. 5000A.—*Copper Island, Barkley Sound.*—Country rock (dacite), *Tunnel Mountain* claim. The hand specimen represents a finely crystalline, light grey, porphyritic rock, with dull lustre and irregular fracture. Microscopically it consists of phenocrysts of turbid plagioclase and quartz—the latter much corroded—in a very finely crystalline base which, partly granular, partly fibrous in structure, is made up of feldspar quartz and a mineral of the zeolite family. The ferro-magnesian constituent, originally augite, from the form, has altered to a pale yellow epidote which is rather turbid. The rock is a dacite.

27. 5001B.—*Magnetic Creek, Maggie Lake, West Coast V. I.*—Country rock (andesite tuff). The rock is light grey in colour, tufaceous in character and apparently much decomposed. Under the microscope it is seen to be composed of lath-shaped plagioclase individuals, very turbid from alteration. The ferro-magnesian is now represented by chlorite, epidote and calcite. The matrix is largely feldspathic and, in addition to holding the above secondary minerals, also holds quartz. Pyrite in grains and crystals occurs in considerable amount. The rock is a decomposed andesite tuff.

Skeena Mining Division.

Sample examined by Dr. Barlow.

28. 5039.—*Bonanza, Observatory Inlet.*—Andesite. The hand specimen represents a hard compact rock of a light grey colour and porphyritic structure. Under the microscope the rock is seen to consist of phenocrysts of feldspar and biotite imbedded in a microcrystalline quartz-feldspar-calcite groundmass. The feldspar is a plagioclase, probably oligoclase. It is very turbid from alteration to kaolin, epidote and calcite, the former product largely predominating. The form, as a rule, is good, but varies from idiomorphic to very irregular and corroded ones. The biotite is present in relatively small amount, and occurs in irregular individuals and oblong forms. It is much altered, either to chlorite or, by bleaching, to a green and then colourless mica, which still retains the high double refraction. A few grains and cubes of pyrite, a grain or two of zinc and apatite complete the section. The rock is an andesite and somewhat altered.

Queen Charlotte Islands.

Sample examined by Dr. Barlow.

29. 5040.—*Queen Charlotte Islands.*—Andesite tuff. The rock is greenish grey, soft, and of tufaceous appearance. Microscopically it is composed of fragments of volcanic rock, and phenocrysts and grains of plagioclase and quartz, the whole imbedded in a cryptocrystalline base which is yellowish from the infiltration of limonite. The rock fragments vary from angular to rounded; they are composed of tabular and slender lath-shaped plagioclase, finely twinned and imbedded in a green, greenish grey, or brown ground mass, which is chlorite, glass or cryptocrystalline mineral. These fragments may range from trachyte to basalt, but probably the majority are andesite. Some fragments are devoid of phenocrysts and simply consist of devitrified glass. The rock is a volcanic tuff, probably an andesite tuff.

Kamloops District.

Samples examined by Dr. Barlow.

30. 5662.—*Iron Mask Mine.*—Country rock, gabbro-porphyrite. A dark, medium-grained granitoid rock, which under the microscope is seen to consist of saussuritized feldspar, and more or less altered colourless augite. The alteration is such that a large amount of secondary mineral is developed, epidote, calcite, chlorite, kaolin and magnetite.

31. 5664 (3).—*Iron Mask Mine.*—Foot-wall, hornblende-porphyrite. The hand specimen is a fine-grained, dull, greenish grey rock with irregular fracture. Under the microscope the structure is seen to be porphyritic, the phenocrysts being turbid feldspar and a ferro-magnesian constituent—not wholly altered to chlorite, calcite and magnetite—which was originally hornblende. The matrix consists of lath-shaped feldspars associated with interstitial quartz, which is evidently secondary. The rock is possibly a contact facies of 5662.

32. 5663 (2).—*Iron Mask Mine.*—Vein matter in which high-grade copper occurs. The rock is porphyritic and is made up of dark phenocrysts, imbedded in a light green base which is very soft and crumbles at touch. The thin section shows a wholly altered rock, which in all probability was originally an augite porphyrite.

33. 5665 (4).—*Iron Mask Mine.*—Rock lying against back of foot-wall; olivine basalt. The hand specimen is a dark green and dull porphyritic rock with slickensided planes, along which are developed serpentine with oily lustre. The thin section consists of phenocrysts and rounded individuals of olivine in a base of chlorite, calcite, magnetite and epidote. The olivine is almost wholly altered to serpentine and granules of iron ore.

CARIBOO.

34. 5062-13.—*Mogul Mineral Claim, Mussel Creek, Horsefly Camp, Cariboo* (augite andesite tuff).

"This claim, located on August 27th, 1902, by Alonzo Lucas, is situated on Mussel creek, about four miles from its junction with Horsefly river. The creek here runs over a series of beds of basalt, lava and volcanic tuff, which appear to have a flow to the south-east and are cut by the stream with the formation of a couple of small falls. Imbedded in the lava were found small globules of copper, of a size from a pin's head up to almost two inches in diameter, while in some of the softer beds were seen small flakes of copper glance. Naturally, at this date, no work had been done, and the only exposures were in the creek bed. While a number of copper globules could be seen, the amount of metal visible was not economically important; yet it points to the fact that grains of metallic copper, at least, are contained in these lavas, so that the question naturally arises, do these same rocks contain globules of gold, and have they anything to do with the gold deposits of the district? These rocks, and the occurrence of copper in them, bear a marked resemblance to the copper-bearing volcanic tuff beds found near Aspen Grove, south of Nicola." (Minister of Mines' Report, 1902, p. H 71.)

The rock is a purplish-coloured tufaceous one and is much altered. It includes irregular areas of epidote and stringers of native copper. Under the microscope the rock is seen to be composed of turbid, lath-shaped plagioclase and a pale yellow augite in a base partly cryptocrystalline, partly opaque, the latter being caused by the presence of a large amount of reddish-brown hematite. Pliochroic epidote of radiate fibrous and columnar structure occupies irregular areas. Considerable magnetite is present in the matrix and also a few isolated grains of native copper. The rock is a decomposed augite andesite tuff.

BOUNDARY AND SIMILKAMEEN DISTRICTS.

Samples examined by L. P. Silver, B. Sc.

35. 117.—*Big Dutchman Mine, Aspen Grove Camp.*—Altered andesite.

"A rock which has the appearance of being a volcanic agglomerate or breccia containing considerable lime." (Minister of Mines' Report, 1901, p. 1180.)

Hand specimen is a fine-grained, greyish rock, showing a few stains of green carbonate of copper on the joint planes. Under the microscope, the rock is seen to be composed of a fine-grained groundmass of plagioclase felsdpar, in which are imbedded large porphyritic crystals of feldspar twinned according to Albite and Carlsbad laws, some untwinned individuals and some microperthitic intergrowths of albite and orthoclase. There are also some forms which are now entirely filled with magnetite and chlorite, but which, from the shape, once belonged to some ferromagnesian constituent, in all probability hornblende. There are areas in the section which consist of angular and sub-angular fragments, giving to it a brecciated appearance and which once evidently belonged to some closely related volcanic rock caught up by this one while it was in a molten condition. The rock is an altered andesite, which in some parts of the mass probably passes into an andesitic tuff or breccia.

36. 120.—*Big Sioux Mine, Aspen Grove.* Basalt.

"The country rock appears to have been of igneous origin and is somewhat similar to that of the rest of the camp; but at this point it has been considerably altered and now approaches serpentine." (Minister of Mines' Report, 1901, p. 1181.)

The hand specimen shows a massive, fine-grained, greenish-coloured rock, having green carbonate of copper stains in the cracks and on the weathered surfaces. Under the microscope, the rock is seen to be very much altered and to consist of a groundmass and phenocrysts. The former makes up a very small proportion of the rock and consists of small plagioclase crystals. The phenocrysts consist of feldspar, in large laths, showing twinning according to both the Albite and Carlsbad laws, some individuals having these two combined, thus allowing of the determination of their composition by Michel Lévy's admirable method. By this it was found such individuals consisted of an oligoclase with the composition $Ab_3 An_1$. There are also aggregates of epidote and chlorite, frequently having definite outlines, which give them the appearance of being secondary after augite. Calcite is also present as a secondary mineral; and, as accessory constituents, ilmenite, leucoxene and sphene are found in considerable quantities.

On account of the very considerable quantity of augite which was present in the original rock, as well as on account of the large proportion of iron ore present, the rock possesses a distinctly basic character, and consequently is better classed as a basalt than as an augite andesite.

37. 125.—*Medal Mineral Claim, Aspen Grove.*—"It is an extension of a dyke of from 10 feet to 12 feet wide, of lighter colour than the general rock, inclined to be porphyritic in structure and containing much lime; there is an impregnation of copper sulphide, but not of important quantity." (Minister of Mines' Report, 1901, page 1182.)

The hand specimen shows fine-grained reddish-looking rock containing greenish chlorite aggregates and a little chalcopyrite. Under the microscope, it is seen to be of volcanic origin, being composed of idiomorphic plagioclase containing zonally arranged alteration products and some individuals of pale green augite. The rock in some places shows a brecciated structure, the phenocrysts having broken outlines, while elsewhere may be seen aggregates of epidote individuals, apparently representing inclusions of some highly altered foreign rock. There are also certain forms now outlined in hydrated oxide of iron and filled with decomposition products, highly suggestive of the former presence of olivine. Biotite is noticeable, but is in nearly all cases wholly or partially altered to chlorite.

Native copper is present in the slides and, from its appearance, seems to be of secondary origin. It borders the plagioclase crystals in narrow strings and also occurs in bunches, running off in little strings which pass through the cracks. It sometimes occurs filling spaces which were once occupied by olivine. The rock was probably a basalt.

The occurrence of native copper is interesting, and its secondary nature is very plainly shown. It has no doubt been derived from the chalcopyrite by reduction.

38. 138.—*Maggie Mineral Claim*, lying to the west of the *Big Sioux*. Altered basalt. (Minister of Mines' Report, 1901, page 1182.)

Hand specimen is a fine-grained greenish rock, impregnated with pyrite and chalcopyrite. Under the microscope, the rock is seen to be much altered and to present a distinct porphyritic character, the phenocrysts being relatively more abundant than the groundmass, which is composed mainly of feldspar laths. Of the phenocrysts, the feldspar is the most abundant, some having good idiomorphic forms, while others show broken individuals. Augite is also abundant in medium-sized grains, which, however, have undergone considerable alteration, in some places being completely changed to epidote and chlorite. Calcite is abundant as an alteration product, and magnetite as an accessory constituent. The rock bears a distinct resemblance to No. 36 (120), but is relatively richer in feldspar and may be considered to be a highly altered basalt.

39. 13.—Fine-grained dark igneous rock (augite-andesite), with markedly porphyritic structure. From an exposure on Nevertouch creek, near its junction with Kettle river. (Minister of Mines' Report for 1901, page 1134.)

Under the microscope, the rock is seen to consist of a rather fine-grained groundmass, in which are imbedded well-defined phenocrysts which, like the groundmass, consist of plagioclase and augite. Many of the smaller feldspar grains are untwinned, and all have undergone considerable alteration. Augite is quite abundant in almost colourless grains, showing much alteration to chlorite. It has a maximum extinction of 39°, which, with its other characteristics, determines it to be diopside. A few crystals which, from their general appearance and high double refraction, closely resemble olivine, are also present. Some biotite occurs in the slides, but is very much altered, now consisting largely of chlorite. A small amount of epidote is present as an alteration product, and ilmenite, which occurs associated with sphene, is abundant as an accessory constituent. The rock is an augite andesite, or possibly, as suggested by the structure, some dyke rock of similar composition.

40. 14.—From the Gorge at the mouth of Canyon creek, where it enters Kettle river. (Minister of Mines' Report for 1901, page 1135.)

"The rock formation on either side of the gorge is of igneous origin, a fine-grained dark diabasic rock, inclined in places to be porphyritic in structure, and very similar to the rocks noted further north and near the heads of those creeks flowing in from the west. This rock apparently overlies the granite from this point as far as to the valley of the main river." (Minister of Mines' Report for 1901, page 1135.)

The collection contains two specimens from this locality, representing two different varieties of the same rock, one showing a massive and porphyritic character, while the other is scoriaceous. Under the microscope, the rock is seen to consist of a microcrystalline groundmass composed of minute laths of feldspar, showing a trachytic structure and often a fluidal arrangement. In the groundmass are included well-defined phenocrysts of plagioclase, augite and biotite, also a few phenocrysts composed of a microperthitic intergrowth of two feldspars, one of which may be orthoclase. Some of the plagioclase individuals are twinned according to both the Carlsbad and Albite laws, which, when examined by Michel Lévy's method, were found to have the composition Ab_1 An_1.

In the second section, which is a highly vesicular variety, the vesicles nearly all show a narrow border of what appear to be zeolites which are just beginning to form in the cavities. The biotite, in this section, is dark brown in colour and contains little black needles arranged in skeleton patterns, which probably consist of rutile derived from the partial decomposition of the mica. The groundmass of this section is relatively more abundant than the vesicles and it is therefore not a true pumice, though it approaches one in appearance.

The rock is very fresh; and, from a comparison with the other rocks described, it would appear that this is a comparatively recent lava flow. It has the character and mineralogical composition of an andesite.

41. 17.—"Reddish-grey rock from the north side of Slate creek, near its mouth."—(Minister of Mines' Report for 1901; p. 1135.) Highly decomposed basic igneous rock, having the composition of an augite andesite. Under the microscope the rock is seen to possess a well marked porphyritic structure. The groundmass is microcrystalline, consisting of minute laths of feldspar, which often shows a fluidal arrangement, and a little chlorite and oxide of iron, representing alteration products of some ferromagnesian constituent. Through this are distributed large, well-defined lath-shaped crystals of plagioclase now almost entirely altered to rhombohedral carbonates; also phenocrysts of some ferromagnesian constituent now completely altered to a mixture of rhombohedral carbonates, quartz, chlorite and oxide of iron. The

rock shows a few vesicles now completely filled with decomposition products, such as chlorite and calcite. A few well-defined hexagonal crystals of fresh apatite of large dimensions occur scattered through the groundmass, also a few veins of calcite.

42. 8.—Fine-grained grey rock (minette) from Brewer creek, Upper Kettle river.—"About one mile from the mouth of Brewer creek, and in line with the foot-hills, there is an outcropping of the solid rock formation exposed in the banks of the creek. The formation here seems to be chiefly granite, alternating with dykes of fine-grained basic volcanic rocks, and occasionally, apparently, with still more recent and very acid dykes." (Minister of Mines' Report, 1901, p. 1132.) The sample in question is taken from one of the acid dykes. The hand specimen is a dyke rock, medium fine-grained and grey in colour. Under the microscope the rock is seen to be much altered and to be composed almost wholly of altered feldspar crystals twinned according to the Carlsbad law, on account of which, as well as from the total absence of albite twinning, they were assumed to be orthoclase. Small narrow laths of biotite are abundant, which, however, have undergone considerable alteration, in most cases being changed to chlorite. Secondary quartz, associated with calcite and apatite, is also noticeable, and, as accessory constituents, magnetite and pyrite. The groundmass, which consists of small feldspar individuals, also has a small amount of quartz, possibly secondary, distributed through it. There are a few vesicular cavities filled with zeolites. The rock corresponds in character and composition to a minette.

43. 53.—Porphyrite from *Rebecca* mine, Rock creek, west side of Kettle river, four miles above Rock creek; elevation 4,000 feet. "Here there is a quartz vein (strike S. 80° W.) carrying some chalcopyrite, selected samples of the ore running as high as 6 % copper, with a total value of $22 per ton." (Minister of Mines' Report, 1901, p. 1147.)

The hand specimen shows a compact, fine-grained, pale greenish-grey rock. Under the microscope it is seen to be very highly altered and to consist of a trachytic groundmass of plagioclase laths interspersed with grains of epidote and chlorite, in which are imbedded larger individuals of plagioclase, and forms which have once been occupied by phenocrysts of some ferromagnesian constituent now entirely altered to chlorite, epidote, zoisite, quartz and calcite. The rock is too much altered to enable a determination of its precise character to be made, but it is evidently some basic igneous rock allied to andesite.

44. 30.—Country rock (altered andesite) from West Fork of Kettle river, between West Bridge and Stuart's hotel.

"The general character of these deposits may be said to be iron sulphides carrying values in gold and occurring in small quartz veins in granite, porphyry or other igneous rocks." (Minister of Mines' Report, 1901, p. 1145.)

Hand specimen shows fine-grained, pink-coloured rock, in which may be distinguished phenocrysts of hornblende, biotite and plagioclase. Under the microscope the rock is seen to be composed of a microcrystalline groundmass of feldspar and quartz, in which are imbedded phenocrysts of plagioclase containing inclusions of some alteration products; also biotite altered in many cases to chlorite, associated with which may often be seen sphene. There are also a few fresh-looking quartz individuals, and outlines now entirely filled with quartz, calcite, chlorite and epidote, which were once occupied by some ferromagnesian constituent, probably augite, as they often show forms indicative of that mineral. Magnetite and apatite are present as accessory constituents. The rock is an altered andesite.

It will be seen from the foregoing descriptions that most of the rocks described are andesites or closely related rocks. No. 40 (14) presents a striking contrast to the others in that, while they are much altered, it is fresh and has every appearance of being a comparatively recent eruptive.

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