

ANNUAL REPORT
OF THE
MINISTER OF MINES

FOR THE
YEAR ENDING 31st DECEMBER,
1906,

BEING AN ACCOUNT OF
MINING OPERATIONS FOR GOLD, COAL, ETC.,
IN THE
PROVINCE OF BRITISH COLUMBIA.



THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA

PRINTED BY
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1907.

REPORT
OF THE
MINISTER OF MINES,
1906.

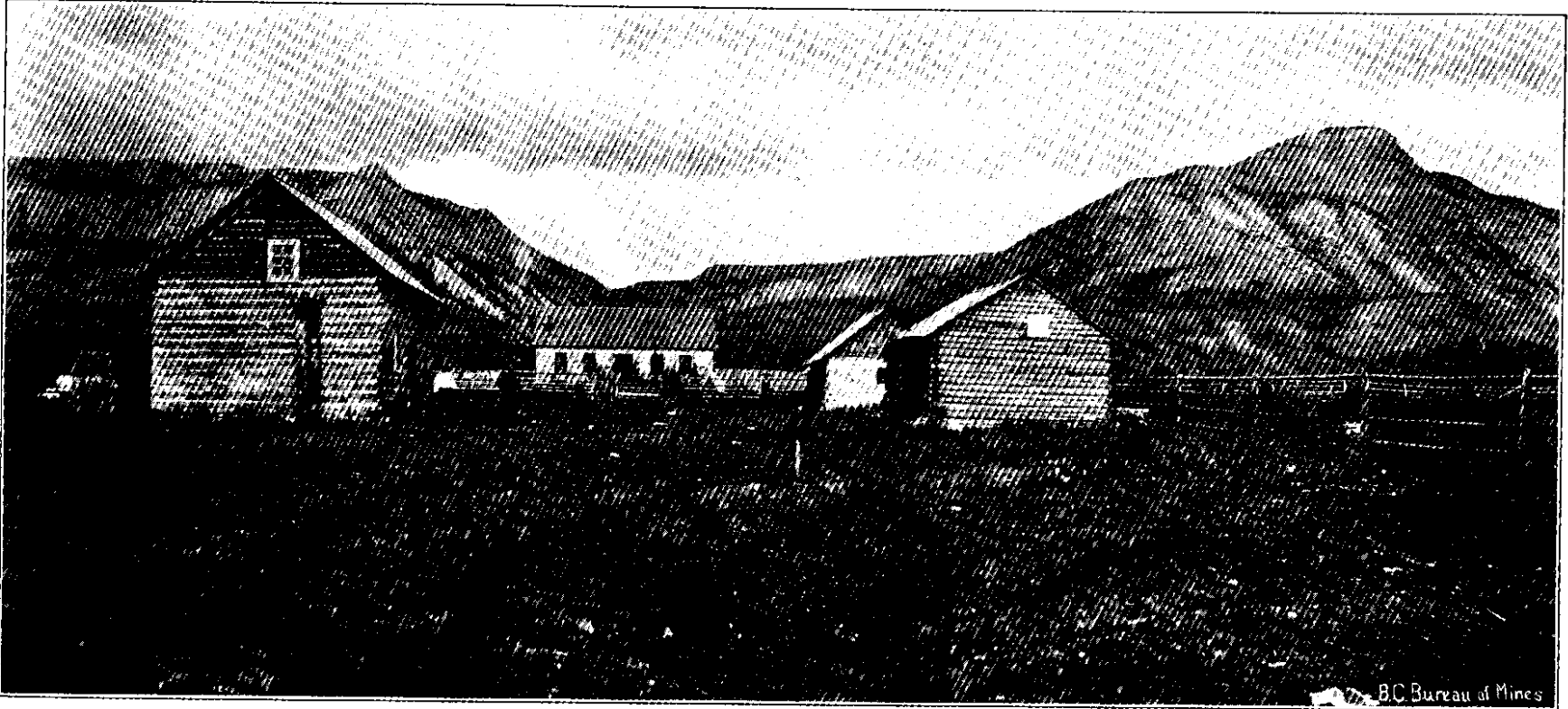
*To His Honour the Honourable JAMES DUNSMUIR,
Lieutenant-Governor of the Province of British Columbia:*

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Provincial Mineralogist upon the Mining Industries of the Province for the year 1906 is herewith respectfully submitted.

RICHARD McBRIDE,
Minister of Mines.

*Minister of Mines' Office,
March 19th, 1907.*



FORT ST. JOHN. H. B. Co.'s POST ON PEACE RIVER, B. C.

REPORT OF BUREAU OF MINES.

—BY—

WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

—O:—

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

SIR,—I have the honour to submit herewith my Annual Report on the Mining Industry of the Province for the year ending December 31st, 1906.

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

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

I have the honour to be,

Sir,

Your obedient servant,

WILLIAM FLEET ROBERTSON,
Provincial Mineralogist.

*Bureau of Mines, Victoria, B. C.,
March 19th, 1907.*

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 Bureau has been adhered to, viz.: The output of a mine for the year is considered that amount of ore for which the smelter or mill returns have been received during the year. This system does not give the exact amount mined during 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 1906.

Gold, placer.....	\$68,721,103
Gold, lode.....	41,015,697
Silver.....	25,586,008
Lead.....	17,625,739
Copper.....	35,546,578
Coal and Coke.....	79,334,798
Building stone, bricks, etc.....	5,543,700
Other metals.....	270,099
Total.....	\$273,643,722

TABLE II.—PRODUCTION FOR EACH YEAR FROM 1890 TO 1906 (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.....	7,507,953
1897.....	10,455,268
1898.....	10,906,861
1899.....	12,393,131
1900.....	16,344,751
1901.....	20,086,780
1902.....	17,486,550
1903.....	17,495,954
1904.....	18,977,359
1905.....	22,461,325
1906.....	24,980,546
Total.....	\$273,643,722

TABLE
SHOWING MINERAL PRODUCTION
OF
BRITISH COLUMBIA.

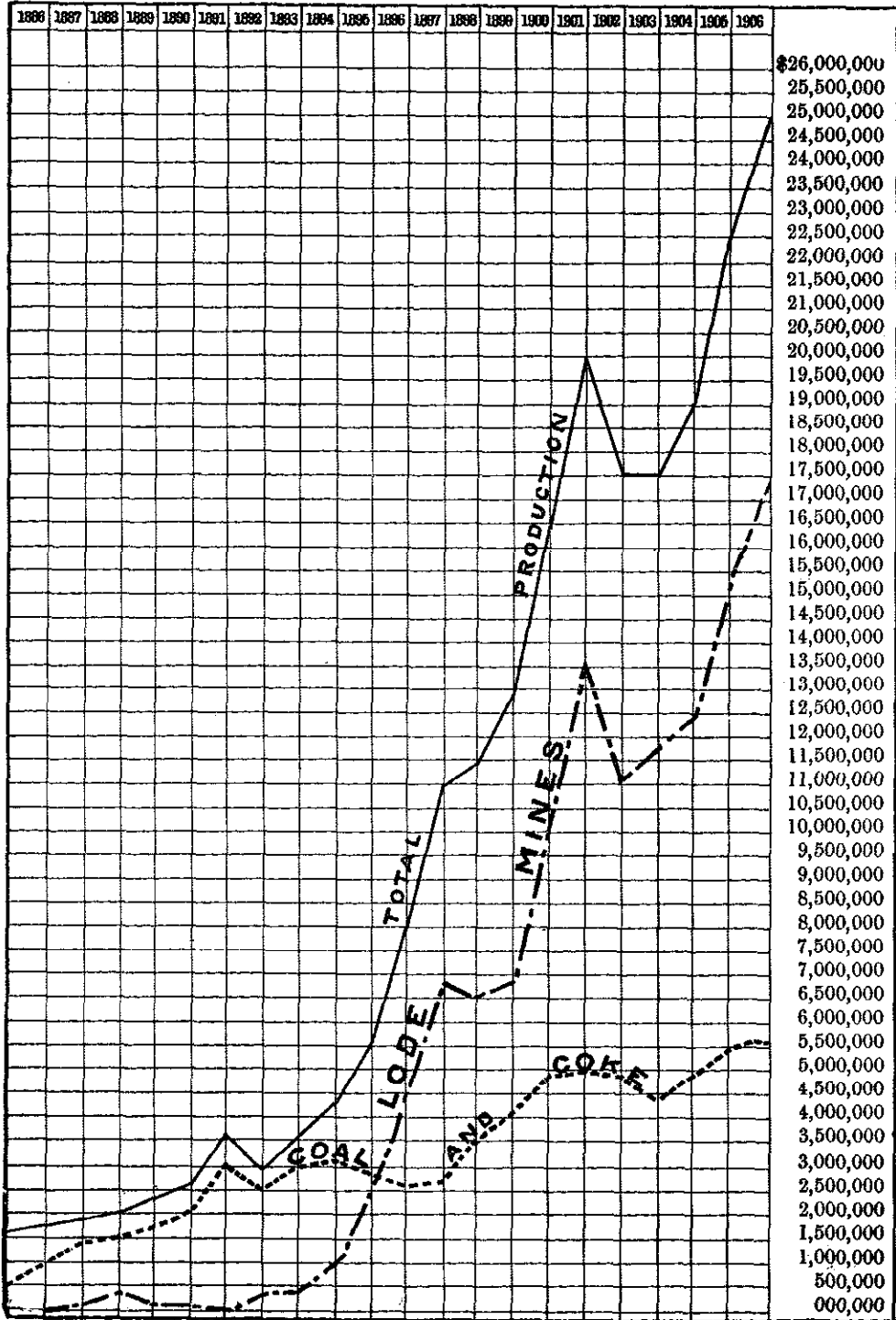


TABLE
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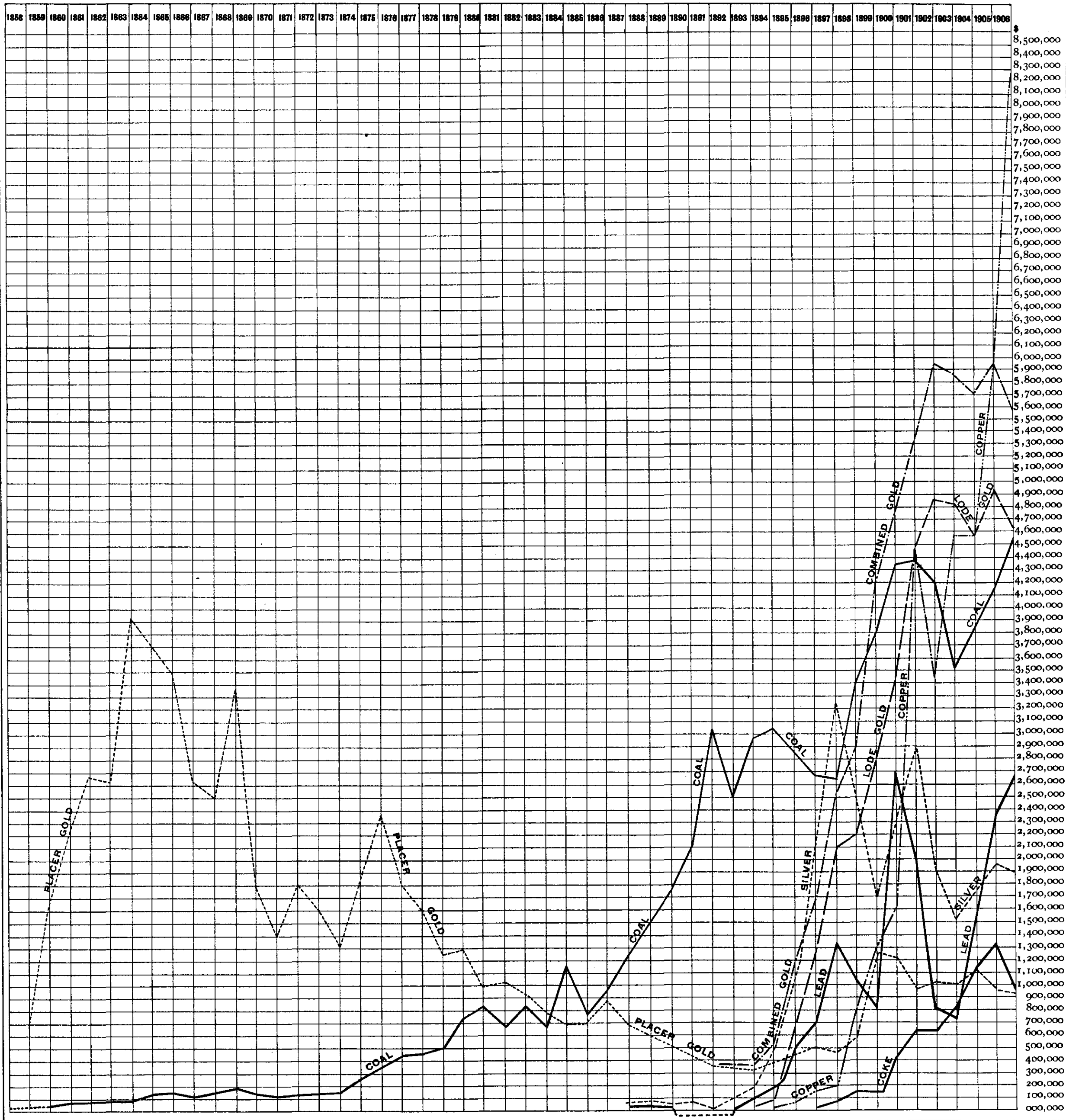


Table IV. gives a statement in detail of the amount and value of the different mineral products for the years 1904, 1905 and 1906. As it has been impossible as yet to collect accurate statistics regarding building stone, lime, bricks, tiles, etc., these are estimated.

TABLE IV.

AMOUNT AND VALUE OF MINERAL PRODUCTS FOR 1904, 1905 AND 1906.

	Customary Measure.	1904.		1905.		1906.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer.....	Ounces.....	55,765	\$ 1,115,300	48,465	\$ 969,300	.....	\$ 948,490
" lode.....	"	222,042	4,589,608	238,660	4,933,102	224,027	4,630,639
Silver.....	"	3,222,481	1,719,516	3,439,417	1,971,818	2,990,262	1,897,320
Lead.....	Pounds.....	36,646,244	1,421,874	56,580,703	2,396,022	52,408,217	2,667,578
Copper.....	"	35,710,128	4,578,037	37,692,251	5,876,222	42,990,488	3,288,565
Coal.....	Tons, 2,240lbs	1,253,628	3,760,884	1,384,312	4,152,936	1,517,303	4,551,909
Coke.....	"	238,428	1,192,140	271,785	1,358,925	199,227	996,135
Other materials.....	" .....	.....	600,000	.....	800,000	.....	1,000,000
			\$18,977,359		\$22,461,325		\$ 24,980,546

TABLE V.

PRODUCTION OF MINERAL BY DISTRICTS AND DIVISIONS.

NAME.	DIVISIONS.			DISTRICTS.		
	1904.	1905.	1906.	1904.	1905.	1906.
CARIBOO DISTRICT.....				\$ 474,600	\$ 406,000	\$ 405,400
Cariboo Mining Division.....	\$ 313,000	\$ 300,000	\$ 355,800	.....	.....	.....
Quesnel ".....	150,000	96,000	39,600	.....	.....	.....
Omineca ".....	11,600	10,000	10,000	.....	.....	.....
CASSIAR DISTRICT.....				558,573	504,372	555,599
EAST KOOTENAY DISTRICT.....				3,210,573	5,339,154	5,171,024
WEST KOOTENAY DISTRICT.....				5,806,070	5,421,859	4,660,352
Ainsworth Division.....	168,023	100,273	268,111	.....	.....	.....
Nelson ".....	466,683	532,564	515,709	.....	.....	.....
Slocan ".....	1,236,858	970,544	532,228	.....	.....	.....
Trail Creek ".....	3,760,866	3,672,828	3,223,587	.....	.....	.....
Other parts.....	173,640	145,650	120,717	.....	.....	.....
LILLOGET DISTRICT.....				34,583	32,584	20,314
YALE DISTRICT.....				4,190,281	6,483,504	8,779,711
Osoyoos, Grand Forks & Greenwood Divisions.....	4,110,366	6,356,410	8,698,470	.....	.....	.....
Similkameen Division.....	2,500	1,533	2,624	.....	.....	.....
Yale ".....	77,415	125,561	78,617	.....	.....	.....
COAST DISTRICTS (Nanaimo, Alberni, Clayoquot, Quatsino, Victoria).....				4,702,679	4,273,852	5,388,146
				\$18,977,359	\$22,461,325	\$24,980,546

PLACER GOLD.

Table VI. contains the yearly production of placer gold to date, as determined by the returns, sent in by the banks and express companies, of gold transmitted by them to the mints, and from returns sent in by the Gold Commissioners and Mining Recorders. To these yearly amounts one-third was added up to the year 1878, from then to 1895 and from 1898 to 1906, one-fifth, which proportions are considered to represent, approximately, the amount of gold sold of which there is no record. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals, as it would be insignificant.

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

1858....\$	705,000	1875....\$	2,474,004	1892....\$	399,526
1859....	1,615,070	1876....	1,786,648	1893....	356,131
1860....	2,228,543	1877....	1,608,182	1894....	405,516
1861....	2,666,118	1878....	1,275,204	1895....	481,683
1862....	2,656,903	1879....	1,290,058	1896....	544,026
1863....	3,913,563	1880....	1,013,827	1897....	513,520
1864....	3,735,850	1881....	1,046,737	1898....	643,346
1865....	3,491,205	1882....	954,085	1899....	1,344,900
1866....	2,662,106	1883....	794,252	1900....	1,278,724
1867....	2,480,868	1884....	736,165	1901....	970,100
1868....	3,372,972	1885....	713,738	1902....	1,073,140
1869....	1,774,978	1886....	903,651	1903....	1,060,420
1870....	1,336,956	1887....	693,709	1904....	1,115,300
1871....	1,799,440	1888....	616,731	1905....	969,300
1872....	1,610,972	1889....	588,923	1906....	948,400
1873....	1,305,749	1890....	490,435		
1874....	1,844,618	1891....	429,811		
Total				\$68,721,103	

TABLE VII.—PRODUCTION OF LOSE MINES.*

YEAR.	GOLD.		SILVER.		LEAD.		COPPER.		TOTAL VALUES.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	
1887		\$	17,690	17,331	204,800	9,216			\$ 26,547
1888			79,780	75,000	674,500	29,813			104,813
1889			53,192	47,873	165,100	6,498			54,371
1890			70,427	73,948	Nil.	Nil.			73,948
1891			4,500	4,000	Nil.	Nil.			4,000
1892			77,160	66,935	808,420	33,064			99,999
1893	1,170	23,404	227,000	195,000	2,135,023	78,996			297,400
1894	6,252	125,014	746,379	470,219	5,662,523	169,875	324,680	16,234	781,342
1895	39,264	785,271	1,496,522	977,229	16,475,464	532,255	952,840	47,642	2,342,397
1896	62,259	1,244,180	3,135,343	2,100,689	24,199,977	721,384	3,818,556	190,926	4,257,179
1897	106,141	2,122,820	5,472,971	3,272,836	38,841,135	1,390,517	5,325,180	266,258	7,052,431
1898	110,061	2,201,217	4,292,401	2,375,841	31,693,559	1,077,581	7,271,678	874,781	6,529,420
1899	138,315	2,857,573	2,939,413	1,663,708	21,862,436	878,870	7,722,591	1,351,453	6,751,604
1900	167,153	3,453,381	3,958,175	2,309,200	63,358,621	2,691,887	9,997,080	1,615,289	10,069,757
1901	210,384	4,348,603	5,151,333	2,884,745	51,582,906	2,002,733	27,603,746	4,446,963	13,683,044
1902	236,491	4,888,269	3,917,917	1,941,328	22,536,381	824,832	29,636,057	3,446,673	11,101,102
1903	232,831	4,812,616	2,996,204	1,521,472	18,089,283	689,744	34,359,921	4,547,535	11,571,367
1904	222,042	4,589,608	3,222,481	1,719,516	36,646,244	1,421,874	35,710,128	4,578,037	12,309,035
1905	238,680	4,933,102	3,439,417	1,971,818	56,580,703	2,399,022	37,692,251	5,878,222	15,180,164
1906	224,027	4,630,639	2,990,262	1,897,320	52,408,217	2,667,578	42,990,488	8,288,565	17,484,102
To 1	1,995,050	41,015,697	44,238,567	25,586,008	443,925,292	17,625,739	243,405,196	35,546,578	119,774,022

* Not included in above is 654 tons of zinc ore—worth \$17,100.

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

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

COAL.		
YEARS.	TONS (2,240 lbs).	VALUE.
1836-65	166,319	\$ 666,288
1866	25,115	100,460
1867	31,239	124,956
1868	44,005	176,020
1869	35,802	143,208
1870	29,843	119,372
1871-2-3	148,549	493,836
1874	81,547	244,641
1875	110,145	330,435
1876	139,192	417,576
1877	154,052	462,156
1878	170,846	512,538
1879	241,301	723,903
1880	267,595	802,785
1881	228,357	685,071
1882	282,139	846,417
1883	213,299	639,897
1884	394,070	1,182,210
1885	265,596	796,788
1886	326,636	979,908
1887	413,360	1,240,080
1888	489,301	1,467,903
1889	579,830	1,739,490
1890	678,140	2,034,420
1891	1,029,097	3,087,291
1892	826,335	2,479,005
1893	978,294	2,934,882
1894	1,012,953	3,038,859
1895	939,654	2,818,962
1896	896,222	2,688,666
1897	882,854	2,648,562
1898	1,135,865	3,407,595
1899	1,306,324	3,918,972
1900	1,439,595	4,318,785
1901	1,460,331	4,380,993
1902	1,397,394	4,192,182
1903	1,168,194	3,504,582
1904	1,253,628	3,760,884
1905	1,384,312	4,152,936
1906	1,517,303	4,551,909
Total	24,144,633 tons.	\$72,815,423
COKE.		
1895-7	19,396	\$ 96,980
1898 (estimated)	35,000	175,000
1899	34,251	171,255
1900	85,149	425,745
1901	127,081	635,405
1902	128,015	640,075
1903	165,543	827,715
1904	238,428	1,192,140
1905	271,785	1,358,925
1906	199,227	996,135
Total	1,303,875 tons.	\$6,519,375

TABLE IX.—PRODUCTION IN DETAIL OF THE

DISTRICT.	YEAR.	GOLD—PLACER.		GOLD—LODE.		SILVER.		LEAD.			
		Ounces.	Value.	Ounces.	Value.	Ounces.	Value.	Pounds.	Value.		
			\$		\$		\$		\$		
Cariboo Cariboo Division	1903	15,720	314,400								
	1904	15,650	313,000								
	1905	15,500	300,000								
	1906	17,790	356,800								
Quesnel "	1903	6,600	132,000								
	1904	7,500	150,000								
	1905	4,800	96,000								
	1906	1,960	39,200								
Omineca "	1903	1,440	28,800								
	1904	680	13,600								
	1905	600	12,000								
	1906	500	10,000								
Cassiar Atlin Division	1903	22,000	440,000								
	1904	26,500	530,000								
	1905	23,750	475,000								
	1906	22,750	455,000								
Liard, Stikine and Skeena Divisions	1903	67	1,340	244	5,043	63	27				
	1904	303	6,060	766	15,323	185	99				
	1905	148	2,960	187	3,740	477	274	5,500	238		
	1906	5,394	107,880	2	41	26	16				
East Kootenay Fort Steele Division	1903	938	1,876			23,537	14,491	717,479	27,357		
	1904	76,895	1,537,900			590,198	314,923	21,071,236	817,564		
	1905	170,073	3,401,460			1,137,872	652,342	43,248,828	2,045,750		
	1906	180,036	3,600,720			1,049,536	665,631	44,437,491	2,264,413		
Windermere-Golden	1903	306	6,120	17	342	59,008	29,503	361,296	36,273		
	1904	365	7,300			20,964	11,186	401,022	15,559		
	1905	228	4,560	14	289	18,830	9,877	149,584	6,342		
	1906	243	4,860	10	207	22,174	14,069	157,691	6,535		
West Kootenay Ainsworth Division	1903	24,332	486,640	33	682	108,678	55,187	4,299,727	163,949		
	1904	14,569	291,380	2	41	90,004	48,028	3,091,648	119,956		
	1905	8,331	166,620	28	579	99,781	57,204	1,002,114	42,490		
	1906	19,431	388,620	19	393	165,915	105,273	3,173,353	121,524		
Nelson "	1903	78,023	1,560,460	26,114	522,282	160,008	98,458	1,072,542	40,896		
	1904	74,442	1,488,840	14,100	282,000	198,795	108,077	976,570	37,891		
	1905	50,090	1,001,800	17,067	341,340	116,729	68,921	1,368,338	58,020		
	1906	50,136	1,002,720	11,677	233,540	211,122	133,957	1,034,553	62,659		
Slocan & Slocan City	1903	12,412	248,240	257	5,142	1,466,931	744,908	9,890,469	376,742		
	1904	70,296	1,405,920	160	3,200	1,540,170	821,835	10,611,227	411,716		
	1905	83,279	1,665,580	184	3,680	1,049,948	599,642	5,399,330	228,932		
	1906	14,973	299,460	69	1,380	671,613	362,688	2,975,674	151,462		
Trail Creek "	1903	369,736	7,394,720	145,353	2,907,060	3,004,446	209,537	109,493			
	1904	312,901	6,258,020	133,066	2,661,320	2,751,074	181,820	97,024			
	1905	330,618	6,612,360	129,843	2,596,860	2,683,855	147,753	84,707			
	1906	279,527	5,590,540	105,356	2,107,120	195,174	80,057				
Revelstoke, Trout Lake and Lardcan Divisions	1903	5,430	108,600	2,417	48,340	392,354	199,237	1,144,239	45,630		
	1904	28,494	569,880	3,615	72,300	74,722	148,201	79,080	18,888		
	1905	22,302	446,040	5,600	112,000	55,854	111,651	69,685	339,883		
	1906	8,715	174,300	2,046	40,920	42,332	79,262	50,292	454,000		
Lillooet Lillooet Division	1903	3,652	73,040	284	5,680		12	6			
	1904	40	800	4	80						
	1905	133	2,660								
	1906	215	4,300	170	3,400						
Yale—BOUNDARY (Grand Forks, Green- wood and Osyoos Divisions)	1903	697,284	13,945,680	3,000	60,000	1,040,900	320,749	162,376	897		
	1904	801,925	16,038,500	3,000	60,000	1,147,288	245,155	130,815	350		
	1905	965,628	19,312,560	1,800	36,000	78,689	1,625,501	630,407	67,076		
	1906	1,182,517	23,650,340	3,300	66,000	94,125	1,945,664	671,661	100,465		
Similkameen, Nicola, and Vernon Div'ns.	1903	100	2,000								
	1904	128	2,560								
	1905	88	1,760	19	380						
	1906	3	60	6	120						
Yale, Ashcroft and Kamloops Divisions	1903	22	440	3	60		15	8			
	1904	1,906	38,120	183	3,660	5,738	625	334			
	1905	14,642	292,840	610	12,200	12,608	3,363	2,215			
	1906	3,837	76,740	500	10,000	215	4,300	866			
Coast (Nanaimo, Alberni, Clayoquot, Quatsino, New West- minster and Victoria Divisions)	1903	103,524	2,070,480	13,771	275,420	229,329	111,883				
	1904	81,383	1,627,660	3,000	60,000	302,030	206,366	110,117			
	1905	61,126	1,222,520	2,000	40,000	178,527	118,156	67,789			
	1906	218,846	4,376,920	10,330	206,600	213,521	91,745	58,212			
Miscellaneous (other metals, building stone, brick, etc.)	1903										
	1904										
	1905										
	1906										
TOTALS	1903	1,286,176	25,721,200	58,021	1,161,600	232,831	4,812,616	2,996,204	1,521,472	18,069,238	689,744
	1904	1,481,609	29,632,180	55,795	1,115,800	232,042	4,699,608	3,222,481	1,719,516	36,646,244	1,421,574
	1905	1,706,679	34,133,580	48,465	969,300	238,680	4,928,102	3,439,417	1,971,618	54,580,703	2,899,032
	1906	1,963,372	39,267,440	47,420	948,400	224,027	4,630,639	2,930,352	1,597,320	62,408,217	2,667,578

† Includes Platinum. ‡ Including 654 tons Zinc ore, valued at \$17,100.

METALLIFEROUS MINES FOR 1903, 1904, 1905 AND 1906.

COPPER.		TOTALS FOR DIVISIONS.				TOTALS FOR DISTRICTS.			
Pounds.	Value.	1903.	1904.	1905.	1906.	1903.	1904.	1905.	1906.
	\$	\$	\$	\$	\$	\$	\$	\$	\$
		314,400	318,000	800,000	355,800	475,200	474,600	406,000	405,400
		132,000	150,000	96,000	39,500				
		28,800	11,800	10,000	10,000				
		440,000	530,000	475,000	465,000	480,368	568,573	504,872	555,598
2,249	298	40,368	28,573	29,372	100,599				
8,900	1,141								
293,269	56,542					123,797	1,180,983	2,731,214	2,964,887
		61,848	1,152,487	2,712,252	2,940,744				
2,730	361	66,949							
6,472	704		23,446	18,962	24,143				
10,606	1,654								
15,910	1,332					6,498,981	5,806,070	5,257,659	4,543,253
		219,818	168,023	100,273	287,180				
343,218	45,822	600,957	496,653	507,564	470,631				
220,500	23,263								
92,663	14,446								
216,034	41,651	1,126,936	1,236,853	831,344	516,123				
181	24								
2,851	552	4,255,959							
3,652,127	1,145,109		3,760,866	3,672,626	3,173,557				
7,119,876	912,783								
5,300,294	304,266	295,262	173,940	145,650	120,717				
4,750,110	918,621								
3,294	436								
		31,283	34,583	32,594	20,314	31,283	34,583	32,594	20,314
18,485,542	2,446,561	3,654,234	4,110,366	6,306,410	8,593,469	3,707,552	4,190,281	6,438,504	8,674,710
22,066,407	2,325,913								
27,670,644	4,313,853								
32,226,732	6,213,323	2,000	2,500	1,533	2,624				
6,409	843	51,318							
323,330	42,093		77,415	125,561	78,617	1,309,606	1,179,295	784,131	1,263,339
630,803	100,133								
355,377	63,517								
6,881,171	908,076	1,309,606	1,179,295	784,131	1,263,339				
5,990,593	784,143								
3,437,238	535,885								
5,136,000	960,608								
		531,870	600,000	800,000	1,000,000	531,870	600,000	800,000	1,000,000
34,359,921	4,547,536	\$13,163,657				\$13,163,657			
35,710,123	4,573,037		\$14,024,335				\$14,024,335		
37,692,351	5,376,222			\$73,949,464				\$16,949,464	
42,980,463	93,280,560				\$13,432,502				\$13,432,502

TABLE X.

Showing Comparative Mineral Production for 1906 of British Columbia and Other Provinces of the Dominion.

	Dominion Total.*	YUKON TERRITORY.	
		BRITISH COLUMBIA.	ALL OTHER PROVINCES COMBINED.
Gold		\$5,600,000	
Gold	\$5,885,071	\$5,579,039	\$ 306,032
Silver	5,436,817	1,897,320	† 3,539,497
Copper	10,606,660	8,268,565	2,338,095
Lead	† 2,779,558	2,667,578	† 111,980
Iron	1,724,400	—	1,724,400
Nickel	8,948,834	—	8,948,834
Coal	19,793,076	4,551,909	11,886,660
Coke		996,135	2,906,372
Total	55,174,416	\$23,980,546	\$31,193,870

* Figures taken from "Geological Surveys, Summary of Mineral Production of Canada in 1906." † At the British Columbia valuation.

PROGRESS OF MINING.

The value of the mineral products of the Province grows steadily greater, each year showing a material increase over the preceding year.

The production for the year 1906 was \$24,980,546, which is 11.2% greater than that of 1905, 31.6% greater than in 1904, and 42.8% greater than in 1903.

An analysis of the returns shows, however, that the increase this year is due chiefly to the Boundary and Coast Districts, with a slight increase in the Cassiar District.

East Kootenay and Cariboo Districts about held their own this year, while Lillooet and West Kootenay show a considerable decrease. In this latter district, however, Ainsworth more than doubled its output, Rossland and Nelson nearly held their own, but Slocan and the rest of the district show a marked decrease.

The tonnage of ore mined in the Province, exclusive of coal, was this past year 1,963,872 tons, some 257,193 tons, or 15%, greater than in 1905.

The number of mines from which shipments were made in 1906 was 154; and of these only 77 shipped over 100 tons each, during the year,—practically no change from the preceding year.

Some 41 mines shipped in excess of 1000 tons each during the year, of which 14 were in the Boundary District, eight in Nelson Mining Division, six in Trail Mining Division and five on the Coast.

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

TABLE SHOWING DISTRIBUTION OF SHIPPING MINES IN 1906.

	Tons of Ore Shipped.	No. of Mines Shipping.	No. of Mines Shipping over 100 tons in 1906.	MEN EMPLOYED IN THESE MINES.		
				Below.	Above.	Total.
CASSIAR:						
Skeena	5,394	2	1	36	49	85
EAST KOOTENAY:						
Fort Steele	180,036	3	3	293	85	378
Windermere	243	6	0	21	16	37
WEST KOOTENAY:						
Ainsworth	19,431	14	7	78	37	115
Nelson	50,135	23	15	233	130	363
Slocan	14,973	54	16	245	92	337
Trail	279,527	10	8	513	237	750
Other Divisions	8,715	5	3	54	25	79
LILLOOET:	215	1	1	3	2	5
YALE:						
Boundary	1,182,517	26	17	808	303	1,111
Ashcroft-Kamloops	3,837	1	1	40	10	50
Similkameen-Vernon	3	1	0	1	1	2
COAST:	218,846	8	5	210	196	406
Total.	1,963,872	154	77	2,535	1,183	3,718

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

The "labour employed to the ton of ore mined" forms some criterion of the total cost of mining in a camp, since the cost of labour is in a more or less constant proportion to such total cost. In this respect it is interesting to note in the various districts the number of tons of ore mined to each man employed. An analysis of the above table shows, approximately, that, taking the Province as a whole, there were 528 tons of ore mined for each man employed about the mines. In this respect, however, the districts vary very materially, since in the Slocan District the figures show 44 tons mined to the man in the year, in the Nelson District 138 tons, in Trail Creek (Rossland) District 373 tons, and in the Boundary 1,064 tons.

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

TABLE SHOWING NON-SHIPPING MINES AND NUMBER OF MEN EMPLOYED, 1906.

DISTRICT.	Number of Mines.	Men employed under ground.	Men employed above ground.	TOTAL.
AINSWORTH	6	14	25	39
BOUNDARY (Gd. Forks, Greenw'd, Osyoos)	16	13	13	26
COAST AND CASSIAR	13	9	8	17
LARDEAU AND TROUT LAKE	10	34	32	66
NELSON	9	8	0	8
SLOCAN (Slocan, Slocan City)	23	56	34	90
EAST KOOTENAY (Ft. Steele & Windermere)	5	6	4	10
TRAIL CREEK	7	3	4	7
OTHERS	7	2	0	2
Total	96	145	120	265

STATISTICAL TABLES.

Referring to the preceding Statistical Tables of the mineral production of the Province, the following is a summary of their contents:—

TABLE I. shows the total gross value of each mineral product that has been mined in the Province up to the end of 1906. From this it will be seen that coal mining has produced more than any separate class of mining—a total of \$79,334,798—followed next in importance by placer gold at \$68,721,103, and third by lode gold at \$41,015,697.

The metal gold, derived from both placer and lode mining, amounts to \$109,736,800, the greatest amount derived from any one metal or mineral, the next most important being copper, of a total gross value of \$35,546,578, followed by silver at \$25,586,008, and lead at \$17,625,739.

TABLE II. shows the values of the total production of the mines of the Province for each year from 1890 to 1906, during which period the output has increased nearly ten-fold, and has now reached a production for the past year valued at \$24,980,546, or more than double what it was in 1899.

TABLE III. presents in graphical form the facts shown by figures in the tables, and demonstrates to the eye the rapid growth of lode mining in the Province and also the fluctuations to which it has been subject.

It will be seen that although coal mining has been a constantly increasing industry during this whole period of 20 years, lode mining did not begin practically until 1894, since when it has risen with remarkable rapidity, though not without interruption, until now it has nearly reached the \$17,500,000 line, and the total production has nearly reached the \$25,000,000 line.

TABLE IV. gives the amounts, in the customary units of measure, and the values, of the various metals or minerals which go to make up the grand total of the mineral production of the Province, and also, for purposes of comparison, similar data for the two preceding years.

The table shows that there has been a decrease in the production of placer gold of some \$20,900, and at the same time a decrease in the output of lode gold of \$302,463, thus leaving for this metal a balance of \$323,363 as a decrease.

The amount of silver produced this past year was 2,990,262 ounces, having a gross value of \$1,897,320, a decrease from the preceding year of \$74,498, due chiefly to the decreased production of the Slocan district.

The table shows an output of lead in 1906 amounting to 52,408,217 lbs., valued at \$2,667,578, which, although a decrease from the production of the preceding year of 4,172,486 lbs. of lead, is still greater than that of any other year since 1900, but owing to the greatly increased market value of the metal, and in spite of the materially decreased amount produced, the value of the product this year shows an increase over the preceding year of \$268,556.

TABLE V. shows the proportions of the total mineral productions made in each of the various Districts into which the Province is divided.

It will be noted that this year again the Boundary District has the honour of first place on the list, followed in order of output by the Coast District and East Kootenay, with West Kootenay, for many years our greatest producer, as only fourth on the list.

The Coast and East Kootenay Districts, however, owe a considerable percentage of their outputs to the coal mines situated within their limits, whereas in the other districts the production is entirely from lode mining.

TABLE VI. gives the statistical record of the placer mines of the Province from 1858 to 1906, and shows a total production of \$68,721,103. The output for 1906 was \$948,400—a decrease of about 2% as compared with the previous year, and due to a dry season with a shortage of water for hydraulic mining.

TABLE VII. relates entirely to the lode mines of the Province, and shows the amounts and values of the various metals produced each year since 1887—the beginning of such mining in the Province. The gross value of the product of these mines to date is \$119,774,022. The production in 1906 was \$17,484,102, an increase over the preceding year of \$2,303,938, or about 15.2%.

TABLE VIII. contains the statistics of production of the coal mines of the Province. The total amount of coal mined to the end of 1906 is 24,144,633 tons (2,240 lbs.), worth \$72,815,423. Of this there was produced in 1906 some 1,517,303 tons, valued at \$4,551,909, a larger amount than has been produced in any year previous.

In these figures of coal production is not included the coal used in making coke, as such coal is accounted for in figures of output of coke.

The amount of coal used in 1906 in making coke was 381,773 tons, from which was produced some 199,227 tons of coke, worth \$996,135, a decrease of some 72,558 tons from the preceding year in coke produced. These figures are to a certain extent misleading, however, as in 1905 some 3,694 tons of coke were put into stock, whereas in 1906 all the coke that was made was sold, together with 13,009 tons taken from stock, making the coke sales this year 210,897 tons.

The production of coke this year would have been much greater than it is but for the very urgent demand for coal and the general scarcity of labour, which taxed the companies' resources to keep up a sufficient supply of coal. A strike at the Crow's Nest Collieries in the fall also greatly diminished the output.

More detailed statistics as to the coal production of the Province and of the separate districts are given elsewhere in this Report.

TABLE IX. gives the details of production of the mines of the Province (excepting coal mines) for the years 1903, 1904, 1905 and 1906, and the districts in which such productions were made, showing the tonnage of ore mined in each district, with its metallic contents, and market value.

The total tonnage of ore mined in the Province during the past year was 1,963,872 tons, having a gross value of \$19,432,502.

The following table shows the percentages of such tonnage and values derived from the various districts of the Province:—

Boundary District,	60.2 % of tonnage and 44.2 % of values.
Trail Creek Mining Division,	14.2 " 16.3 "
Fort Steele "	9.2 " 15.1 "
Slocan District,	.8 " 2.7 "
Coast "	11.1 " 6.5 "
Miscellaneous and other districts	4.5 " 15.2 "
	100.0 100.0

TABLE X. compares graphically the output of mineral products in British Columbia with that of similar products in all the other Provinces of the Dominion, and shows that in 1906 British Columbia produced of the metals and coal an amount over 75% of that of all the other Canadian Provinces combined.

COAL.

During the year 1906 the actual production of coal in British Columbia has as yet been confined to the two well-known districts, the collieries in vicinity of the Crow's Nest Pass and the collieries on Vancouver Island.

In the former of these districts the Crow's Nest Pass Coal Co. has been operating collieries at Michel, Coal Creek and, for the first portion of the year, at Carbonado, but latterly this last colliery has been closed down.

The collieries on Vancouver Island have been operated by two companies, the Western Fuel Co. at Nanaimo, and the Wellington Colliery Co. at Ladysmith and Comox.

The gross output of the coal mines of the Province for the year was 1,899,076 tons (2,240 lbs.), which, with 17,230 tons taken from stock, makes a total consumption of 1,916,306 tons. Of this total amount, 1,361,728 tons were sold as coal, of which 681,899 tons were for consumption in Canada and 679,829 tons were exported, while 381,773 tons were used in making coke and 172,805 tons were used under the companies' boilers, etc., or sold locally.

The amount of coke made was 199,227 tons (2,240 lbs.), which, together with 11,670 tons taken from stock, made the sales for the year 210,897 tons.

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)	531,106	150,793	681,899
" export to United States....."	433,183	230,863	664,046
" export to other countries....."	15,783	.....	15,783
	980,072	381,656	1,361,728
COKE.			
Sold for consumption in Canada....."	14,547	134,646	149,193
" export to United States....."	8,304	53,400	61,704
" export to other countries....."	.....	.....	.....
	22,851	188,046	210,897

VANCOUVER ISLAND COLLIERIES.

The Vancouver Island Collieries mined in 1906 some 1,178,627 tons of coal, which, with 17,230 tons taken from stock, makes the total amount of coal disposed of 1,195,857 tons, distributed as follows:—

Sold as coal in Canada.....	531,106 tons
" United States.....	433,183 "
" other countries.....	15,783 "
Total sold as coal.....	980,072
Used under companies' boilers, etc.....	138,057
Used in making coke.....	77,728
	1,195,857

The total coal sales of the Coast collieries show an increase of 172,042 tons, or about 21.3 % over the preceding year. The amount of coal exported to the United States is very little greater than it was last year, but amounts to about 45.8 % of the total sales. The chief market for this coal is still San Francisco, although Alaska, with its increasing requirements for mining and smelting, has become an important factor in the export trade, and promises to become greater. The consumption of coal in that portion of British Columbia served by the Coast collieries shows a marked increase, being 150,774 tons, or 39.6 % greater than during the preceding year.

The production of coke on the Coast is confined to one company, the Wellington Colliery Co., which made in 1906 only 9,842 tons, but took from its stock piles some 13,009 tons, making the coke sales 22,851 tons, of which amount 14,547 tons were sold locally and 8,304 tons were exported chiefly to Alaskan points. The local consumption of coke shows an increase of 9,137 tons, or 169 %, due to the active operations of the Vancouver Island copper smelters. The increase in the amount of coke exported is equally marked, being 4,004 tons, or 93 %, and is due to the constantly increasing copper smelting operations carried on in Alaska.

While these increases are very considerable, they are not nearly as great as they would have been but for the shortage of labour at the various collieries, which were, therefore, quite unable to satisfy the demand for fuel. A fuel famine seemed to be imminent, and, as a matter of fact, in the spring of 1907 coke had to be and was imported, a cargo of some 3,000 tons having been received by the Crofton smelter from Australia.

The selling price of coal has also advanced very much, so much so that local coal dealers are charging \$7.75 for 2,000 lbs. of coal delivered for domestic use.

CROW'S NEST PASS COLLIERIES.

In the Rocky mountain coal field, the collieries in British Columbia are all operated by the Crow's Nest Pass Coal Company, although over the boundary in the Province of Alberta there are three or four other companies operating. The Crow's Nest Pass Coal Company operated collieries at Michel, Coal Creek, and at Carbonado (Morrissey); the latter, however, was shut down on April 1st and has not since resumed operations. This company mined during the year 720,449 tons (2,240) of coal, the disposition of which is shown in the following table:—

Sold as coal in Canada.....	150,793 tons.	
" United States.....	230,863 "	
		381,656
Used by company in making coke.....		304,045
" under companies' boilers, etc.		34,748
		720,449 tons.

The amount of coke produced from the coal noted above was 189,385 tons, of which 1,339 was carried over the year as stock and 188,046 tons sold, some 134,646 tons for consumption in Canada—all in British Columbia—while 53,400 tons were exported to the United States. The coal sales of the Crow's Nest Company this year are less than during the preceding year by 13,285 tons, or 3.3%. The coke sales also show a decrease of 70,335 tons, or 27.2%. These decreases are accounted for by the facts that in the fall a labour strike closed the mines for six weeks or two months, and later the unusually heavy snow fall blocked the railways to such an extent that they were unable to move the coal.

GOLD.

The production of placer gold during the year 1906 was about \$948,400, Placer Gold. which is about 2.2% less than that of 1905. This falling off, though slight, is general and represents the lessened work of the individual miner, whose successors, the large companies, have not as yet got into satisfactory operation.

The Atlin District produced very nearly as much gold as it did the previous year, chiefly the work of comparatively small companies, although in this district individual miners are still at work, but the ground suited for this class of mining is gradually diminishing.

The two large dredges installed in this district have been practically abandoned, as the ground upon which they were working was found unsuitable for dredging operations.

A large steam shovel plant has been installed on shallow ground, and from present indications promises to be a large producer. The small shovel, the first installed in the district, has not been a commercial success, owing to the quite inadequate arrangements for handling and washing the dirt lifted.

In the Dease lake section of Cassiar, despite the difficulties of transportation, one hydraulic company recovered between \$20,000 and \$25,000 in gold, and a second company will probably be in operation in 1907. Here, however, the individual miner has almost disappeared.

In the Cariboo District, the Cariboo Mining Division shows a marked increase over the preceding year, about 18.6%, chiefly from small hydraulic enterprises, but the Quesnel Division shows a decrease of about 30%, due to the fact that the largest producing company did little mining, being taken up with large operations for increasing its water supply.

The Fort Steele District continues to produce a little gold from the old creeks, but the quantity is yearly diminishing.

The bars on the Thompson and Fraser rivers have been very disappointing, and the dredges installed thereon have not been successful.

The value of the gold produced from lode mining in the Province in 1906 was \$4,630,639, of which about 95 % was recovered from the smelting of copper-bearing ores. There are practically no stamps in operation since the Ymir mine ceased to operate, excepting one at Hedley.

SILVER.

The total amount of silver produced in the Province during the year was 2,990,262 ounces, valued at \$1,897,320, a decrease of about 449,155 ounces and in the value of the product of \$74,498.

About 77 % of the silver is found in association with lead, in argentiferous galena; the remainder being found in conjunction with copper ores.

The Fort Steele Mining Division produced 1,049,536 ounces, about the same as in 1905, but the Slocan shows a decrease in output of 474,335 ounces, or 45 %.

LEAD.

There was produced in the Province in 1906 some 52,408,217 pounds of lead, valued at \$2,667,578. Although this is a decrease of 4,172,486 lbs. from the preceding year, the value, owing to the higher market prices, shows an increase of \$268,556, and is the highest amount ever received for the lead product of the Province, except in 1900.

With lead, as with its associated metal silver, the greater part of the production comes from Fort Steele Division, while the production of the Slocan in 1906 is only 55.1 % of that of 1905, or 28 % of the production of 1904.

The following table shows the output of the various districts, and the percentage such bear to the total output for the year:—

Fort Steele Mining Division	44,487,481 lbs. =	84.88 %
Ainsworth "	3,173,353 "	6.05
Slocan "	2,975,674 "	5.66
Nelson "	1,034,553 "	1.96
All other "	737,156 "	1.45
	<hr/>	
	52,408,217 "	100.00

For the whole of the year 1906 the market price of lead has been above £12 10s. in London; consequently the Dominion Government lead bounty has, during this period, been proportionately reduced.

COPPER.

The copper output in 1905 was the largest the Province had ever made, but the production of 1906 exceeds it by some 5,298,237 lbs., an increase of 12.32 %, while the value of the total product this year is \$2,412,343 in excess of the preceding year, an increase of 41 %.

The production of copper in 1906 was 42,990,488 lbs., having a gross value of \$8,288,565. This increase is chiefly attributable to the Boundary District, although there is an increase in the Coast District, but Rossland shows a decrease. Of the total output, the Boundary District produces 73 %, the Coast District 12 %, and Rossland 10 %.

The following table shows the production of the various districts for the years 1904, 1905 and 1906:—

	1904.	1905.	1906.	
Boundary District	22,066,407 lbs.	27,670,644 lbs.	32,226,782 lbs.	= 74.90 %
Rossland "	7,119,876 "	5,800,294 "	4,750,110 "	11.40
Coast "	5,960,593 "	3,437,236 "	5,431,269 "	12.45
Yale-Kamloops "	328,380 "	680,808 "	355,377 "	.75
Nelson "	220,500 "	92,663 "	216,034 "	.45
Various Districts	14,372 "	10,606 "	10,916 "	.05
	<u>35,710,128 "</u>	<u>37,692,251 "</u>	<u>42,990,488 "</u>	<u>100.00</u>

The average assays of the copper ores of the various camps, based upon the copper recovered, were as follows:—

Boundary, 1.4 % copper; Coast, 1.21 %, and Rossland, 0.85 % copper.

OTHER MINERALS.

There has been no iron ore mined in the Province during this past year, for the reason that there is no market for it on the Pacific Coast.

There has been considerable prospecting work done in connection with the known iron deposits on the Coast, and schemes have been in consideration for the erection of blast furnaces, either in British Columbia or on Puget Sound.

The production of zinc ore this past year was very small, only some 654 tons, and the industry has been practically at a stand still. In 1905, concentrating or "enriching" plants were erected for the production of concentrates that would assay about 50 % zinc, for which there was a market in the United States, into which country they were admitted free of duty as "crude mineral"; but in 1906 a decision of the United States Customs Department ruled that these concentrates were not "crude mineral," and, consequently, were subject to duty, which duty was so high as to be prohibitive, the result being a suspension of zinc mining in British Columbia. This decision has, however, been appealed from, and on February 7th, 1907, the United States General Appraisers reversed the decision, deciding that these concentrates were "crude mineral" and, consequently, free from duty. The full text of this decision will be found in the Report on the Slocan District submitted herewith.

The Commission, headed by W. R. Ingalls, of New York, and Philip Argall, of Denver, appointed by the Dominion Government to investigate the zinc resources of British Columbia, has published its report, which goes into the subject most thoroughly. Copies of this report can be obtained from the Mines Branch of the Department of the Interior, Ottawa.

The following is a brief summary of some of the more important points brought out in the report:—

PRESENT POSSIBLE ZINC OUTPUT.

The two mines working are essentially lead mines, although containing considerable zinc—one of them has more developed zinc ore than any other mine in British Columbia—but the character of the ore is such that zinc extraction is almost hopeless (p. 47 of Report).

Assuming *Blue Bell* ore to carry 15 % zinc mined *en masse*, then, if Ainsworth M. D. mined and concentrated at rate of 200 tons of ore a day, it might produce 39 tons a day of 50 % concentrates. All the other mines in the Division might produce 15 tons a day of 50 % concentrates (p. 166).

Slocan. Ingalls says 15,000 tons per annum of concentrates (45 to 50 tons a day) would be a liberal estimate for Slocan, and this could only be produced as a by-product from lead mining (pp. 41-47).

Coast. "The zinc deposits of the Coast are still of unknown magnitude; they are, in fact, nothing but prospects" (p. 56).

POSSIBILITIES AND COST OF ZINC SMELTING IN B. C.

The ore must be taken to the coal, as the consumption of coal is 2 tons to 1 of ore; hence the only places adapted for zinc smelting in British Columbia are Crow's Nest or Coast (pp. 51 and 52). Ore or concentrates must contain over 40% metallic zinc. "It is difficult to see how zinc smelting could be profitably carried on in British Columbia with coal at Crow's Nest Pass Coal Co.'s price"—\$2 a ton (p. 52).

"The prospect for zinc smelting on the Coast, at least by the standard method, is too remote to merit detailed consideration at the present time" (p. 56).

The estimated cost of smelting in British Columbia, given by Ingalls, for the running expenses of a perfectly equipped and economically run modern zinc smelter—with no allowance for interest on investment, or legitimate profit—with coal at \$1.50 a ton, and skilled labour at \$3 a day of 10 hours, is \$15 a ton (p. 54.)

(If we substitute in this estimate the lowest prices at present available, viz.:—Coal at \$2 to \$2.25 a ton, and skilled labour at \$3.25 to \$3.50 for eight hours, it will make the estimated costs of operation about \$18.75 a ton of 50% concentrates.) Ingalls further estimates the cost of marketing the spelter produced from 1 ton of zinc concentrates at \$8.50, which makes his total estimate \$23.50 a ton of concentrates (or, if corrected as above noted, \$26.75 a ton).

The Report further estimates the cost of shipping the same concentrates to Europe for treatment would be \$25.03 a ton, from which it would appear that zinc smelting is not at present feasible in British Columbia.

ELECTRIC SMELTING OF ZINC ORES.

The following are the conclusions arrived at by the Commission as to electric smelting of zinc ores in British Columbia (pp.132-133):—

(1.) "Electric smelting will never displace ordinary (fire) smelting, if it is necessary to generate the power from coal."

(2.) "Electric smelting may be, in the future, economically conducted at places where very cheap hydro-electric power is available." (By *cheap* he means less than \$15 per h. p. per annum. Nelson and Trail are now paying \$45 per h. p. See p. 67.)

(3.) "Aside from the question of power, up to the present time, certain peculiar and serious metallurgical difficulties in electric smelting have not been satisfactorily overcome."

"It is unlikely that electric smelting of zinc ores can ever be profitably carried on in the zinc-producing districts of the East and West Kootenays" (p. 133).

Platinum. Platinum continues to be found in small quantities in various parts of the Province, but as yet no systematic attempt has been made to save it. As already noted in previous reports, it is found in alluvial washings in the Similkameen District, on the Quesnel river in Cariboo, on Thibert creek in Cassiar, and also in the Yukon. The latest find was at Lillooet, from which district there was received a few ounces of the crude platinum sand, saved by a prospector in washing for gold, for which the Provincial Mineralogist was able to obtain some \$25 an ounce net cash.

The quarrying of stone for building purposes has as yet only on the **Building Stone.** Coast taken the form of an industry, as in that district only has the use of stone for building become at all general. In a previous report descriptions were given of the more important quarries that had been opened up on the Coast, to which there is not much to add now, except to note that the general output of the quarries has nearly doubled in the last couple of years.

The manufacture of red building brick is constantly increasing with **Brick.** the market. A special report on the industry and the clay deposits of the Coast will be found elsewhere in this report. The greater consumption of brick, and consequently the greater production, is on the Coast, near Vancouver and Victoria, although scattered throughout the Interior are small yards supplying local demands, suitable clay being found in abundance.

The manufacture of fire brick formerly carried on at Comox has, as far **Fire Brick.** as is known, ceased, although about 3,500 tons of fire clay were mined from the coal mines in the vicinity. A deposit of fire clay of apparently very fair quality is being developed near Vancouver, and a brick-making plant erected, the product of which has not, however, been on the market for a sufficient time to assure its reputation.

The manufacture of earthenware, such as sewer and drain pipes, chimney caps, flower pots, &c., has been carried on near Victoria by the B. C. Pottery Company, the output having a value of somewhere about \$80,000, while other firms have also been making drain tiles and pipes.

The production of lime is naturally associated more or less closely with **Lime.** constructions of brick or stone, aside from its use in internal plastering, and, consequently, the greatest production has been on the Coast, the most extensively operated lime-kilns being situated at Victoria and on Texada Island, at both of which points a lime of almost theoretical purity is made, although the kilns are rather primitive and the economies of production have only begun to be introduced.

Although other enterprises are in contemplation, the only concern at **Cement.** present manufacturing cement in British Columbia, to any extent, is the Vancouver Portland Cement Company, with works at Tod Inlet, some 14 miles from Victoria, a description of whose plant, as it then existed, was given in the Report of 1904, since which time the capacity of the plant has been about doubled and the demand for the cement will probably necessitate further enlargements in the near future. The value of the output in 1906 approached a quarter of a million dollars.

There has been no serious attempt made to develop the supposed oil **Oil and Oilshales.** fields in the Flathead valley, owing probably to the conflicting and questioned validity of titles to the various claims; but this matter has now been practically settled, and it is expected the coming season will see active operations tending to prove the field. Nothing further has been heard of the oil-shales found in the vicinity of Harper's Camp, Cariboo, and no serious attempt has been made to prospect for oil in the Queen Charlotte Islands, where seepages were reported as found.

DEVELOPMENTS OF THE YEAR.

There have been few developments or occurrences during the past year that require special notice. Mining is becoming more a settled business, by the elimination, to a large extent, of visionary schemes.

In placer mining a departure has been made in Atlin, from the methods formerly in vogue, in the installation of the first properly equipped steam shovel, with apparently satisfactory results. In Cariboo, the long-preached axiom that the quantity of water available for hydraulicking is the measure of the output, has had the effect of starting extensive plans and works for rendering available considerably more water, the effect of which will not be noticeable on the production for a couple of years.

Dredging in Atlin has proved a failure, owing to the character of the gravel rather than the scarcity of gold. Dredging on the Fraser river and its tributaries has not proved successful, for various reasons.

Individual placer mining is decreasing to such an extent as to be now relatively unimportant.

The increase in the production of the metalliferous mines of the Province this year is entirely due to the increase in the market price of metals, together with the effect this has had in stimulating the output of copper ore in the Boundary and Coast Districts. The chief product of the East Kootenay District is silver-lead ore, of which practically all is obtained from two or three mines in the Fort Steele Mining Division. Here, although the amount of lead produced this year is about 3,761,347 lbs. less than in 1905, this year's production is over double that of 1904. Despite the decreased production, the market price has been so much higher as to make the value of this year's diminished product greater than was that of last year.

The same is true of the silver product. The quantity of ore handled this year has increased by about 10,000 tons.

Fort Steele Mining Division this year produced about 85 % of the total lead output of the Province. The North Star Co. has again begun to ship a considerable quantity of ore from another of its properties.

In the Windermere Mining Division some six mines shipped during the year, but did not average 50 tons each.

In the Nelson Mining Division the tonnage of ore mined was about the same as in the previous year, but, owing to the closing of the *Ymir* mine, the production of gold decreased, while the copper output more than doubled. Several of the smaller properties in the Division have been energetically and successfully operated.

In the Slocan District some 52 mines shipped ore—about the same as in the previous year—but of these only 16 produced over 100 tons each during the year. During the past year the metallic content of the ore is only about half what it was in 1905, or one-quarter of what it was in 1904.

This great decrease is partly attributable to the fact that this year there has been no market for zinc ore, which is a by-product in the mining of galena. Neither the Dominion Government bounty nor the high price of the metals seems to be able to stimulate the lead industry in this district.

In the Rossland Camp there is a decrease in the tonnage of ore mined of 15 %, with a somewhat greater decrease in gold and copper contents.

In the Boundary District, despite a shortage of coal and coke for about two months, there has been an increase of some 22 % in the tonnage of ore mined. The value of the gold product has increased about 19 %; of silver, about 18 %; and of copper, of 44 %. The value of the copper product in this district is 75 % that of the whole Province.

In the Coast District, on Texada Island, the *Marble Bay* mine has maintained regular shipments, while the *Copper Queen* and *Van Anda* properties have again begun to ship, although in small quantities. The iron mines have not been operated.

In the New Westminster District the *Britannia* mine has been in operation, but on account of troubles with the aerial tramway, and difficulties encountered in the concentration of the ores, has not been as successful as it was hoped it would be. There were mined, however, during the year about 90,000 tons of ore, of which some 35,000 tons were shipped direct to the smelter and about 55,000 tons were concentrated, producing nearly 10,000 tons of concentrates. The metallic contents of the ore mined were, approximately, 2,800 ounces of gold, 4,500 ounces of silver, and 2,600,000 lbs. of copper. The smelter operated by this company, situated at Crofton, has been in operation during the year on *Britannia* ore, supplemented by ores from Alaska and from the Portland Canal.

The Portland Canal District has at least partly fulfilled its promise of last year, and during the latter part of this year has been shipping to the smelter at Hadley, Alaska, from one mine, about 100 tons of copper ore a day.

In the Omineca Mining Division, on the headwaters of the Telkwa and Zymoetz rivers, a number of prospects are being developed which have good surface showings, chiefly copper ore. These will, however, be too remote from transportation to be available until after the Grand Trunk Pacific railway is built.

On Vancouver Island, the *Tyes* mine shipped some 24,000 tons of ore, containing 1,800,000 lbs. of copper, in addition to the gold and silver values. The development of the lower levels of the mine has been continued regularly, but has so far failed to disclose any important ore bodies.

On the *Richard III.* shipments have again been begun from a body of ore, a continuation of the *Tyes* ore body.

A shipment of almost 100 tons of copper ore was made from the *Southern Cross* mine, on the Alberni canal.

Active development has again begun on the copper properties at Sidney inlet on the West Coast of the Island.

BUREAU OF MINES.

—O—

WORK OF THE YEAR.

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

The routine work of the office, and the preparation and publication of the Report for the year just ended, followed by the examination in the field of as many of the mines and mining districts as the season would permit, together with the work of the Laboratory and instruction of students, fully occupied the staff for the year. The staff of the Bureau consists of the Provincial Mineralogist, the Provincial Assayer, and a junior assistant in the Laboratory, with a clerk as temporary assistant during the publication of the Report.

After the publication of the Annual Report for the previous year and the finishing of office work, the Provincial Mineralogist, early in June, made a trip to the vicinity of Cowichan lake, visiting there such mineral claims as had had any material amount of work performed on them, and making a report on the same. A report was also made as to the necessity for and the best route to be followed for a trail into certain claims situated on the Nanaimo river. The field-work to be undertaken during the summer months by the Bureau was then planned out and preparations for the main summer trip of the Provincial Mineralogist made.

On July 12th the Provincial Mineralogist, acting under instructions of the Hon. the Minister of Mines, started on a trip to the valley of the Peace river, east of the Rocky mountains and west of the 120th meridian, the Provincial boundary between the 54° and 60° north latitude. The reports of rich finds of gold, and also of coal, in this district, combined with its agricultural possibilities, on all of which the Government had no authentic information, and the fact that this was a proposed route of the G.T.P. Railway across the Province which seemed most likely to be followed, rendered an early report on this district very desirable.

The route chosen was to go up the Skeena river from Essington to Hazelton; thence by pack-train to Babine lake, portaging to Stuart lake, and thence to Fort St. James, at the outlet of this lake. From here pack-horses were taken to Fort McLeod, on the Pack river, one of the tributaries of the Peace river, a distance of 85 miles. At McLeod Lake post canoes were obtained, with which, and later the use of a bateau, the tributaries of and the main Peace river were followed to Peace River Crossing, some 430 miles down stream, during which run three or four side trips were made into the adjacent country by pack-train or on foot.

From Peace River Crossing a waggon road was followed for 100 miles to Lesser Slave lake, which discharges through Lesser Slave river into the Athabasca river; and these waterways were descended in a canoe, a distance of 200 miles, to Athabasca Landing, from which place to Edmonton the trip of 100 miles was made in a waggon. From Edmonton to Victoria the trip was made by the Canadian Pacific Railway.

The total distance travelled on this trip was a little over 3,000 miles, of which 910 miles was by steamer, 840 miles by railroad, 700 by canoe, 470 on horseback or on foot, and 200 by freight waggon. The total time occupied, including all stops and delays, was 88 days. From Hazelton to Edmonton, with included side trips, occupied 76 days, during which time camp was moved 56 times.

In November the Provincial Mineralogist made a trip to Texada Island, accompanying an officer of the United States Geological Survey.

In May, and again in December, Examinations for Assayers were held in the Government Laboratory, Victoria, by the Board of Examiners appointed under the Act, on which Board the Provincial Mineralogist and Provincial Assayer sat.

In December two bulletins—one on the West Coast of Vancouver Island and the other on the Portland Canal district—were prepared, and published in January.

The remainder of the time was spent in the preparation for publication of the notes taken in the field, the collection and preparation of statistics and the routine work of the office, which included, in connection with the various inquiries for information and the collection of statistics, the sending out of, approximately, 1,500 letters, with, approximately, the same number received.

In addition to the work in the assay office, which is noted in a separate report herewith, the Provincial Assayer made a trip up the west coast of Vancouver Island and another to the district at the head of Portland canal, with a short run into the Kemano river, on Gardner canal, visiting the mineral claims under development in these sections, the reports of which trips are contained in the body of this report. He also undertook an investigation of the clay deposits of the Coast that are now being commercially worked, and although this investigation is not yet completed, an account of some of the deposits visited will be found under the heading of the Mining Divisions in which they are situated.

The photographs, from which cuts accompanying this report were made, were almost all developed in the Laboratory.

Attention is drawn to the very skillful manner in which the Provincial Assayer has made one photograph out of, in some cases, as many as six separate negatives (4x5 Kodak); which have been so successfully joined that in most cases it is quite impossible to detect the fact that the photograph is not from one negative. As good results have never been attained by any professional photographer in the Province.

ASSAY OFFICE.

The following is a summary of the work of the Assay Office of the Bureau for the year 1906, as reported by the Provincial Assayer, Mr. Herbert Carmichael:—

During the year 1906 there were made by the staff in the Government Assay Office 1,005 assays or quantitative determinations, which is a decrease from the number made during the previous year. Of these, a number were for the Bureau of Mines, or for the Department, for which no fees were received. The fees collected by the office were as follows:—

Fees from assays	\$ 393 00
" melting and assaying gold dust and bullion	249 00
" assayers' examinations	467 00
	\$1,109 00
Determinations and examinations made for other Government Departments for which no fees were collected	\$ 400 00
	\$1,509 00
Value of assaying done	\$1,509 00

The value of gold melted during the year was \$85,000, in 117 lots, as against \$99,631, in 142 lots in 1905.

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

In addition to the ordinary work of the office, a large number of water analyses were made for New Westminster city and Phoenix.

A considerable number of samples of black sand were assayed and platinum was found in the samples from Omineca and Cassiar Districts.

An examination is being made of the clay and clay industry of the Province, and when the work is further advanced a complete report will be made.

EXAMINATIONS FOR ASSAYERS.

REPORT OF H. CARMICHAEL, SECRETARY OF BOARD OF EXAMINERS.

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

The Act requires that at least two examinations shall be held each year, and such have duly taken place.

Both these examinations were held in the Government Laboratory at Victoria, each occupying a week; the first examination began on April 23rd, and the second on December 3rd, 1906.

At the first examination the Board consisted of the Provincial Mineralogist, the Provincial Assayer and Mr. Thomas Kiddie, and at this examination five candidates came up for examination, of which number four passed the required examination, only one failing. At the December examination, the Board consisted of the Provincial Mineralogist, Provincial Assayer and Mr. D. E. Whitaker, a B. C. L. Assayer, at which twelve candidates stood for examination and seven successfully passed.

The question of holding the fall examination at Nelson was thought of, providing a sufficient number of candidates from the Upper Country entered for the examination. Advertisements were inserted in the Kootenay papers, giving notice of such intention and calling for entries, but no sufficient number applied to justify the considerable additional expense entailed by holding an examination away from Victoria.

In addition to the twelve candidates mentioned above, who successfully passed the examinations, the Board recommended during the year the granting of two certificates by exemption, under sub-section (2) of section 2 of the Act. In accordance with these recommendations, all these fourteen certificates have been duly issued by the Honourable the Minister of Mines.

The following is a list, up to December 31st, 1906, of those to whom Certificates of Competency have been issued:—

LIST OF ASSAYERS HOLDING PROVINCIAL CERTIFICATES OF EFFICIENCY UNDER THE
"BUREAU OF MINES ACT AMENDMENT ACT, 1899."

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

Under section 2, sub-section (1).

Austin, John W	Britannia Beach, B. C.	Mitchell, Charles T	Grand Forks.
Baker, C. S. H	Grand Forks.	McCormick, Alan F	Ruth, Nevada.
Barke, A. C.	Greenwood, B. C.	MacDonald, Alex. C	Vancouver.
Belt, Sam'l. Erwin	Boundary Falls, B. C.	McFarlane, James A	Kaslo.
Bernard, Pierre	Monte Christo, Wash.	Nicholls, Frank	Norway.
Bishop, Walter	Grand Forks.	O'Sullivan, John	Vancouver.
Buchanan, James	Trail.	Parker, Robt. H	Rossland.
Campbell, Colin	New Denver.	Parsonow, W. L	
Carmichael, Norman	Clifton, Arizona.	Perkins, Walter G	Basin, Montana.
Church, George B		Robertson, T. R	
Cobeldick, W. M	Scotland.	Rombauer, A. B	Butte, Montana.
Comrie, George H	Atlin.	Schroeder, Curt. A	Hazelton.
Collinson, H	Ladysmith.	Segsworth, Walter	Houghton, Mich.
Crerar, George		Sharpe, Bert N	
Cruickshank, G	Rossland.	Sim, Charles John	England.
Day, Athelstan	Dawson.	Snyder, Blanchard M	Greenwood.
Dedolph, Ed	Marysville, B. C.	Steven, Wm. Gordon	
Dookrill, Walter R	Chemainus.	Stimmel, B. A	Boundary Falls.
Farquhar, J. B.	Vancouver.	Sundberg, Gustave	Prince of Wales Island.
Fingland, John J	Sandon.	Tally, Robert E	Spokane, Wash.
Grosvenor, F. E	Nelson.	Thomas, Percival W	Pr. of Wales Is., Alaska.
Hannay, W. H.	Rossland.	Tretheway, John H	Kokanee, B. C.
Hart, P. E	Grand Forks.	Turner, H. A	
Hawkins, Francis	Silverton.	Vance, John F. C. B.	Vancouver.
Hook, A. Harry	Greenwood.	Van Agnew, Frank	Siberia.
Hurter, C. S		Wales, Roland T	
John, D	Haileybury, Ont.	Watson, William J	Ladysmith.
Kiddie, Geo. R.	Victoria.	Welch, J. Cuthbert	Alaska.
Kitto, Geoffrey B.	Ladysmith.	Wells, Ben T	Vancouver.
Lang, J. G.		West, Geo. G	
Ley, Richard N	Nelson.	Whittaker, Delbert E.	Victoria.
Marsh, Richard	Spokane, Wash.	Widdowson, E. Walter	Nelson.
Marshall, H. Jukes	Britannia Beach, B. C.	Williams, W. A	Grand Forks.
Marshall, William S	Ladysmith.	Williams, Eliot H	Nelson.
Miles, Arthur D		Wimberly, S. H.	Grand Forks.

Under section 2, sub-section (2).

Archer, Allan		Mussen, Horace W	Siberia.
Browne, D. J	Rossland.	McArthur, Reginald E.	
Bryant, Cecil M	Vancouver.	McLellan, John	Port Simpson.
Blaylock, Selwyn G.	Nelson.	McMurtry, Gordon O	
Cartwright, Cosmo T	Vancouver.	McNab, J. A.	Trail.
Cavers, Thomas W	Rossland.	McVicar, John	
Clothier, George A.	Rossland.	MacLennan, F. W.	Rossland.
Cole, Arthur A	Cobalt, Ont.	Noble, David T	Trail.
Cole, L. Heber	Phoenix.	Outhett, Christopher	Kamloops.
Coulthard, R. W	Fernie.	Pemberton, W. P. D.	
Cowans, Frederick		Reid, J. A	Greenwood.
Dixon, Howard A	Toronto, Ontario.	Scott, Oswald Norman	
Galbraith, M. T		Shannon, S.	Trout Lake, B. C.
Gilman, Ellis P.	Vancouver.	Sharpe, G. P.	Midland, Ontario.
Green, J. T. Raoul	Blairmore.	Sloan, David	Three Forks, B. C.
Guess, George A.	Trail.	Stevens, F. G	Mexico.
Gwillim, J. C	Kingston, Ontario.	Sullivan, Michael H	Trail.
Heal, John H		Sutherland, T. Fraser	
Hilliary, G. M	Idaho, U. S.	Swinney, Leslie A. E	
Holdich, Augustus H	England.	Thomson, H. Nellis	Anaconda, Montana.
Johnston, William Steele	Lachine, Que.	Watson, A. A.	Olalla.
Kaye, Alexander	Vancouver.	Watson, Henry	
Lay, Douglas	Silverton.	Workman, Ch. W	
Lewis, Francis B		Wright, Richard	Rossland.
Merrit, Charles P.		Wynne, Lewellyn C	Princeton.
Musgrave, William N.	Victoria, B. C.		

LIST OF ASSAYERS HOLDING PROVINCIAL CERTIFICATES OF EFFICIENCY.—*Concluded.*
Under section 2, sub-section (3).

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

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

Pinder, W. J.	Dawson, Y. T.	Thompson, James B	Vancouver.
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EXAMINATIONS FOR COAL MINE OFFICIALS.

During the year 1904, under the "Coal Mines Regulation Act Further Amendment Act, 1904," the regulations regarding the qualifications and examinations of officials employed in coal mines have been completely revised and at the same time made much more stringent and thorough.

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

FIRST CLASS CERTIFICATE (or Manager's Certificate).

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

SECOND CLASS CERTIFICATE (or Overman's Certificate).

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

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

THIRD CLASS CERTIFICATE.

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

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

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

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

Examinations for first, second and third classes were held simultaneously at Fernie, Nanaimo and Cumberland, October 23rd, 24th and 25th, 1906.

BOARD OF EXAMINERS FOR COAL MINE OFFICIALS.

FIRST, SECOND AND THIRD CLASS CERTIFICATES.

Report of Secretary of Board, Francis H. Shepherd.

I beg to submit the annual report, covering the transactions of the above Board, appointed under the "Coal Mines Regulation Act."

The period intervening between the holding of the last examination and the previous one was longer than usual, and the number of applicants was in consequence greater. The Board possesses no definite means of ascertaining when these examinations should be held, in order to enable intending candidates to present themselves for examination without unnecessary delay, and the Board has hitherto been governed in this matter by the response to the previous examination.

While it is the desire of the Board to hold examinations sufficiently often to fully meet the requirements of the "Coal Mines Regulation Act," it should be stated that the necessary arrangements and preparations required to hold such examinations simultaneously over so large an area, embracing as it does, coal mining centres 800 miles apart, necessitates work of some magnitude, and the fixing of dates for holding these examinations should, and does, receive the careful consideration of the Board.

In order that intending candidates may have ample time in which to prepare for examination, the Board now publishes notices of examinations intended to be held fully three months previous to the date set for such examination. The last examination was held simultaneously at Nanaimo, Fernie and Cumberland, on October 23rd, 24th and 25th.

The examiners were as follows:—

Nanaimo—Messrs. Charles Graham, Elijah Priest and F. H. Shepherd.

Fernie—Messrs. John John and R. G. Drinnan.

Cumberland—Messrs. A. Dick, John Matthews and Tully Boyce.

The following candidates having earned the necessary percentages, were recommended to receive first, second or third class certificates accordingly:—

First Class—Thos. H. Williams, Thos. France and John K. Millar.

Second Class—Bernard Canfield, John Newton, James Derbyshire, Edward Budge, William Lockhart, Thomas M. McGuchie, John Gillespie, David McKinnel, Joseph D. Thomas and John C. Brown.

Third Class—D. B. Douglas, William Merrifield, Samuel K. Mottishaw, William Stockwell, George Merrifield, James M. Stewart, Edward Devlin, George Moore, William Lancaster, Samuel Richards, William Watson and John White.

Regarding the nature of the examinations, the Board regrets that it was unable to procure suitable apparatus in time to submit the "sight test" suggested in previous report, but acknowledges with thanks the valuable information received upon the subject from James



CAMERON CLAIM, WILLIAMS CREEK B. C. 1868.

Ashworth, Esq., The Cassels, Old Colwin, England, who describes, with drawings, a very efficient apparatus for testing mine officials in the detection of small percentages of gas by safety lamps. Also from J. T. Beard, Esq., Principal of the Scranton School of Mines (Coal Min. Div.), for valuable suggestions upon the same subject, accompanied by his valuable pamphlet upon the "Detection of small percentages of Gas by the Safety Lamp." Also suggestions kindly sent by E. Gilpin, Esq., Inspector of Mines, Works and Mines Department, Halifax, N. S.

The Board will endeavour, at its next examination, to install the necessary apparatus and submit to each candidate this very important and necessary test.

The by-laws of the Board prohibit the use of text-books and of written or printed formulae at the examinations, and this question has been brought to the attention of the Board by a pertinent circular letter issued by J. T. Beard, Esq., and addressed to State Examining Boards for Mine Foremen, Firebosses and Engineers, a copy of which was forwarded by the author to this Board.

The question has from time to time received the consideration of the Board, and it is probable that the matter will be taken up at the next general meeting of the Board. Giving as an example a long, complicated numerical calculation, Mr. Beard comments as follows:—

"If this question came up in the office, or was worked out by the candidate at home, he would naturally refer to his handbooks and find the formula that he required to make the calculation, and in a few minutes he would arrive at the correct answer.

"No one expects a practical man to remember rules, formulae, etc., that are required in such numerical calculations, and, except when a candidate is preparing for these examinations, he does not attempt to memorise such formulae, because he knows where he can find them when required.

"I think you will agree with me that the purposes of any examination should be: first, to show the candidate's practical knowledge and acquaintance with mine-work of every description, and the laws, conditions and requirements in any way affecting the work; and, second, to show his capability for making necessary calculations.

"A man may understand how to solve the hardest theoretical questions, and yet, without practical experience, he would be incapable of holding any position of responsibility in mining operations."

Mr. Beard has given this question much consideration, and in this connection I may say that the recent efforts of the Board have been to render the British Columbia examinations more practical, and to eliminate the ultra-academic feature, tending towards furnishing coal mine officials of greater practical experience, and thus making for greater safety to life and property.

The Board of Appointment of Examiners consists of: Messrs. Andrew Bryden, Lady-smith, Chairman; Tully Boyce, Nanaimo, Vice-Chairman; T. R. Stockett, George Williams and A. Dick, Nanaimo; R. G. Drinnan and John John, Fernie; F. H. Shepherd, Nanaimo, Secretary. The office of the Board is in the Provincial Court House building, at Nanaimo.

I have, etc.,

FRANCIS H. SHEPHERD,

Secretary to the Board.

The following is the registered list of those to whom Certificates of Competency have been issued by the Managers' Board, the Secretary of which Board is Francis H. Shepherd, Nanaimo :—

FIRST CLASS CERTIFICATES.—SERVICE CERTIFICATES ISSUED UNDER SECTION 39, "COAL MINES REGULATION ACT, 1877."

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.

FIRST CLASS CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL MINES REGULATION ACT, 1897."

NAME.	DATE.
Shepherd, Francis H	March 5th, 1881
Gibson, Richard	" 5th, "
*McGregor, William	" 5th, "
Honobin, William	May 1st, 1882
*Muir, Archibald	" 1st, "
Little, Francis D.	" 1st, "
Martell, Joshua	" 1st, "
*Scott, Robert	" 1st, "
Chandler, William	December 21st, 1883
Priest, Elijah	" 21st, "
McGregor, James	January 18th, 1888
Randle, Joseph	" 18th, "
*Dickinson, Urick Evan	" 8th, 1889
Matthews, John	" 8th, "
*Jones, John Bunyan Louis	" 8th, "
Norton, Richard Henry	August 26th, "
Bryden, Andrew	December 30th, "
Russell, Thomas	April 20th, 1891
Sharp, Alexander	October 27th, "
*Lindsay, William Alfred	March 4th, 1892
Kesley, John	" 4th, "
Wall, William H.	May 30th, 1896
Morgan, Thomas	" 30th, "
Wilson, David	" 30th, "
Smith, Frank B.	" 30th, "
*Jamieson, Robert	" 30th, "
Bradshaw, George B.	June 12th, 1899
Simpson, William G.	" 12th, "
*Fisher, Robert	November 5th, "
Hargreaves, James	February 5th, 1901
Drinnan, Robert G.	" 5th, "
Browitt, Benjamin	August 3rd, "
Stockett, Thomas, Jr.	" 3rd, "
Pearson, Robert	" 3rd, "
Cunliffe, John	" 3rd, "
*Lamb, Robert B.	" 3rd, "
Evans, Daniel	" 3rd, "
McEvoy, James	October 17th, 1902
Wilson, A. R.	" 17th, "
Simister, Charles	" 17th, "
Colville, Andrew	" 17th, "
Budge, Thomas	" 17th, "
Mills, Thomas	" 17th, "
Faulds, Alexander	" 17th, "
Richards, James A.	" 17th, "
McLean, Donald	January 21st, 1905
Wilkinson, Geo.	" 21st, "
Wright, H. B.	" 21st, "
Coulthard, R. W.	" 21st, "
Roaf, J. Richardson	" 21st, "
John, John	" 21st, "
Manley, H. L.	" 21st, "

*Dead.

ISSUED UNDER "COAL MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904."

NAME.	Date.
France, Thos.....	November 22nd, 1906
Fraser, Norman.....	March 4th, 1905
Graham, Charles.....	November 14th, "
Heathcote, Elijah.....	March 4th, "
Millar, John K.....	November 22nd, 1906
Strachan, Robert.....	March 4th, 1905
Shaw, Alex.....	November 14th, "
Williams, Thos. H.....	" 22nd, 1906

SECOND CLASS CERTIFICATE OF SERVICE.

NAME.	Date.	Cer. No.
Corkhill, Thomas.....	March 4th, 1905	B 7
Morton, T. R.....	" 4th, "	B 8
Lee, John S.....	" 4th, "	B 9
Millar, J. K.....	" 4th, "	B 10
McCliment, John.....	" 4th, "	B 11
Martin, David.....	" 4th, "	B 12
Hunt, John.....	" 4th, "	B 13
Walker, David.....	" 4th, "	B 14
Short, Richard.....	" 4th, "	B 15
Powell, William Baden.....	" 4th, "	B 16
Sharp, James.....	" 18th, "	B 17
Bryden, Alexander.....	" 4th, "	B 18

SECOND CLASS CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904."

NAME.	Date.	Cer. No.
Barclay, Andrew.....	July 29th, 1905	B 25
Bridge, Edward.....	October 23rd, 1906	B 33
Brown John C.....	" 23rd, "	B 39
Canfield, Bernard.....	" 23rd, "	B 30
Derbyshire, James.....	" 23rd, "	B 32
Dunsmuir, John.....	November 14th, 1905	B 26
Evans, Evan.....	March 11th, "	B 2
Finlayson, James.....	July 29th, "	B 21
France, Thos.....	November 14th, "	B 27
Graham, Chas.....	March 4th, "	B 1
Gillespie, Hugh.....	July 29th, "	B 24
Gillespie, John.....	October 23rd, 1906	B 36
Jackson, Thos. R.....	March 4th, 1905	B 5
Jones, Wm.....	July 29th, "	B 20
Lockhart, William.....	October 23rd, 1906	B 34
McGuckie, Thomas M.....	" 23rd, "	B 35
McKinnel, David.....	" 23rd, "	B 37
Nellist, David.....	March 4th, 1905	B 6
Newton, John.....	October 23rd, 1906	B 31
Reid, Thomas.....	July 29th, 1905	B 23
Rigby, John.....	" 29th, "	B 29
Somerville, Alex.....	March 4th, "	B 4
Shaw, Alex.....	July 29th, "	B 19
Thomas, Joseph D.....	October 23rd, 1906	B 38
Webber, John Frank.....	March 4th, 1905	B 3
Wyllie, John B.....	July 29th, "	B 22
Watson, Adam G.....	November 14th, "	B 28

THIRD CLASS CERTIFICATES ISSUED UNDER "COAL MINES REGULATION ACT FURTHER
AMENDMENT ACT, 1904."

Name.	Date.	Cer. No.
Biggs, John	March 4th, 1905	C 210
Bridge, Edward	July 29th, "	C 223
Crawford, David	March 4th, "	C 208
Cooke, Joseph	" 4th, "	C 209
Catchpall, Charles	July 29th, "	C 227
Cunningham, G. F.	November 11th, "	C 229
Devlin, Edward	October 23rd, "	C 241
Doney, John	March 4th, 1905	C 211
Douglas, D. B.	October 23rd, 1906	C 235
Freeman, H. G.	November 14th, 1905	C 230
Hodson, R. H.	March 4th, "	C 216
Hutchison, Ben	November 14th, "	C 232
Jemson, J. W.	March 4th, "	C 205
Jones, W. T.	" 4th, "	C 221
Lancaster, William	October 23rd, 1906	C 243
Liddle, John	July 29th, 1905	C 228
Mattishaw, Samuel K.	October 23rd, 1906	C 237
Merrifield, George	" 23rd, "	C 239
Merrifield, William	" 23rd, "	C 236
Moore, George	" 23rd, "	C 242
Morgan, John	July 29th, 1905	C 224
Monks, James	November 14th, "	C 234
McAlpine, John	March 4th, "	C 217
McLellan, William	" 4th, "	C 219
McGuckie, Thomas	July 29th, "	C 226
Perry, James	March 4th, "	C 215
Plank, Samuel	November 14th, "	C 233
Richards, Samuel	October 23rd, 1906	C 244
Rigby, John	July 29th, 1905	C 225
Spruston, Thos. A.	March 4th, "	C 206
Smith, Joseph	" 4th, "	C 207
Stewart, James M.	October 23rd, 1906	C 240
Stockwell, William	" 23rd, "	C 238
Taylor, Charles M.	March 4th, 1905	C 213
Thomson, Duncan	" 4th, "	C 218
Thomas, Joseph	" 4th, "	C 220
Thomas, John B.	November 14th, "	C 231
Watson, Adam G.	March 4th, "	C 212
Watson, William	October 22nd, 1906	C 246
Weeks, John	March 4th, 1905	C 214
White, John	October 23rd, 1906	C 245
Wintle, Thomas A.	July 29th, 1905	C 222

COAL MINE OFFICIALS.

Third class certificates issued under "Coal Mines Regulation Act Further Amendment Act, 1904," sec. 38, s.-s. 2, in exchange for certificates issued under the "Coal Mines Regulation Act Amendment Act, 1901."

Name.	Date.	Certificate No.	Name.	Date.	Certificate No.
Adam, Robert	Oct. 12, 1904	C 42	Marsden, John	May 3, 1904	C 21
Addison, Thos.	Dec. 10, 1904	C 52	Marshall, Howard	Dec. 6, 1905	C 127
Aitken, James	Oct. 24, 1904	C 44	Matthews, Chas.	April 27, 1904	C 9
Alexander, Wm.	Feb. 17, 1905	C 72	Miard, Harry E.	March 3, 1905	C 76
Allsop, Harry	Oct. 11, 1904	C 34	Middleton, Robt.	Feb. 11, 1905	C 71
Ashman, Jabez	Feb. 5, 1907	C 131	Miles, Thos.	Aug. 10, 1904	C 31
Aughinvole, Alex.	March 29, 1905	C 89	Miller, Thos. K.	Feb. 21, 1905	C 74
Barclay, Andrew	April 27, 1904	C 19	McKenzie, John R.	Oct. 12, 1904	C 40
Barclay, James	April 27, 1904	C 20	McKinnell, David	March 29, 1905	C 99
Barclay, John	April 17, 1905	C 111	McKinnon, Arch'd.	April 3, 1905	C 102
Berry, James	Feb. 11, 1905	C 70	McMillan, Peter	March 29, 1905	C 94
Bickle, Thos.	Oct. 11, 1904	C 37	McMillan, Henry	May 13, 1905	C 115
Biggs, Henry	April 10, 1905	C 110	McMurtrie, John	March 29, 1905	C 96
Black, John S.	April 3, 1905	C 103	Moore, Wm. H.	June 17, 1905	C 119
Bowie, James	May 13, 1905	C 116	Morris, John	Dec. 27, 1904	C 57
Briscoe, Edward	Oct. 10, 1906	C 129	Myles, Walter	April 3, 1905	C 100
Campbell, Dan.	March 29, 1905	C 93	Nash, Isaac	June 1, 1904	C 120
Carr, Jos. E.	Oct. 11, 1904	C 36	Neave, Wm.	Oct. 12, 1904	C 43
Carroll, Harry	March 29, 1905	C 98	Nellist, David	April 27, 1904	C 13
Clarkson, Alexander	April 27, 1904	C 18	Nelson, James	April 27, 1904	C 16
Collishaw, John	Feb. 7, 1905	C 68	Newton, John	Oct. 12, 1904	C 39
Comb, John	March 23, 1904	C 2	Nimmo, Jas. P.	April 3, 1905	C 103
Cosier, Wm.	March 29, 1905	C 86	O'Brien, Geo.	Feb. 6, 1905	C 66
Courtney, A. W.	Nov. 2, 1904	C 45	Pengelly, Richard	Dec. 27, 1904	C 58
Crawford, Frank	April 6, 1904	C 7	Perrie, Jas.	March 15, 1905	C 81
Daniels, David	April 27, 1904	C 12	Perry, James	June 13, 1904	C 27
Davidson, David	April 3, 1905	C 106	Pounder, Geo.	Oct. 16, 1905	C 125
Davidson, John	March 29, 1905	C 87	Price, Jas.	Nov. 8, 1904	C 50
Devlin, Henry	Oct. 12, 1904	C 41	Reid, Thos.	Nov. 3, 1904	C 47
Dobbie, John	Nov. 27, 1905	C 126	Rafter, Wm.	March 29, 1905	C 95
Dudley, James	March 22, 1905	C 114	Reid, James	March 23, 1904	C 1
Duncan, Thomas	Aug. 29, 1906	C 128	Richards, Thos.	April 27, 1904	C 14
Dunlap, Henry	Nov. 21, 1904	C 51	Reid, Wm.	Dec. 15, 1904	C 54
Dunn, Geo.	Dec. 19, 1904	C 56	Ross, John	April 3, 1905	C 101
Dunsmuir, John	March 29, 1905	C 90	Roughead, George	Jan. 30, 1907	C 130
Eccleston, Wm.	March 15, 1905	C 80	Ryan, John	Dec. 28, 1904	C 59
Evans, Evan	March 13, 1905	C 78	Sanders, John W.	April 3, 1905	C 107
Evans, W. H.	March 14, 1905	C 79	Shenton, Thos. J.	July 25, 1904	C 30
Fagan, David	April 6, 1905	C 109	Shepherd, Henry	June 13, 1904	C 26
Farmer, Bernard	Jan. 31, 1905	C 64	Smith, Ralph	March 7, 1905	C 77
Farquharson, John	April 27, 1904	C 17	Smith, Geo.	March 29, 1905	C 84
Findlayson, James	June 6, 1904	C 25	Somerville, Alex.	March 24, 1904	C 3
Fulton, Hugh T.	April 3, 1905	C 105	Stauss, Chas. F.	Feb. 9, 1905	C 69
Gibson, Edward	May 30, 1905	C 118	Steele, Jas.	March 29, 1905	C 92
Gilchrist, Wm.	March 29, 1905	C 85	Stewart, Duncan H.	March 28, 1904	C 4
Gillespie, Hugh	April 6, 1904	C 8	Stewart, John	April 3, 1904	C 104
Gillespie, John	April 6, 1904	C 5	Stewart, Daniel W.	May 16, 1904	C 23
Gould, Alfred	April 17, 1906	C 112	Stobbart, Jacob	Feb. 21, 1905	C 73
Green, Francis	Oct. 11, 1904	C 38	Strachan, Robt.	April 27, 1904	C 15
Handlen, Jas.	June 16, 1904	C 122	Strang, James	April 27, 1904	C 10
Harmison, Wm.	Feb. 3, 1905	C 65	Thomas, John	March 29, 1905	C 97
Haworth, Geo.	March 29, 1905	C 88	Tunstall, James	June 15, 1904	C 121
Hesscott, John	Jan. 16, 1905	C 62	Vaas, Robt.	Dec. 12, 1904	C 53
Hutchison, Archie	Sept. 8, 1905	C 123	Vater, Charles	April 6, 1904	C 66
John, David	Nov. 8, 1904	C 49	Walkem, Thos.	Dec. 16, 1904	C 55
Johnson, Geo.	May 9, 1904	C 124	Webber, Chas.	Sept. 13, 1904	C 32
Johnson, Wm. R.	March 1, 1905	C 75	Webber, Chas. F.	Sept. 13, 1904	C 33
Kerr, Wm.	March 29, 1905	C 91	Whiting, Geo.	May 29, 1905	C 117
Lander, Frank	Jan. 9, 1905	C 61	Wilson, Austin	Feb. 7, 1905	C 67
Landfear, Herbert	Jan. 27, 1905	C 63	Wilson, Thos.	April 27, 1904	C 11
Lewis, Thos.	Oct. 11, 1904	C 35	Woodburn, Moses	March 29, 1905	C 83
Lockhart, Wm.	Jan. 6, 1905	C 60	Yarrow, Geo.	Nov. 3, 1904	C 46
Malpass, James	Nov. 7, 1904	C 113			

CARIBOO DISTRICT.

CARIBOO AND QUESNEL MINING DIVISIONS.

REPORT BY GEORGE WALKER, GOLD COMMISSIONER.

I have the honour to submit herewith my report on mining operations in Cariboo District during the year 1906.

I am unable to announce any increase in the gold output of the mines, but, at the same time, the actual conditions give the greatest encouragement that the district is on the eve of a prosperous term that has not been equalled for years, from the fact that more applications for mining leases have been granted than in any previous year, while there has also been an increase in the revenue. The work done during the past year has given evidence of such a substantial character that it is safe to predict greatly increased activity in the near future. Several of the small properties, hitherto held and worked by individual miners, have been purchased by strong companies and formed into large enterprises, necessitating the construction of extensive ditches, flumes, reservoirs and other works of a substantial nature. This changing of the methods of working, together with the very dry season, has had a deterrent effect upon the output of our hydraulic operations, the method by which three-fourths of the gold of the district is produced, and has curtailed this year's output of gold, but, when the extensive preliminary works already well under way are completed, there will undoubtedly be a large increase in the gold yield of the district.

In order to obtain as reliable information as possible, I addressed notes to the foremen and managers of the various mines, requesting a report on the season's operations at the mines under their supervision, and from the information thus obtained the following report is largely taken.

QUESNEL MINING DIVISION.*

Of this portion I regret my inability to speak with any degree of certainty, not having received reports from the various managers, but the report of the Mining Recorder of the Division will be found appended hereto.

The *Luce* claim, on Little Snowshoe creek, was purchased last spring by Messrs. Graham and Minisci, to whom I am indebted for the following report:—

“The present season we operated the mine with a crew of seven men, but had only two months' water. Unfortunately, just as the water had about given out, a large slide came down from the bank and buried the bedrock we had stripped, in consequence of which we were unable to clean up. We were unprepared for the freshet that occurred in the fall and did not use the water. We drifted toward the hill rim for 50 feet, and found the pay of greater width than was expected. We look forward with confidence to a good season next year.”

* See also Report of Mining Recorder, page 44.

 THE CARIBOO MINING DIVISION.

In the Cariboo, or what is locally known as the Barkerville Mining Division of Cariboo District, the result of the season's operations has been fairly good, but shows a slight decrease from that of the previous year.

WILLIAMS CREEK AND TRIBUTARIES.

The *Mucho Oro* claim on Stout's gulch, formerly owned by W. C. Fry and purchased this year by John Hopp, who, having leased the Cariboo Gold Fields ditch and installed a larger hydraulic plant, moved approximately eight times as much material as was previously done by the former owners. The output of the mine, so far as I can learn, has been very satisfactory and the future prospects are promising.

The *Forest Rose* hydraulic claim, on Williams Creek, also owned by Mr. J. Hopp, on which very little has been done for a number of years, has been put into good working order and active operations will commence in the early spring.

LOWHEE CREEK.

The property on this creek formerly owned by the Cariboo Consolidated, Limited, and on which very little has been done for the past three or four years, was also purchased by Mr. John Hopp, who in the fall employed quite a force of men repairing ditches, enlarging the sluice flume and making general repairs in and around the property so as to be in readiness for next season's work, when, I am informed, it will be operated to its full capacity.

LIGHTNING CREEK AND TRIBUTARIES.

I am indebted to the manager of the Cariboo Consolidated Company, Limited, Mr. M. Bailey, for the following brief but comprehensive report on the *La Fontaine* mine:—

"Work has progressed steadily, with a force of men numbering on an average 48 per diem for the whole year. The total length of the various tunnels, drives, cross-cuts, etc., that have been driven to date, in developing and prospecting the channel, is 6,340 feet. A total of 95.2 feet of upraises has been made, in addition to the main shaft, which is of a depth of 175 feet. Since the first of January, 1906, a total of 6,828 cubic yards of gravel has been mined and washed, which yielded 1,451.5 ounces of gold; the gravel having, therefore, an average value of \$3.91, as against last year's average of \$2.22 per cubic yard. The total amount of gold recovered to date in our *La Fontaine* mine is 2,035 ounces, having an approximate value of \$37,450. Our drainage drives are being continued up stream as rapidly as possible, in order to block out and drain the gravel so that it can be worked to advantage later on.

"Above the *Old Eleven of England* workings, opposite the mouth of Anderson creek, gravel containing very much higher values has been struck, some of this gravel averaging \$30.40 per cubic yard, making the outlook for the future very bright."

I am indebted to Mr. S. Keast, Superintendent of the Lightning Creek Gold Gravel and Drainage Co., Ltd., for the following report:—

"Our previous report included mention of prospect drilling operations closing the season of 1905. This determined the depth and location of the old channel of Lightning creek, at the present location of our works, to our satisfaction. A year ago we began the preliminary work and placed orders for the equipment of our shaft; since then we have sunk a double compartment shaft, $8\frac{1}{2} \times 12\frac{1}{2}$ feet, about 200 feet deep, and at this writing the cross-cut, 8×12 feet, is in about 90 feet and, we believe, very close to gravel. We have equipped the plant with a 40 h. p. engine, 10 h. p. dynamo engine, 12 h. p. compressor, two 40 h. p. boilers, 25 h. p. hoist, saw-mill, two 12-inch Cornish pumps, driven by a water-wheel 8 feet breast and

20 feet diameter, a Keystone drilling apparatus to locate the depth, values and position of the old channel, a considerable amount of special machinery, including a power-lathe, large pipe cutter and threader, boring machine, and a complete outfit of tools to suit our work. We also have one large and one small steam pump, with special arrangements for fire protection. The property is also well provided with buildings for various purposes. The main shaft-house is 62 x 90 feet. The old shaft house is equipped with an 8-inch pump and water-wheel, and besides this we have two 6-inch fast-speed pumps for general use. Estimates on a 500 h. p. electric plant, to be driven by turbines (water power), have been obtained from various companies, it being our intention to run all the works by electric power, the station to be located below the old *Big Bonanza* dam, which we have cut away preparatory to the erection of a much larger dam on the same site. All our operations along the creek will be connected by a narrow gauge electric railway.

"The installation of this plant, which we estimate will cost \$60,000, will greatly reduce operating expenses and enable us to operate on a much larger scale. Since the last active work began, in May, 1905, the company has expended for labour, equipment and working expenses, generally, an average of \$5,000 monthly. At present there are about 30 men directly connected with the work, which number will be increased as soon as we get working room in the drifts, if efficient labour can be secured.

"During the past winter our holdings, including the *Big Bonanza* and other claims not included in the previous Consolidation Act, were re-consolidated by an Act of the Provincial Assembly.

"The supplies and equipment for drilling operations and for special work during the ensuing season have been ordered. These will aggregate fully 25 tons of material, excluding the proposed electric plant. A second shaft will be started in the spring, and after drilling the *Big Bonanza* a 300-foot shaft will be started thereon. The steam equipment for the No. 2 shaft is now on the ground.

"The drilling operations at our present location showed 9 feet of old or pre-glacial channel gravel, very firm and apparently rich, underlying all the other gravel and sand. The formation is about as follows: 40 feet sand and gravel, 40 feet blue clay, 30 feet dry and wet slum, 45 feet sand and gravel, 10 feet old hard gravel; altogether, 165 feet.

"The 6-inch drill hole which penetrated the old channel at this depth gave values of \$7.15, recovered by the sand pump. This would figure over \$1,000 to the set, if these values were similar over the bedrock at this location.

"During the past summer seven holes were drilled about half a mile above our present shaft, and the last one, we feel certain, would have located the old channel, but that at 146 feet the drive pipe parted, and not having enough for a new string, we closed that work until spring. At this depth, however, we recovered about \$2.50 with the sand pump. The gravel at this point was quite thick, and from the upper indications of value the bedrock was expected to show a larger value than the location below."

Of the Fountain Creek Consolidated Mining Co., of Fountain creek, an enterprise started last year to prospect the deep ground of this creek, Mr. A. McPherson, the foreman, writes me:—

"The Fountain Creek Consolidated Mining Co. was first organised in July, 1905, to prospect on Fountain creek. After four months' work the venture was found too expensive for the company. The first bedrock was found at 45 feet, from which some 50 feet of drift was run, but the bedrock found in the channel had so heavy a grade and was washed so smooth that very little value was obtained, but the quality of gold was so encouraging that the com



OLD BLACK JACK & BURNS HYDRAULIC, CARIBOO, B. C. 1863.

pany concluded to go half a mile further down stream and sink a second shaft. This was done, but a depth of only 42 feet was obtained when a flow of water was struck; after three days' work bailing with a bucket and windlass the shaft had to be abandoned and work was suspended for two months and the company was reorganised. The reorganised company, on November 20th, 1905, started to work to find the channel by sinking a large shaft, building an overshot water-wheel to drive pumps and a large shaft-house, all of which are completed. The shaft was sunk 52 feet and a drift started in rock to find the channel. This drift is now out from the shaft 55 feet, but, as the rock encountered is very hard, the progress made is slow. Up to the present time the company have expended \$10,000."

Mr. Bertram Mellon, manager of the Slough Creek, Limited, kindly furnishes me with the following particulars of the company's operations:—

"Our operations for the current year consist of drifting in bedrock and tapping the gravel at various points at intervals during the year, but only as much work of this nature has been done as was necessary to maintain a flow of water from the gravel at a speed sufficient to keep both pumps running at from 70 to 80 per cent. of their capacity. The greater part of the year has been occupied with purely construction work. A water lodgment (having a capacity of about 60,000 Imperial gallons), has been driven below the level of the main tunnel for a distance of 140 feet. A drift is now being run from the main tunnel to connect with the pump chamber and provide a necessary exit. The old drain tunnel, commencing some 2,000 feet down the valley and connecting with the gravel shaft, has been opened up and repaired throughout. This drift is now being continued up stream, for the purpose of taking off the surface water and so reducing the possibility of this water finding its way to the bedrock gravels. Pumping, at the rate of from seven to eight million gallons a week, has gone on steadily throughout the year. It is now quite clear that the unwatering of this mine is a much greater undertaking than was anticipated, and in order to increase the outflow and assist the pumps it is proposed to elevate water with bailing tanks. Two additional boilers and a pair of 16" x 36" direct-acting winding engines will be installed. The work attending this increase of plant, new boiler house, an extension of shaft-house and a new head frame, etc., is now going forward. From 20 to 30 men have been employed and about 60 Chinese are at work cutting fuel, under contract."

WILLOW RIVER.

The Willow River Mining Company, Limited, has at last succeeded in reaching the deep channel of Willow river, and, I am credibly informed, when compelled to shut down on account of the fatal illness of the principal owner, was working on gold sufficient to pay, with the ground improving with every foot advanced across the channel.

MOSQUITO CREEK.

The *Williams* and *Alabama* hydraulic claims, owned by Flynn Brothers, owing to the light snowfall of last winter, had a short season; notwithstanding this fact, these claims still continue to be among the most productive of the district.

EIGHT-MILE LAKE.

Mr. T. O. Burgess, Assistant Manager of the Thistle Gold Company, Limited, says:— "Notwithstanding the fact that it was necessary to do considerable dead work before obtaining any returns from the mine, the season just past has proved a very successful one. This is due in great part to the unusual rainfall in the latter part of the season, there being, after the first day of September, 26 days (24 hours each) of water for hydraulic operations. From the commencement of the season to June 30th, there were 52 full days of water. In order to gain depth, a cut for a sluice flume two feet in width was brought up from the lake

through the east side of the diggings. As the old sluice flume was on the west side, this also afforded better dumping facilities, that part of the lake into which the old sluice dumped having been filled up with tailings. With the exception of occasional bedrock, the cut was in hardpan, all of which it was necessary to blast before the 'pipes' would take hold. This cut, 800 feet in length, had a minimum depth of 8 feet, a maximum depth of 30 feet and an approximate width of 8 feet. Total length of new sluice flume laid, 1,200 feet. Grade of sluice, 4 inches to the 12-foot box.

"While the above was in progress, the top material at the working face, which, in the fall of 1905, was prepared for washing by a bank blast, was worked off through the old sluice flume. The bottom or pay gravel was left until the fall run, when it was taken up and washed through the new sluice. At the same time a small pit was also taken out on the west side of the diggings. Another bank blast will be put off this fall; length of main drive 60 feet; length of T, 60 feet; charge, 3,000 pounds of black blasting powder.

"Fifteen men were employed in the early part of the season.

"The prospects for next season are bright, the ground is good, and all work will be live work."

GROUSE CREEK.

Regarding the *Waverly* mine, Mr. P. Carey, the foreman, says:—

"With a light snowfall during the winter, it was the general opinion that the water supply was going to be short, which proved well founded. After a short run with the best of the freset, I decided to store the remaining flow in the reservoir, and thus keep the mine going steadily with the usual number of hands. The result of the clean-up was so satisfactory that the Board of Directors was able to declare a dividend of \$5 per share, an increase of \$1 a share over any previous year. Then the necessity of having to divert water from the main pipe line for the economical and convenient working of the west branch pit, a new giant, water gates and other apparatus had to be provided for. A contract has now been let for the supplying and delivering of this material at the mine, to be in readiness for next spring's operations. In concluding this report, I might add that, from present appearances, the large body of pay gravel in the faces of both pits of the mine will be a steady and increasing dividend-producer for years to come."

CHINA CREEK.

I am favoured with the following report from Mr. B. A. Laselle, manager of the China Creek Hydraulic Co.:—

"An early spring made it possible to commence hydraulicking the last week of April, ten days earlier than is usual. The total 'yardage' washed during the season was 150,000 cubic yards, of which 60,000 yards was piped off during the fall run and not cleaned up. The equipment on this property now has an average daily washing capacity of 2,000 cubic yards a day of 24 hours. The gold values here continued uniform, and the large amount of workable ground in this company's holdings makes the future of this mine satisfactory to the owners."

NUGGET GULCH.

There is a new hydraulic mine of much promise on Nugget Gulch, which has been equipped this season, and of which the manager, Mr. B. A. Laselle, says:—

"This property has been equipped during the past season with a complete hydraulic plant, capable of handling 1,500 cubic yards a day of 24 hours. The water supply is secured from Victoria creek, where an earth-filled crib dam was constructed for storage and reservoir purposes, which will enable the property to be worked a part of the time during the dry seasons

The water was turned into the pipe for a few days in the latter part of October, and the pit opened up enough to enable this mine to start hydraulicking with the first water available in the spring of 1907. Construction work on the property completed this season consists of 2½ miles of ditch, with a carrying capacity of 1,200 miner's inches; an earth-filled crib dam 250 feet long, 14 feet high and 34 feet wide on the bottom; pipe-line, 1,250 feet long; sluice-flume, 200 feet long; camp buildings and three miles of new waggon road up Antler creek. This property is situated on what is apparently a pre-glacial channel coming in from the head of Cunningham creek, with every appearance of having been the principal source of the gold found on Antler creek during the early 60's, and the owners feel assured of profitable returns from this property in the future, as the workable ground is extensive and well suited for cheap and economic working."

ANTLER CREEK.

The *Russian Creek* Hydraulic Mine, on Lower Antler creek, is a new hydraulic mine of much promise, which is at the present time being opened up, and of which the superintendent writes me as follows:—

"The *Russian Creek* mine is situated at the junction of Russian and Antler creeks, having a bench over a mile in length, and ranging from 500 to 1,000 feet in width. Gold was first discovered late in the season of 1905 by a shaft sunk to a depth of 35 feet. Later, seven shafts were sunk, cross-cutting the bench, ranging from 20 to 30 feet in depth, all showing high gold values, which increased with depth, although it was impossible to reach bedrock in any one of the shafts on account of water. During the present season two men have been employed ground-slucing a cut, which cross-cuts the bench, in order to determine the average value of a cubic yard. There was, approximately, 900 yards of gravel moved, producing 12¼ ounces of gold, which was an average of about 25 cents a cubic yard. The face of the present cut is about 38 feet high, with the bedrock pitching into the hill; therefore, it is impossible to determine the depth of the 'deep ground' at present. The company intends to install a hydraulic plant for next season, and at present there are four men at work digging a ditch about a mile long, which is 3 feet in the bottom by 5 feet on top, for the purpose of bringing water from Russian creek on to the grounds."

CUNNINGHAM CREEK.

The Bear Hydraulic Company, Limited, on Cunningham creek, which owns the second largest hydraulic mine in Cariboo District, has completed a large dam on Cunningham pas for storage purposes, which will enable the management to work the mine continuously during the season; also six or seven hundred feet of a large rock cut through the rim-rock to tap the bottom gravels of the channel was practically completed in the latter part of the season, thereby putting the claim in good shape for next year's work.

QUARTZ.

Mr. C. J. Seymour Baker writes me regarding his operations as follows:—

"A considerable amount of work has been done on Proserpine mountain, three miles from Barkerville, and several new reefs opened up, but they all appear to be low grade on the surface. The *Forest* shaft was bailed out and the fault examined. From its appearance, the reef is thought to be close by.

"Assays were made of galena found and in several places on the mountain the galena went 70 ounces of silver to the ton, and in one case as high as 180 ounces, but the quantity is so small and the distribution so irregular that the ore cannot be made to pay as a silver-lead ore. In no other place in the district has galena carrying such high values of silver been found.

"Some quartz veins on Sugar creek, Island mountain and near Stanley were examined, but the highest value found was about \$16 in gold to the ton, and the galena ore 25 ounces of silver to the ton.

"The deposit on Hardscrabble creek containing scheelite was visited. The scheelite appears to be distributed very irregularly in the country rock, which has quartz in lumps and lenses running through it. The quartz often appears to the eye to be much richer in scheelite or in tungstic oxide than the country rock, even where it is actually much poorer, as it is very difficult to judge of the value of the ore by its appearance.

"It is very doubtful if the scheelite carries any gold or silver, although that near the surface of the bedrock does, but this is believed to be derived from the auriferous alluvial above it."

OFFICE STATISTICS—CARIBOO DISTRICT.

Free miners' certificates issued, company	9
" " " individual	343
" " " special	0
Records and transfers of recorded claims (placer)	43
Leaves of absence	30
Water records issued	44
Placer mining leases issued	164
" " cancelled	20

Revenue Receipts.

Free miners' certificates	\$ 2,343 00
Mining receipts general	45,160 95
Water grants and rentals	2,609 00
Leaves of absence	82 50
Land sales	16,493 22
Other land revenue	474 00
Mineral tax	1,783 30
Revenue tax	2,667 00
Real property tax	2,594 65
Personal property tax	2,644 53
Wild land tax	174 04
Income tax	380 59
Licences, spirits	1,587 50
Licences, trade	605 00
J. P. Court fines	318 70
Miscellaneous receipts	154 17
Total	\$80,072 15

QUESNEL MINING DIVISION.*

REPORT BY W. STEPHENSON, MINING RECORDER.

In submitting the annual report, with the estimated yield of gold obtained for the mining season of 1906 from the Quesnel Mining Division of Cariboo District, it might be inferred from the small amount of gold obtained for the season that this section of the district was becoming unproductive, or, as miners would say, worked out. Such is not by any means the case. The first and real cause of the very apparent shortage of gold obtained is the scarcity of water for the working of hydraulic and other surface mining. As is well known, the winter of 1905-6 the snowfall was very light in this division. The same conditions have held for the last four

*See also report of Gold Commissioner, page 33.

winters. Consequently, each succeeding year, for the last four years, the water in the lakes, swamps and other natural reservoirs has been diminishing, and many of these natural reservoirs have become exhausted by evaporation; a number of the gulches and small streams which were fed from these sources have become altogether dry, while some of the lakes have fallen below the level of the ditch-heads through which the ditches formerly drew their water supply. Through the mining section of this division a large number of the small mining claims were unable to work for lack of water, and the same was the case with the large hydraulic mines, the water supply being so limited that they did not attempt to operate during the season. For this reason we have no returns whatever from our chief producers. Owing to the demand, at good wages, for labour, it may be said that desultory mining on the river bars and creeks was abandoned during the season, the men doing better by working for the wages to be obtained from the companies and contractors on the preliminary work in constructing roads, digging ditches and other works which is being pushed as fast as available labour will permit and the materials can be procured. Judging from the work already done and the work contracted for, it would seem that mining men and capitalists have confidence in the future of this section of Cariboo District.

NOTE BY PROVINCIAL MINERALOGIST.—Mr. J. B. Hobson has kindly provided the Provincial Mineralogist with a copy of his report, as manager of the Cariboo Gold Mining Co., to the General Manager of the Guggenheim Exploration Co., of New York, from which the following extracts are made:—

“I hand you herewith my annual report, which reviews briefly the work carried on at the company's mines during the progress of the season commencing 1st March and ending 20th November, 1906. Owing to the impossibility of securing the number of labourers and mechanics required for excavation and construction work, the season's work turned out a most disappointing one, for the reason that only a small portion of the work on Spanish lake canal was performed. The increased rate of wages demanded and paid added materially to the cost of the work performed. The failure of the contractors to complete the lower or Bullion section of the Spanish lake system, which cuts away the old Polley's lake ditch for a distance of one and seventy-three one-hundredths miles, made it impossible to utilise the water stored in Morehead, Polley's lake and Boot Jack lake reservoirs, for mining purposes, in the hydraulic excavation.

“WATER SUPPLY.

“The quantity of water available for use during the season of 1906, was: From Morehead lake, 37,000 miner's inches; from Polley's lake, 31,600 miner's inches; from Boot Jack lake, 6,100 miner's inches; total, 74,700 miner's inches, which is barely sufficient to operate the mine thirty days with 2,500 miner's inches of water.

“It was intended to use this water to take up the high-grade bottom gravel in Pit No. 1, but the failure of the contractors to complete the Lower or Bullion section of the Spanish lake ditch, which cut out the lower end of the South Fork ditch, made it impossible to deliver the water from Polley's lake and Boot Jack lake reservoirs for use at the mine.

“It is expected that the contractors will complete the Bullion section on or before 1st July, 1907, when mining operations can be commenced in Pit No. 1, and continued to such time as the water supply is exhausted.

“The snowfall on the watershed tributary to Boot Jack, Polley's and Morehead lakes is greater than it has been for several years past, so that the outlook for the ensuing season's water supply is quite favourable.

"The water in Spanish lake reservoir stood 83 inches above the bottom of discharge gates on November 20th, and 100 inches on the 27th December—a rise of 17 inches in 37 days.

"CONDITION OF THE MINE.

"The mine, having been equipped with a gravity tram, an hydraulic elevator plant, and a Loveridge derrick, may be considered in good condition for the economical removal of the high-grade bottom gravel, which has been uncovered for a distance of 1,500 feet.

"The disintegration of a large quantity of the top deposits by the bank blasts places the high bank of Pit No. 1 in good condition for economical and profitable removal.

"The sluice tunnel should be completed and ready for use early in the season of 1908.

"SPANISH LAKE WATER SUPPLY SYSTEM.

"The dam built across the outlet of Spanish lake is 298 feet long on crest, 31 feet high; width on top, 12 feet; inner or water slope, $\frac{3}{4}$ to 1; outer, $\frac{1}{2}$ to 1.

"The dam is constructed of barked spruce logs, in cribs of 9 feet centres, all securely fastened with iron drift-bolts, and rock-filled. The inner slope is sheeted with double 2-inch plank and battens; said sheeting is well bedded in concrete and covered with earth carried up to the discharge gates.

"The water is discharged through three cast-iron, brass-faced gates, 40 inches in diameter which are fastened to three 42-inch riveted sheet-steel conduits, each 24 feet long, which terminate in the outlet flume at head of ditch.

"The structure is completed, with the exception of a small amount of work to complete and make safe the waste weir, and a few cribs to fill with rock at extreme top of structure.

"SPANISH LAKE DITCH.

"By reference to the Engineer's report, it will be noted that some work has been done all along the line of ditch, excepting on the Quesnel section. About one mile only is completed on the Bullion section. The whole of the work performed by the contractors will not exceed nine per cent. of the excavation. The contractors, however, appear confident that they will, with the aid of the steam shovels now on the ground, be able to complete the work by the middle of November, 1907.

"*Estimated Cost of completing the Spanish Lake Water Supply System.*

"Summary of Estimates :—

Expended during season 1906, as per Accountant's books, as follows :—

Spanish Lake Dam		\$18,282 54
" Ditch—		
Payments to contractors	\$31,177 74	
Telephone construction	710 69	
Other payments, covering supervision, engineering, surveying, camp equipment, lumber, material, etc.	13,154 31	
		<hr/> 45,042 74
Roads to Spanish lake		26,894 28
Bridge, Quesnel lake crossing		7,093 16
		<hr/>
Total expenditure for season		97,312 72

"Estimated Cost to complete Spanish Lake Ditch System.

1st Spanish Creek Division.....	\$112,100 00	
2nd Division	77,500 00	
Quesnel River section	109,500 00	
Bullion section, to complete.....	9,500 00	
Pipe-lines—		
Poquette line	12,614 25	
South Fork Quesnel Crossing, including bridge ...	61,016 25	
Right of way, clearing	6,400 00	
		388,630 50
Total estimate to complete		
To which must be added the 10 % retained on contractors' estimate during 1906, which is still unpaid		3,299 60
		\$489,242 82 "

I have no returns of gold from the Horsefly section, as there has been no mining nor even prospecting done on the waters of the Horsefly river during the season, but lately 5 mining leases have been located upon the upper Horsefly, which may cause development of the ground.

The hydraulic mines on the south fork of the Quesnel river not having been operated during the season, there are no returns from them. On the north fork a few individual white miners have been taking out fair wages during the year.

Upon the main Quesnel river, from the Forks down, very little mining has been done this season, but quite a number of mining leases, both dredging and bench, have been located.

Keithley, Snowshoe and other creeks in this vicinity are holding out well, but owing to the limited supply of water, returns for 1906 fall short of average years.

In the matter of lode mining there is little to be said; there have been a few mineral locations recorded, but very little development work done.

Although the amount of gold obtained for the year is small, yet the number of new locations and the heavy expenditure on preliminary work done in the opening up of those locations give promise of good returns in the near future.

CASSIAR DISTRICT.

ATLIN MINING DIVISION.

REPORT OF J. A. FRASER, GOLD COMMISSIONER.

I have the honour to submit my annual report on mining operations in the Atlin Mining Division of Cassiar District for the year ending 31st December, 1906.

This division now includes what were formerly the Chilkat, Bennett and Teslin Mining Divisions, and covers the north-west portion of the Province from the height of land between the Teslin and Stikine rivers on the south and east to the Yukon and Alaskan boundaries on the north and west. There were about as many men engaged in mining during the summer season (1906) as last year, viz., about 450, and though the individual operators were fewer, the results, generally speaking, were as good as in previous years. There is, apparently, a falling off in production and amount of royalty obtained, as compared with 1905, but this is more than accounted for by the decreased output from Boulder creek alone, which is explained elsewhere. If the output of that creek is deducted from each season's returns there will be an increase shown for the remainder of this district of about 1,000 ounces in favour of 1906.

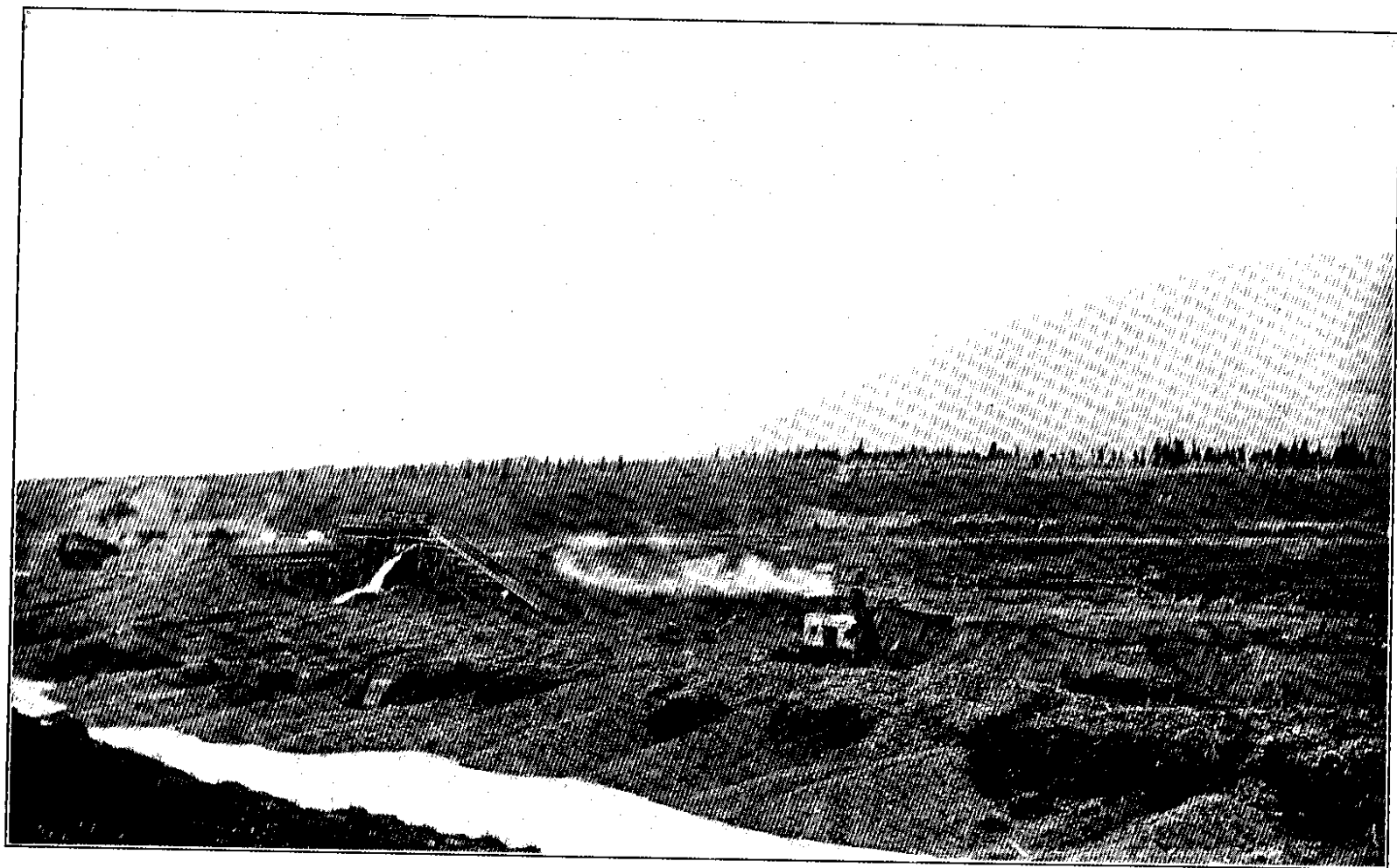
The scarcity of water was again an embarrassment, and will doubtless continue to be so until reservoirs are established on the various creeks and sources of supply.

The drifting operations of last winter were, on the whole, very satisfactory, but I regret to say that there are fewer men operating in that way this winter than for several years; there being not more than 100 as against 190 last winter and 250 the winter before, and so on. This is due to several causes, the principal being that the sections along the creeks where the best results have been obtained in the past have been pretty well worked out, and, while the "pay" is not by any means exhausted, the operators realise the necessity for better plant and facilities for operation, the installation of which would involve an expenditure which they, individually, are unable to undertake. Consequently the properties are being gradually acquired by companies, who are not disposed to prosecute winter operations to any extent. There is no reason for supposing that portions of Spruce and other creeks which remain practically untouched will not prove just as rich as the parts already tested when systematically operated.

Drifting operations are being carried on this winter on Spruce, Pine, Gold Run, Boulder and Gold Bottom creeks.

McKEE CREEK.

Only four individual miners operated on this creek during the season. Of the companies, the McKee Consolidated Hydraulic, Limited, under the management of Mr. William H. Davis, spent the season between the 1st of May and 17th of August prospecting for an older and deeper channel, supposed to exist to the south of, and parallel with, the present channel. The banks are high, about 110 feet, and the material very hard, yet, with an average of ten men, they moved about 100,000 cubic yards of material and uncovered about 2,000 square yards of bedrock, without, however, securing sufficient gold to cover expenses. The mine closed down on the 17th of August on account of scarcity of water, but not until they had uncovered what they consider very promising indications of the existence of the channel sought, farther south than they were able to reach this year.



GUGGENHEIMS' STEAM SHOVEL, PINE CREEK, ATLIN, B. C.

NOTE BY PROVINCIAL MINERALOGIST.—The following notes on the season's work have been received from Mr. F. T. Hamshaw, president and manager of the company, since the report was written :—

“The entire year's work was put in hydraulicking into the bench at right angles with the creek. This is believed to be the break from the old channel on the hill, and it is our intention to follow up this break about 500 feet farther; this should let us into this supposed old channel. The deep ground runs into the hill and there is heavy gold found on this right limit; in fact, we have taken out, during all our development work, about \$6,000. From this break the amount that we recovered this year was 163 ounces, and as Ginaca (who had the use of our hydraulic during the season of 1905) recovered practically nothing from that portion of the present creek bed above this break, we are more thoroughly convinced that the original run of gold is on a higher level and that this break is the feeder at this point. It will probably require one season to finish this development work and it is quite probable that a drill will be used next spring to prove the existence of this channel.”

The Amalgamated McKee Creek Mining Company, Limited, under the management of Mr. S. H. Plumbe, operated farther down stream. The banks being high (140 feet), the material hard and cemented, with large boulders, so powder drifts were run in and dynamite used to shake it up. Water under pressure was applied on May 12th, and for about ten weeks two six-inch monitors were used. Water began to fail during the first week in August, and on the 22nd September the mine closed down for lack of enough to operate hydraulically. They were also hampered by the “tailings” and débris from the upper company's operations, which necessitated the construction of a débris dam across the creek. Other necessary dead-work done during the season was the building of about 1,200 feet of flume. Notwithstanding these difficulties and the shortage of water, with an average force of 18 men, they uncovered nearly 8,000 square yards of bedrock, yielding upwards of \$4 per square yard, and netting them a handsome profit on the season's operations. This company intends installing a steam shovel plant for next season's operations.

NOTE BY PROVINCIAL MINERALOGIST.—Mr. F. T. Hamshaw, president and manager of this company also, has, since this report was written, forwarded to the Gold Commissioner the following notes on the season's work of this company :—

“During our operations on McKee creek for the year 1906, by the Amalgamated McKee Creek Mining Company, Limited, we have taken out \$32,000. We found the values increasing as we went farther into the bench. For the past three years that portion which lies nearest the right rim has been by far the richest, and the past two years have proved that the bedrock averages about \$12 per square yard, while in the middle of the creek it ran as low as \$3.00. We had a fairly good season of water but our low pressure pipe line was not sufficient to handle the heavy wash that we encountered on bedrock. During the past two years we have been prospecting by means of tunnels to ascertain the width of our pay streak and so far only one rim has been encountered; but we are now convinced that we have an immense body of gravel that will average about 50 cents per square foot of bedrock.

“The Christopher flume will be completed next summer. This will give us 110 feet more pressure head and we will use this pipe line for removing the top material down to within twelve feet of bedrock.

“It is the intention of the Company to put a heavy steam shovel plant on this property next year that will be worked with the hydraulics. There is two years' work on the left limit of the creek that has no over-burden to remove before beginning work on the lower strata which will be worked by the hydraulic. The stripping of our top material occupies but little

time, for we can usually remove enough of the upper strata in three weeks to keep us occupied the rest of the season on the lower wash, so that having abundance of water for twenty days each year, we expect to remove sufficient top material to keep our shovel running steadily.

"The steam shovel plant will have a permanent washing station on the top of the hog-back, just below the camp, and the Christopher flume will be extended 4,400 feet beyond the point that is graded to the washing station. All boulders will be hydraulicked before passing over the grizzly. The steam shovel to be installed will have a five-cubic yard dipper, so that all boulders, up to five feet in diameter, can be handled. This will do away with a great deal of blasting.

"One of the heavy expenses connected with the hydraulic is the cost of maintenance of a long line of sluices and block riffles. This we hope to obviate by having a good dump and steel riffles, with a reasonably short sluice, not to exceed 600 feet. It is our ultimate intention to put a double-track railroad to Atlin lake, but it is deemed more advisable to make a success of this plant before attempting to put in the large one."

PINE CREEK.

Not more than 30 individual miners operated on Pine and Gold creeks this season, but those who did seemed well satisfied with results.

Of the companies, the Pine Creek Power Company, Limited, was the most successful, the North Columbia Gold Mining Company coming second. These companies are under the management of Mr. J. M. Ruffner, president and general manager of both companies, and seem to have had the most successful season in their history, their aggregate output exceeding \$70,000.

I regret to say that the manager has again failed to supply me with the customary details of cost and methods of operation, but from my own observation, I may say that they appeared to pursue the method in vogue last year, viz.: running in powder drifts, shaking up the material with dynamite and then washing it down. They have employed a force of about 25 men between the two companies. Water was turned on early in May and used until about the 12th of November. They are still encountering the same "yellow deposit" referred to in previous reports, the deposit being astonishingly uniform and satisfactorily auriferous and shows no signs of exhaustion. These companies enjoyed a much better water supply during the latter part of the season, the result of the conservation of the waters of Surprise lake by a dam they built at the head of Pine creek, the outlet of said Surprise lake. Had this dam, whereby a large quantity of water which ran to waste during the winter would have been conserved, been completed in the fall of 1905, as at first intended, a much earlier start could have been made, and no doubt would have resulted in a materially increased output. I understand it is the intention of these companies to increase the size and capacity of their ditches, flumes and conduits, accommodating a very much larger quantity of water than is at present possible.

On the *Stephendyke Group* of leases, which is also under Mr. Ruffner's management, nothing worth mentioning has been done this year.

The Atlin Consolidated Mining Company, promoted and organised, I believe, by Guggenheim Sons, of New York, who have acquired the properties and leases formerly owned and controlled by the Atlin and Willow Creek Gold Mining Company, together with other leases and claims on "Tar-flats," *i. e.*, on the north side of Pine creek, running practically from Discovery up to "Gold Run," has installed thereon a 70-ton Bucyrus steam shovel with a 1½-yard dipper, capable of handling six cubic yards per minute, or about 3,000 cubic yards

a day of 24 hours. (NOTE.—A very full and complete report of this plant and the methods and results of operation may be found in the "Atlin Claim" newspaper of September 29th, 1906.)

This plant, under the superintendence of Mr. Thos. D. Harris, commenced operating about the 15th of August and was operated until the 25th of October, in which time they moved a considerable quantity of gravel and cleaned up over \$25,000, which must have been very satisfactory to the parties concerned. This manager also failed to supply me with any details of work done, quantity of gravel moved, cost of operation, etc., so that I cannot give fuller details. They operated night and day and employed some 36 men.

No work was done by the British American Dredging Company, Limited, this year, beyond operating their electric power plant at Pine creek falls, from which they supplied power to the steam shovel on "Tar-flats," and to the B. C. Dredging Company's dredge at Blue Canyon while it was operated.

Very little work was done on "Gold Run" after the winter dumps were sluiced, because the high pressure at which the North Columbia Gold Mining Company's ditch was run caused more water than usual to escape into the individual workings, which are all under ground, rendering them difficult and dangerous of operation.

From 90 to 100 men were engaged on Pine creek and Gold Run during the season.

SPRUCE CREEK.

On this creek between 210 and 220 men were employed during a portion of the season, including the company employees, and, while not as many were engaged in individual operations as in some former years, it is still first as regards the number so engaged and amount of output, which latter aggregated about \$77,000 as reported, and would be considerably more if fully reported. The operators not being so closely located as in former seasons, there was much less trouble in the apportionment of water and dump; so that, while troubles of this nature had not entirely disappeared, the difference was marked and appreciated.

Some of the best results obtained by individual operators on this creek were from re-slucing "tailings" which had already been washed once and had lain for a time exposed to the action of the elements, and from which more gold was actually recovered than by the first sluicing.

About 70 men are drifting on the creek this winter.

Of the companies operating on this creek, the Spruce Creek Power Company, Limited, under the management of Mr. W. C. Hall, with an average force of 16 men, spent about \$20,000 in prospecting work and in removing and changing plant, flumes, pipe-lines, etc., preparatory to next season's operations. Again I much regret having to report that this company failed to recover an amount equivalent to its outlay, but I believe the gravel exposed at the close of this season's work is the most promising that has yet been encountered, and it really looks as if the "pay-streak," which is known to exist on the property, is in sight. This company was also hampered for want of water, but not to the same extent as in former years.

The Northern Mines, Limited, under the superintendence of Mr. Henry B. Warren, P. L. S., operated with the steam shovel for a portion of the season, but although working phenomenally rich ground, the results cannot be regarded as satisfactory. A force of about 20 men was employed and about \$15,000 was recovered before operations were suspended owing to financial difficulties. These difficulties were, perhaps, due to causes over which the local management had little or no control. The property is in the hands of a receiver.

The British Columbia Dredging Company, Limited, from the operation of whose dredge at Blue Canyon great things were expected, commenced in good season but only operated for a

few weeks and closed down, reluctantly admitting this dredge also to be a failure. The dredge worked well and handled the material satisfactorily, but for some reason appeared unable to save the gold. The failure of this dredge was a great disappointment to many others besides its owners, for had it proved successful the problem of how to successfully mine the large areas of auriferous ground which exist in this district would have been solved.

The Columbia Hydraulic Company did not attempt to operate this season, as its property was in the hands of its creditors. Its affairs are being adjusted, and I expect the plant will be in operation next season.

A number of leasehold properties, such as the *Kensington, Crown Group, Nora, Joker, Gladstone, Calder, Peterborough, Gorgon* and *Little Spruce Group* were worked, but little more than what would represent development assessment was done on any of them.

Options of purchase on behalf of Guggenheim Sons (so it is represented) were obtained last fall on most of the property on this creek, so that, possibly, entirely different methods of operation may be in vogue there in the near future. There is little doubt that the installation of a properly equipped plant, with a sufficient supply of water to work with, will be amply rewarded, for there is unquestionably much gold still recoverable even from the so-called worked out portions of the creek.

BIRCH CREEK.

About 16 men were engaged in mining on this creek during the summer, and three or four are on it this winter. Messrs. Pearse & Co. having obtained a lease or "lay" on the properties formerly owned by the Atlin Lake Company, but now held by the Dominion Trust Company, commenced operations early in May, overhauling the plant, etc., and were ready for the spring freshet which began on the 18th of May and lasted nine days. After that date the water fell rapidly, and for most of the season they had very little for piping purposes. They, however, moved about 16,000 cubic yards of gravel, recovering therefrom some \$5,000. Individual operators further upstream had a fairly successful season.

BOULDER CREEK.

On this creek about 20 individual miners operated during the summer, making 40 altogether, including the company's employees. Results were very satisfactory in most cases. There are 13 men drifting on the creek this winter.

The Société Minière de la Colombie Britannique, under the management of T. Obalski, Esq., M. E., assisted by Monsieur E. Janne de LaMare, with an average of 16 men (maximum 20), operated from the 1st of May to the 20th of October, running day and night shifts. The company uncovered about 1,600 square yards of bedrock, winning therefrom about \$23,500, and, although the expenses for the season aggregated about \$19,000, the management felt much more hopeful than for some seasons past, owing to the discovery that the "pay-streak" ran under the benches on the west side and was richer than most of the ground they had hitherto been working. Some of the ground worked this season ran \$16 to the square yard of bedrock and averaged \$14.50 to the square yard for the season's work. This, with the fact that the increased grade of the creek (working up stream) provides such an elevation as will enable the company with a comparatively short flume line to secure much better dump and operating facilities, makes it very hopeful for the coming season's success. Contracts have been let for the driving of two tunnels of 200 feet each under the above-mentioned benches this winter, for the purpose of determining the width or extent of the pay-streak in that direction.

On the *Non-Union* lease a small force of men with a small hydraulic plant did very good work, resulting in material profit to themselves.

The decreased output from Boulder creek is easily accounted for, being in no way attributable to any lack of gold in the gravel, but simply to the fact that not so much work was done this year. For this at least two reasons may be stated. One is, that the comparatively large amount of gold reported by the Société Minière de la Colombie Britannique, as shown by 1905 report, was mostly produced by Messrs. Black & Grant, who, with a steam hoisting and pumping plant, operated a "lay" on the company's ground. Neither this nor any similar plant was in operation there in 1906, and, therefore, no corresponding output. This alone would account for the difference in output during the two seasons. Another reason is that the perpetual injunction obtained in 1903 by the Société Minière de la Colombie Britannique against certain miners on this creek, practically restraining them from ground-slucing, has had such a deterrent effect that this year (1906) only half as many individual miners operated as in 1905.

Although the gold is apparently distributed through the gravel to a greater depth than on most of the other creeks, drifting operations are not satisfactory to the owners, for while a fair wage is usually obtained, they know they are not securing all the gold, the same area of bedrock or claim usually yielding quite as much more when afterwards operated by ordinary sluicing methods. Rather than invite vexatious and costly litigation, the individual and other holders situated on the upper portion of the creek have been holding off in the hope of some improved plan of operation, or of the whole creek being acquired by some company capable of controlling and operating it altogether.

RUBY CREEK.

Very little work was done on this creek during the season, as a considerable outlay of capital is necessary to open it up properly and install the necessary plant for its profitable working, and which capital the owners have not yet succeeded in securing.

WRIGHT CREEK.

About 12 miners were working on this creek during the summer, and, as usual, some of them were very well satisfied, while others were not. I am very much pleased to be able to state that Messrs. Gierke & Co., who for five seasons have operated on the English Counties Hydraulic Syndicate's leases (*Lincolnshire* and *Surrey*) and adjacent ground, with indifferent and disappointing returns, have at last "struck it rich" and have every chance of being amply repaid for their pluck. Such perseverance deserves every commendation, and, in fact, would usually be similarly rewarded in this district.

OTTER CREEK.

On this creek we have another evidence of plucky perseverance and faith in the ground which, I am glad to say, promises to be well rewarded. I refer to the operations of Messrs. Carmichael & Co., who own the *Otter Creek Consolidated Group* of hydraulic leases, situated on upper Otter creek, acquired and for a time held by the "Otter Hydraulic Company, Limited," and reconveyed last year to Messrs. Carmichael and partners, the original owners. These operators commenced in April to move the plant, pipe lines, etc., and did a large amount of dead work, including the laying and riffling of 240 feet (lineal) of sluice flume, 2 ft. by 3 ft. and laying a long length of supply pipe. They commenced piping on May 22nd, and between then and the 10th of October, when their sluices froze up, with an average force of 5 men and a very limited supply of water, they washed down 26,000 cubic yards of barren dirt and over 10,000 cubic yards of "pay gravel" from which they obtained, approximately, \$4,000 worth of gold. They have left their plant and pits in excellent shape for an early start and successful operation next season. The banks on which they operated average about 18 feet in height,

with from 8 to 12 feet of pay gravel, yielding from \$2.34 to \$3.16 per square yard of bedrock and over 50 cents per cubic yard. This property is now owned by a small "close" corporation which has several leases of apparently good ground, and a plant is installed consisting of about one mile (5,240 feet) of supply flume, 20 inches by 30 inches, 2,600 feet of steel pipe lines, 600 feet of sluice flume, two No. 3 Giants, the usual supply of mining tools, blacksmith shop and outfit, and very comfortable dwelling house, cabins and barn. I believe it is intended to establish a system of reservoirs next season, for which the physical conditions are said to be favourable, so that very good results may be expected from future operations.

Another group of leases on lower Otter is held under bond by Messrs. Maluin, Jamieson & Co., who did considerable prospecting on them last season, with, I believe, very encouraging results, and I understand all preliminary arrangements have been made for the installation of an hydraulic plant next year.

VOLCANIC CREEK.

On this creek four men worked all season without reaching bedrock, having a heavy inflow of water and many other difficulties to contend with. I am pleased to say, however, that they have met with such encouragement as makes them determined to continue next season until bedrock is reached. This is still another case of that perseverance which deserves success, and which in this case also, I trust, will be amply rewarded.

WILSON CREEK.

This is a tributary to O'Donnel river and hitherto has not attracted sufficient attention to be worthy of mention. It is one of the many creeks which, in 1898 and 1899, were staked from end to end and abandoned. Subsequently a portion of it was located in hydraulic leases, but no development work was done and the leases were cancelled. The creek was then open for two years, but last winter a new discovery was made, and quite a number (90 or more) of claims located on it. Considerable prospecting was done during the summer, but owing to the scarcity of labour and the lack of capital, no persistent work was done except on *Discovery* claim, on one or two claims on either side of it, and on two or three others. On *Discovery* claim I have reason to believe that the operators realised from \$25 to \$30 a day each, and this winter some comfortable cabins are being erected and other preparations made for more persistent and systematic work next season.

O'DONNEL RIVER.

On this river only one crew of four men did any work this year. They were operating on the *Gold Hill Group* of leases owned by Robert McKee. They put out a dump last winter which was believed to be valuable. They were, unfortunately, quite unprepared for the freshet when it came in the spring and lost most of their dump. They then sluiced until some time in September with very gratifying results, winning, it is said, about an ounce a day per man. Work was suspended because the flow of water was too great for the pumps which were in use, and steps had to be taken to procure more efficient appliances. It looks now, however, as if either a steam shovel or a dredge will be installed on the property, definite action to that end having been taken.

GOLD BOTTOM CREEK.

This is a creek situated beyond the south end of Atlin lake, tributary to the Sloko river, a district in which no other placer properties are held, but a group of leases has been located upon the creek, and active prospecting commenced in November by an American company which has a bond on the property.

A crew of four or five men have been prospecting on Gold Bottom creek since then, but from recent reports I fear the usual difficulty with water is embarrassing them, and they will very likely close down until they can instal proper and efficient pumping apparatus. I may say that all the physical conditions are very favourable, viz., high gravel banks, good dump, plenty of water and timber, and it only remains to be demonstrated that they have the gold in paying quantities to prove that they possess a very valuable property. I may say further, that if this property proves to be worth working it will lead to extensive location in that part of the district, which so far has received very little attention.

LINCOLN CREEK.

This creek is a tributary of Teslin lake and attracted some attention last year, there having been a number of placer claims located. Some desultory prospecting was done and some three or four men spent most of the season on the creek, but did not accomplish anything worth mentioning.

CONSOLATION CREEK.

The same may be said of Consolation creek, another tributary of Teslin lake situated quite near Lincoln creek, and on which two or three men have spent two seasons prospecting, but without finding bedrock, the ground being deep and somewhat difficult to work.

The success of the steam shovel on Pine creek will doubtless direct more attention to that style of plant and method of operation, as being the best yet suggested and adapted to the peculiar nature of the material found in this district, there being but one serious objection to it that I can see, viz., the cost of the fuel, which will soon be scarce and very costly. It is expensive now and will become more so as the timber is consumed. If electric power can be successfully applied instead of steam, that objection will be overcome, for water-power is plentiful throughout the district.

MINERAL CLAIMS.

The active development carried on by Col. Conrad and his associates on the Yukon side of Windy arm, Tagish lake, gave a great impetus to prospecting and a large number of mineral locations were recorded around Tutshi lake, and in fact all through the district. The surface showings on quite a number seem to indicate the existence of valuable deposits therein. Sufficient development has not been done anywhere to justify definite pronouncement as to values. On most of the properties about Atlin only sufficient work has been done to keep them in good standing; several Crown grants have, however, been applied for.

The quartz deposits in and about "Rainy Hollow," on the Klehini river, in the north-west corner of the district, have attracted considerable attention during the past season, and the indications are that a copper camp will be established there in the near future. A number of claims (upward of 100) have been located on apparently very extensive deposits or ledges of what is said to be self-fluxing copper ore, which also carries good values in gold. The limited amount of development so far done has tended to justify and increase the high expectations induced by the surface indications. There have also been discovered in the same vicinity ledges of galena, molybdenum and other metals.

The above-mentioned claims are situated between 50 and 60 miles from tide water at Haines, Alaska, and about 10 miles beyond the International Boundary at Pleasant camp. A large number of the claims are held under bond by certain British and American capitalists, who profess to be about to vigorously prosecute development.

There is another group of claims located from two to five miles from the International Boundary, and therefore nearer tide water, on which very little development work has been done.

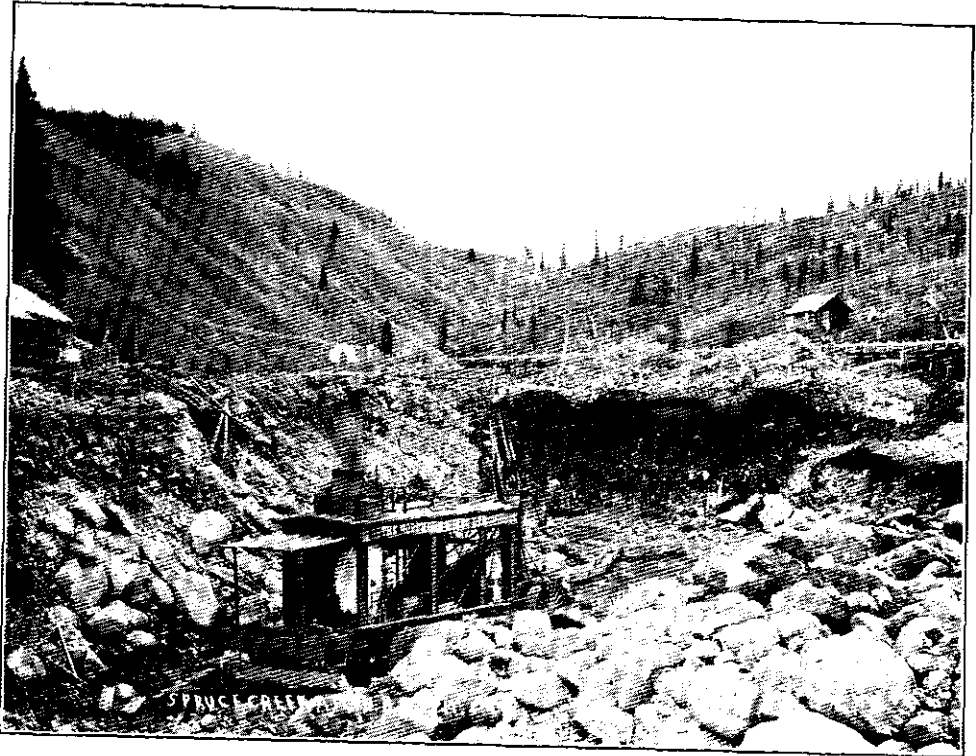
Altogether, there is good justification for the belief that the whole north-west portion of the district, from the International and Yukon boundaries through to Bennett, Tutshi and Atlin will be the scene of active mineral development and operation at no very distant date.

OFFICE STATISTICS—ATLIN MINING DIVISION.

No. of records issued, 126, representing	127	claims.
" re-records issued, 383, representing	464	"
" grouping permits (placer) issued	29	
" abandonments filed, 9, representing	15	"
" leaves of absence granted, 131, representing	307	"
" hydraulic leases applied for	18	"
" " " issued	51	
" " " cancelled	23	
" applications for mining leases declared void	73	
" " " " declined	1	
" " " " withdrawn	2	
" bills of sale recorded (placer)	209	
" " " " (hydraulic)	103	
" " " " (mineral)	74	
" mineral records issued (Atlin, 188; Bennett, 117; Klahini, 69),	374	
" certificates of work issued (Atlin, 87; Bennett, 29; Klahini, 55),	171	
" notices filed under Mineral Act (Atlin, 16; Bennett, 15;		
Klahini, 2),	33	
" permits to move stakes issued (recorded)	16	
" free miner's certificates issued (individual)	845	
" " " " " (individual special)	12	
" " " " " (companies)	12	
" " " " " (companies special)	1	
" water records applied for	23	
" " " issued	2	
" " " abandoned	nil	
" " " cancelled	nil	
" " " in force	68	
" bedrock flume grants issued	nil	
" " " " lapsed	nil	
" " " " in force	1	
" " drain licences issued	nil	
" " " " cancelled	nil	
" " " " in force	1	
" investigations held by Gold Commissioner under part ix of		
" Placer Mining Act"	numerous	

Revenue Collected, 1906.

Free miner's certificates, individual	\$ 3,896 25
" " " companies	1,350 00
Mining receipts, lease rentals	17,510 00
" " lease deposits	300 00
" " water records and rentals	1,006 50
" " bedrock flumes and drains	200 00
" " other sources	5,873 50
Leaves of absence	767 50
Mineral tax or royalty on mines and minerals	4,073 54
Land sales	295 00
Other land revenue	549 01
Taxes, realty	\$ 837 50
" personalty	3,474 05
" wild lands	6 30
" income	134 00



STEAM SHOVEL, GREAT NORTHERN MINE
(Spruce Creek, Atlin, B. C.)



PINE CREEK POWER CO., ATLIN, B. C.

OFFICE STATISTICS—ATLIN MINING DIVISION.—*Concluded.*

Taxes, revenue	\$ 849 00	\$5,300 85
Licences, trade	145 00	
" liquor	1,982 00	2,127 00
Magistrates and Small Debts Court		266 85
Other sources		349 21
		\$43,865 21

GOLD RECOVERED—ATLIN DISTRICT, 1906.

NAME OF CREEK.	INDIVIDUAL MINERS.			COMPANIES.		
	Ounces.	Value.	Royalty.	Ounces.	Value.	Royalty.
Pine Creek	582	\$ 9,024 72	\$ 28 20	6,223	\$96,472 26	\$1,769 16
Spruce Creek	4,964	76,941 23	759 85	586	9,078 28	101 78
Boulder Creek	1,249	19,366 00	293 50	1,942	30,108 00	424 00
Wright Creek	376	5,873 50	40 25			
Otter Creek				255	3,952 00	39 05
McKee River	98	1,550 00		2,000	32,000 00	600 00
Wilson Creek	181	2,887 50	17 75			
	7,450	\$115,642 95	\$1,139 55	11,006	\$171,610 54	\$2,933 99

Summary.

	Ounces.	Value.	Royalty.
Individual Miners	7,450	\$115,642 95	\$1,139 55
Companies	11,006	171,610 54	2,933 99
	18,456	\$287,253 49	\$4,073 54

STIKINE AND LIARD MINING DIVISIONS.

REPORT OF JAMES PORTER, GOLD COMMISSIONER.

I have the honour to submit my sixteenth annual report on the mining operations in the Stikine and Liard Mining Divisions of Cassiar District, for the year ending 31st December, 1906.

I regret to say that I am not able to report any very marked improvement in the season's operations over that of other years, yet the result may safely be said to be encouraging for the future. The amount of prospecting in new fields during the season has been small, but the results at least showed a revival of mining activity.

During the summer a party, guided by an Indian, went out from McDame creek in a S. E. direction for a distance of, approximately, 80 miles to the watershed of Black or Turnagain river, where the Indian knew of a large body of quartz. The result of the expedition was that

some claims were staked and recorded, and it is said that assays of the rock obtained went from \$31 to \$111 to the ton, in gold, silver and copper. These results were obtained from crude methods, and it was thought that by more scientific assays better results would be obtained. For this purpose some of the ore was taken to Chicago, and it was promised that I should be advised as to the result of the assay made there. I regret to say that I have not heard any more about it. However, I feel that there will be more or less attention paid to the locality mentioned during the coming season. The country in question is approximately 250 miles from this place by the route at present travelled, of which 100 miles can be made by water in the open season.

A party of three prospectors, looking for placer diggings, went across from the head of Dease lake to the headwaters of the west branch of Black or Turnagain river, which can be reached some 35 miles from the lake. These men, so far as I know, found nothing rich enough to work, but it is said that they obtained encouraging prospects in several places, and I understand it is their intention to return to the place next summer better equipped for a season's work.

Some prospecting for quartz was done on the lower part of the Iskut river, where some fair-looking ore was found in place. Several locations were made, but it seems that when the rock was assayed it was found to be worthless, or at least not of sufficient value to encourage further expenditure.

STIKINE MINING DIVISION.

FIRST NORTH FORK OF CLEARWATER RIVER.

This stream is large and may be said to be unmanageable from any ordinary mining point of view, as it contains a large volume of turbulent water the whole year round, and the greater portion of it is said to be confined between narrow walls of rock. About four miles, however, of the lower part of the stream is not so closed in. This occurs just before it joins the main Clearwater river, and here wide flats and bars have been made by the wash from above. The mouth of this stream is distant, approximately, 40 miles from Telegraph Creek by water. Gold was discovered on the creek a few years ago, and on the 31st of October, 1904, the partnership of Messrs. Conover, Wilson and Jackson recorded a creek lease, where the stream leaves the canyon to flow over the stretch mentioned. So far the company has confined its operations to working a high bar at the upper end of the claim, and the work has been carried on in the old ordinary sluice-box method, without the use of any modern appliances. The results obtained from this manner of operating have been fair, and I think should prove that some very good deposits of gold may be found. So far no attempt has been made to sound the present channel.

On the opposite side of the Stikine river from the mouth of Clearwater river are located the *August, Mountain Goat No. 1* and *Mountain Goat No. 2* mineral claims, which are owned by Mr. Lewis Kirk. These are said to be good ledges of copper ore. Nothing more than the necessary amount of assessment work has been done on these claims.

LIARD MINING DIVISION.

DEASE CREEK.

One creek lease at the mouth of this well-known creek was recorded during the season, and two hydraulic leases have changed hands. No extensive operations have yet commenced on the creek, and what little gold is being taken out is from desultory mining.

THIBERT CREEK.

This stream has been and is yet a good producer of gold, and on it are the large holdings, comprising ten hydraulic leases, of the Berry Creek Mining Company, Ltd., now under the management of Mr. D. R. Irvine, of Victoria, B.C. This energetic company can truly be considered as being the present stay of the district. The company has been confronted during the several years of its existence with the numerous obstacles and drawbacks met with by undertakings of the kind, more especially when operating in a locality like this where the seasons are so short and transportation facilities uncertain and expensive. The company has now installed, at an enormous expense, large monitors, pipe lines, miles of ditches and flumes, and the whole plant and everything in connection with it is ready to operate on a larger scale than ever. The result of the past season's washing did not quite meet the expectations of those interested, yet it has established the important fact of the presence of gold in paying quantities.

There are a few Chinamen working on the creek who manage to make a living.

NOTE BY PROVINCIAL MINERALOGIST.—Through the courtesy of Mr. D. R. Irvine, the manager of the Berry Creek Company, the following extracts from his official report to his directors are given:—

“During the winter of 1905-06 the foreman left in charge of the mine got out riffle-blocks and wood, while a contractor moved some 30,000 feet of lumber required for flumes, etc., from the company's saw-mill on Dease lake up to the mine.

“In February, 1906, the hydraulic piper went in over the ice from Wrangel, reaching the mine about the middle of March.

“By the first week in May the foreman, with the four men then on the ground, had finished repairing the flume, clearing sluice-boxes and cuts from ice and rocks, tightening up pipe-line, etc., and had everything ready to begin operations. On May 9th water was turned on the mine, running one shift a day, with one piper and four men.

“The other men reached the mine from ‘outside’ on May 22nd, but owing to breakdown of steamer on the Stikine river, the manager, Mr. Irvine, did not reach the mine until June 17th.

“The first piping of the season was done in removing the gravel ridge between Nos. 1 and 2 pits, which occupied until June 1st, when No. 1 pit was abandoned and the No. 1 monitor moved into No. 2 pit. The ridge moved was mostly top soil and gravel, the ‘pay-streak’ having been mined in early placer days, and, as was expected, did not carry much gold.

“The total number of days, of 24 hours each, run of water during the season of 1906 was divided among the pits as follows: No. 2 pit, 50 days; No. 3 pit, 21 days 19 hours; No. 4 pit, 17 days; No. 5 pit, 20 days 5 hours; total, 109 days. The total amount of gold recovered was \$21,750, or an average of \$200 for each day's run.

“In No. 2 pit there were three ‘clean-ups’ in the run of 50 days, in which time \$17,000 was cleaned up, an average of \$335 a day, despite the fact that 15 days of this time were spent in removing top gravels and the ridge between pits Nos. 1 and 2, and in removing a big cave of top clay that had come down the previous fall. The 35 days' washing of middle and lower gravels yielded \$475 a day's washing.

“By middle and lower gravels is meant here the lower 70 feet of the bank—the bottom gravel and cement average 6 feet in thickness. No accurate estimate was made of yardage moved, but the manager makes the following approximate estimate of the values to the cubic yard of the various strata:—

“Bottom gravel and cement, 6 feet thick.....	25 cents to cubic yard.
Lower “ “ 70 “	14 “ “
Upper “ “	8 “ “

"In places the bottom gravel runs much richer, as high as several dollars to cubic yard. No. 2 pit and the results obtained therefrom is said to give the fairest idea of the deposit. The height of the bank in this pit is 210 feet, and the face is 400 feet from the outer edge of the new channel. The bank is all gravel, with no boulder clay on top.

"No. 5 pit was piped 20 days, of which half the time and water was used in removing a valueless slide of boulder clay which had come down; the bottom gravel or cement was barely touched; yet for the whole 20 days' run the average yield was \$105 a day. This pit has only been worked in for 140 feet, and has at present a face of 60 feet in height, which will, however, rapidly increase, as the hillside is steep, and as yet only the outer edge of the old channel has been touched.

"The ground occupied by pits Nos. 3 and 4 has had, since the mine opened up, a succession of slides from the bank above, as the gravels of the old channel are covered with a capping of boulder clay.

"In No. 3 pit there were two runs, the first of 12 days, yielding \$1,300, or \$108 a day. The second run of ten days yielded \$400, or \$41 per day. In No. 4 pit a run of 17 days recovered \$750, or \$43 a day.

"These comparatively low results are accounted for by the fact that, while the lighter material from the slides of the last three years had been already removed, there remained this year an accumulation of large boulders which impeded operations. Most of this mass of boulders had been removed before the close of the season.

"Water Supply.

"The work laid out and started in 1905 to bring in additional water from two tributaries of Dease creek was completed in August of this year. While Berry creek supplies an abundance of water to run the monitors to their full capacity of 1,000 miner's inches until the end of July, after that the supply from this source was insufficient to run full, but, after the additions to the water supply had been completed on the 18th August and the Dease creek water turned in, there was plenty of water for the remainder of the season and a surplus running over the dam, despite the fact that it was an unusually dry fall. The condition of the mine at the end of the season, with the pits well cleaned up and a sufficient water supply assured, gives a better prospect of a profitable season's work next year than it has ever done before."

MCDAME CREEK AND TRIBUTARIES.

This creek is another substantial reminder of the early mining in the district, for it also yielded a goodly supply of the yellow metal. There are thirteen creek and hydraulic leases on the creek and tributaries, but as yet nothing more than development work has been done on any of them, excepting that of Mr. John P. Allen, located at the mouth of Snow creek, which is said to be producing a fair return, considering that it is worked without machinery of any kind.

The Seattle Prospecting & Development Company, of which Mr. John Ley is manager, controls several leases on the creek, and the company has attempted to instal machinery there for two successive seasons, but owing to unavoidable breakdowns on each occasion, very little headway has been made.

Quite a number of quartz claims have been recorded on the creek and in its near vicinity, some of which are said to be very promising properties. Nothing more than actual assessment work has been done on any of them. Several of these claims are controlled by Mr. John W. Haskins, of Victoria.

 ROSELLA CREEK.

It is on this creek that the Rosella Hydraulic Mining & Development Co., Ltd., of Victoria, B.C., has four creek and five hydraulic leases. The operations of this company, under the management of Mr. J. W. Haskins, has been confined to preliminary work about the ground and getting the hydraulic plant to the claims. This property is the most remote of any taken hold of in the district, hence the expense of instalment has been heavy, and it has also been necessarily slow. I understand that everything can now soon be put in shape to reimburse the projectors.

I think it is quite unnecessary for me to mention here that in this part of the Province there is a very great deal of unexplored country and many mountainous tracts that have never even been seen by the ever inquisitive prospector.

OFFICE STATISTICS—STIKINE AND LIARD MINING DIVISION.

Revenue collected from general mining receipts.....	\$2,904 90
" other sources	2,256 68
Total revenue.....	\$5,161 58

 SKEENA MINING DIVISION.

The Gold Commissioner of this division, Mr. John Flewin, has this year failed to make any report as to the condition of the mining industry in his division. This is much to be regretted, as mining has been more than usually active there this past season, and many particulars as to the work done on the individual claims cannot, therefore, be given.

 PORTLAND CANAL DISTRICT.

REPORT BY H. CARMICHAEL, PROVINCIAL ASSAYER.

Portland canal is the most northerly inlet on the coast of British Columbia, and forms the boundary between that province and Alaska. This International boundary, the position of which was definitely decided upon some few years ago, has now, in this portion of it at least, been laid out on the ground, and its position clearly marked by monuments or by a cutting through the forests where such occur. The settlement of this boundary has relieved claim owners of much uncertainty as to which country their claims lie in, and should stimulate development on both sides of the line. The canal, or fiord, communicates with the open sea at Dixon entrance, and from that point runs nearly due north a distance of 55 miles to its head. It possesses few and indifferent anchorages, since the shores on either side are precipitous mountains with, in places, peaks which rise almost perpendicularly to heights of 6,000 feet. About 35 miles from the head of the canal, on the east side, is Maple bay (marked Maple point on the chart), a small bay affording good shelter but with rather deep anchorage. The two rivers, the Bear and the Salmon, at the head of Portland canal, are separated by a high bare ridge of mountain that forms the International boundary line, trending off to the west. On the east side of the valley of Bear river a mountain range extends in an east and west direction, the highest peak of the range, mount Disraeli, being a snow-clad pinnacle 7,000 feet high. The valley of the river is about a mile wide, composed of gravel and sand dotted with cottonwood and alder trees. It extends easterly in a straight line, with a gradual rise, for ten miles, until an elevation of 400 feet is attained. From this point the river and creeks rise

more rapidly, becoming mountain torrents. With very little work a good waggon road could be made up the valley for ten miles or more. A bridge over the river, near its mouth, is needed, as, without it, it is nearly impossible to cross the river at high water, and all means of communication are cut off.

Communication up Portland canal is maintained by the Union Steamship Company every ten days from Vancouver, and every week by a small steamer from Port Simpson. There is a very comfortable hotel at Stewart, at the head of the canal. Attention was first drawn to Portland canal when, on the 4th of May, 1898, a party of 64 persons from Seattle landed at the head to look for placer diggings at the source of the Nass river. Some 21 of the party went over the divide from Bear river and down the Nass river and struck "colours," but no pay placers. Some of the men still believe that if the "grub" had held out they would have found diggings worth staying with. Two or three of the party wintered on the Canal and staked in the spring of 1899 what is now the *Roosevelt* claim, on Bitter creek, while Stewart's claim, on American creek, was staked in 1902, and the principal claims on Glacier creek in 1905 and 1906.

The country round Glacier creek is the only part which so far has been visited and reported on. The locations there have been made on well-defined veins in a schist country rock, carrying values in silver, gold and lead, with a little copper. Farther up Bear river the country rock is said to change, becoming more granitoid, the change being noted on the *Mother Lode* claim, two and a half miles above Glacier creek. There is still ample field for further prospecting, and the district is well worthy of attention.

On the west side of the Canal the country rock is granite, which continues from the mouth to its head and forms the range referred to as between the Salmon and Bear rivers.

On the east side a similar granite extends from the mouth nearly to Maple bay, where the country rock changes to a schist* intersected by dykes, which formation continues to a point about seven miles up Bear river valley, where granitoid rocks again appear.

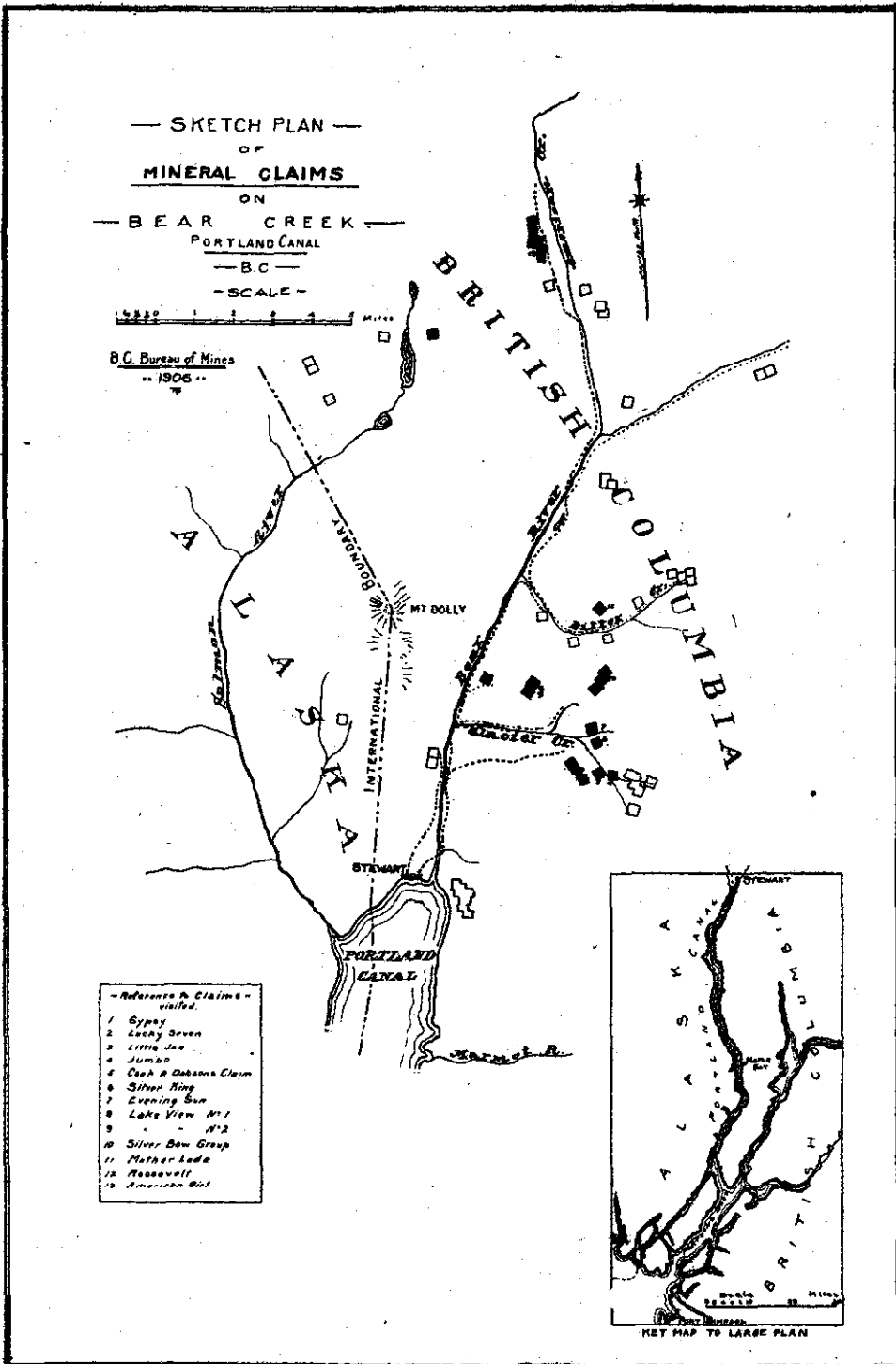
MAPLE BAY CAMP.

The properties at Maple bay are being worked by the Brown Alaska Company, with head office in Seattle and a smelter at Hadley, Alaska. The general superintendent at Maple bay is Mr. Arthur A. Wakefield.

The group consists of fourteen claims, including fractions, and lies to Outsiders Group. the north-east of Maple bay. A quartz vein has been traced through seven claims running diagonally up the hillside at an angle of 30 to 40 degrees. The principal work has been done at the junction of the *Regina* and *Copper King* claims. At an elevation of 1,100 feet, and 6,000 back from the bay, a main tunnel has been run in 300 feet on a well-defined quartz vein, which follows the strike and dip of the schistose country rock, the dip being about 60 degrees to the east. The vein, while clearly defined, swells and contracts in places, varying from five to fourteen feet wide, and is well mineralised with copper pyrites, fairly well disseminated, the mass averaging 3% in copper.

* The following is a report by Dr. J. A. Dresser, of Montreal, of a microscopic examination of this rock:—

"No. 4,218.—*Country Rock, Maple Bay, Portland Canal.*—This is a specimen of a dark gray rock which has uneven fracture and rather fine texture, is of medium hardness and effervesces with cold dilute hydrochloride acid. In the slides it is found to be a highly decomposed rock. The distinguishable minerals are feldspar, which is very turbid, and zoisite, the colourless hornblende which is without pleochroism. A part of the bisilicate constituents show rather brilliant polarisation colours and parallel extinction, and probably is bastite or some allied mineral species. The rock can scarcely be more definitely determined than as an extremely altered basic eruptive."



A second tunnel, called the "Intermediate," has been run in an elevation of 75 feet above the first, and is in on the vein 100 feet.

Twenty feet still higher up a third, or "Upper" tunnel, has been run on the vein 40 feet. No stoping has been done, but the different levels have been connected preparatory to stoping, when the ore will be taken out by the lower or main tunnel.

On the surface, above the upper tunnel, the vein has been stripped and shows up strongly, crossing over a shoulder of the mountain. Two or three small diabase dykes were cross-cut in the tunnels, and also show up on the surface; these dykes cross the vein from wall to wall, but do not run into the country rock.

On a level with the upper tunnel, but some 550 feet to the north, in a small gulch, a cross-cut has been driven through the schist country rock, cutting the vein at 150 feet in. At this point the vein was found to be about three feet wide and not as heavily mineralised as in the main workings. From the inner end of this cross-cut tunnel a drift has been run to the north, on the vein, for 150 feet, while a drift to the south, towards the main workings, has been run for 220 feet. In this south drift, at 140 feet from the tunnel, the vein has been replaced by a diabase dyke, but towards the inner end of the drift the vein comes in again with a width of eight feet, throughout which width it is well mineralised with copper pyrites. The vein has been traced for a considerable distance, both above and below the main workings, and gives promise of carrying a large body of good ore.

Just below the main tunnel is the upper terminal of an aerial tramway which runs 6,000 feet to the ore bunkers at Maple bay, where there are good loading facilities. A 6-drill Rand compressor has been installed at the beach and a pipe line run to the mine.

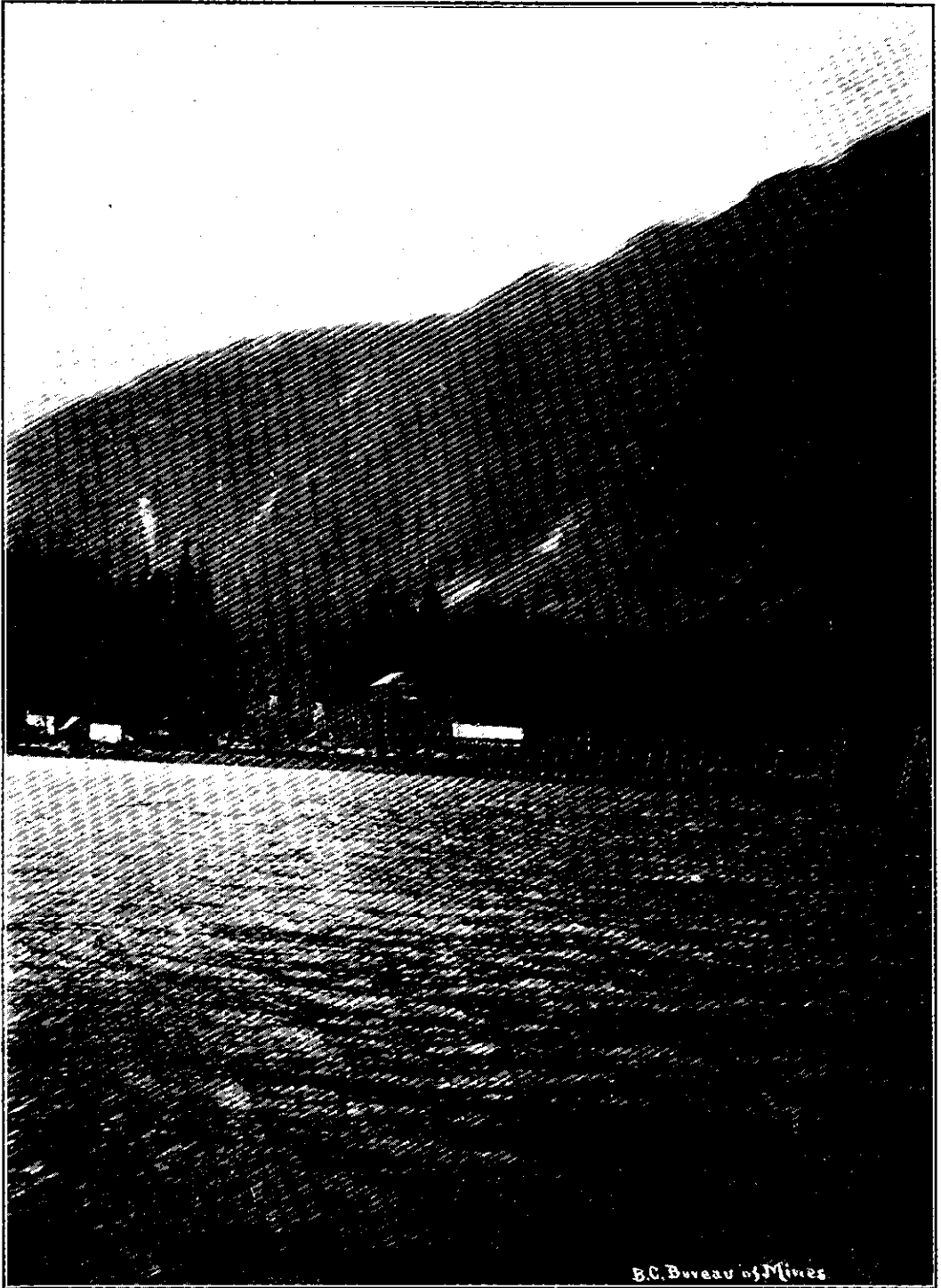
A sample of the ore taken as it was being mined gave, upon assay, copper, 3.4 %; silver, 0.4 oz. per ton; and gold, 0.05 oz. per ton.

The *Blue Bell Group*, consisting of eight claims, is situated to the Blue Bell Group. south-east of Maple bay, the principal work having been done on the *Blue Bell*. Some 4,500 feet back from the bay and at an altitude of 1,500 feet a tunnel has been run in 50 feet on a quartz vein from 18 inches to 5 feet wide, carrying copper pyrites. Some 150 feet below this tunnel a cross-cut is being run to strike the vein, that is now in 185 feet and is expected to cut the vein at 200 feet. A sample taken of the ore as it could be sorted for shipment gave, upon assay:—Copper, 11.3 %; silver, 5.2 oz., and gold, 0.02 oz. per ton.

The *Eagle Group* of five claims is situated above and to the north-east Eagle Group. of *Outsiders Group*. On the *Eagle* claim surface work has exposed a quartz vein 7 to 12 feet wide. It has been traced for 1,500 feet, and is well mineralised with copper pyrites. It is intended to develop this vein by a tunnel and to ship the ore by tramway to the bunkers at Maple bay, 3,000 feet below and horizontally 3,000 feet distant.

BEAR RIVER CAMP.

These claims are owned by John Griffin and Jos. McGrath. They are Lucky Seven and reached by following up the main Bear river trail, $2\frac{1}{2}$ miles from the hotel, Little Joe. where a trail strikes up the south-east slope of Glacier creek, and rising rapidly until the claims are reached at an altitude of 2,450 feet and about $1\frac{1}{2}$ miles from the Bear river trail. A short distance above the mine cabin a small creek has exposed a quartz vein; this has been developed on the *Little Joe* by a short tunnel 20 feet long and a series of shots and open cuts extending through both that claim and the *Lucky Seven*. The development, while not extensive, shows a well-defined quartz vein averaging



B.C. Bureau of Mines

MAPLE BAY AND "OUTSIDERS" TRAMWAY PORTLAND CANAL.

about 8 feet wide, striking N.W. and S.E. and dipping about 20° southerly into the hill. The hanging-wall is schist* and the foot-wall porphyritic dyke.† The vein shows marked brecciation, the quartz enclosing and cementing large and small pieces of the schist country rock. The vein is well mineralised throughout, the mineralisation, however, varying in places, the prevailing ore being galena with occasional native silver, while at certain points in the vein lead carbonate replaces the galena. A streak of solid, fine-grained pyrites, from 2 to 14 inches wide, occurs with great persistence through the lead. This carries about 0.25 oz. of gold per ton. An assay of a fair sample of the ore gave:—Gold, 0.1 oz.; silver, 32 oz. per ton; copper, trace; lead, 27.5%; zinc, 6.3%. The owners state that average ore assays:—Gold, \$4; silver, 25 to 30 oz. per ton; lead, 4 to 6%. The vein shows great permanence, having been clearly traced through the *Lucky Seven* and *Little Joe*, while extensions have been located at either end of these claims. Another small vein has been located on the claim, but no work has yet been done on it.

This claim, owned by Beaton and Didsdale, adjoins the *Lucky Seven* and *Little Joe*, farther down the hill, but was not visited, as the shaft was reported partly filled with water. The owners state that they have sunk a shaft 40 feet on a quartz vein from 2 to 5 feet wide, in schist, mineralised with galena and pyrites, the values running \$30 to \$40 in gold, 20 oz. per ton in silver, and 20% lead. The owners intend to sink farther in the spring.

This claim is located at the headwaters of the south fork of Glacier Cook and Dobson's creek, three miles from Bear river. An open cut into the hillside has cut a mineralised zone in the schist, in which stringers of quartz run into and impregnate the country rock. This may be a continuation of the *Little Joe* vein, or it may be a parallel vein, though it is not so strong nor well defined, and is not so well mineralised. The width of the mineralisation is uncertain, but may be taken as about 8 feet.

The *Jumbo* mineral claim, owned by Sam Gurley and R. B. Dodge, is situated at the headwaters of the south fork of Glacier creek, at an elevation of 2,190 feet, and is distant about 3½ miles from Bear river. On the face of an overhanging bluff 100 feet high is a mineralised zone in the schist, which here has a strike east and west, with a dip of 22° into the hill. This zone is a quartz impregnation of the schist, there being quite as much schist as quartz. The entire mass is, however, more or less mineralised with lead carbonate and galena, and also carries iron pyrites. Little develop-

* The following are reports by Dr. J. A. Dresser, of Montreal, of microscopic examinations of these rocks. Sample No. 4,202 represents the general country rock in vicinity of Glacier Creek—locally known as "schist"—in which most of the ore bodies occur. Samples Nos. 4,811 and 4,201 may be taken as representing the general dyke system of this vicinity:—

"No. 4,202.—*Schist, Glacier Creek, Portland Canal.*—This is a fine grained, iron gray rock having a distinct schistose structure. It is rusty along the joint planes. The microscopic section shows fine parallel lines of minute grains of magnetite in a very fine granular base of a dull gray colour. There are also present a few larger grains of pyrite and of feldspar. It seems to be a very fine-grained sediment, perhaps altered by proximity to some igneous intrusion. It might be called a ferruginous argillite."

† "No. 4,881.—*Footwall of the Lucky Seven Claim, Bear River Camp, Portland Canal.*—This specimen is a fine-grained, dark green rock showing occasional small areas of a lighter shade. Under the microscope this is found to be a much altered rock, consisting of a ground mass of turbid secondary material, probably kaolin, in which the outlines of feldspar phenocrysts can be discerned. The feldspar is too much decomposed to admit of the exact species being determined. Is a much altered porphyritic rock, probably a porphyrite."

"No. 4,201.—*Dyke, Glacier Creek, Bear River, Portland Canal.*—A dark gray rock with occasional lighter shades. It contains numerous small crystals of hornblende, which appear black to the naked eye. In the slide it shows a distinct porphyritic structure. The phenocrysts consist of hornblende and feldspar; the former ranges from straw colour to bronze. The feldspar phenocrysts, where suitably cut, give symmetrical extinction on the albite lamellae of 8 to 10 degrees, indicating that it has the composition of oligoclase. The ground mass is a finely crystalline aggregate of quartz and feldspar. The rock is a hornblende porphyrite."

ment has been done beyond a few shots put into the vein, and it is impossible at this stage to say the average values in the ore-body, as it is much decomposed, and it is probable that the greater part of the values have been leached out; but, judging from the results obtained on other claims, there is every reason to expect that it may prove a valuable ore-body. A selected sample of the ore taken for assay gave:—Lead, 69.2 %; zinc, 1.5 %; gold, 0.03 oz., and silver, 47.2 oz. to the ton.

The *Evening Sun* mineral claim, owned by Rush and Baggs, is reached
Evening Sun. by a zig-zag trail up the north side of the middle fork of Glacier creek, and 400 feet higher than the cabin, which is about three miles from Bear river and 1,950 feet above sea level. A vein outcrops on the hillside, in schist country rock, on which a tunnel has been driven 36 feet. The vein dips vertically, strikes N. and S., and is from 3 to 4 feet wide, with well-defined walls. The vein-matter is largely calcite, fairly well mineralised with galena and a little iron pyrites. A sample of the ore gave, upon assay:—Gold, 0.04 oz. per ton; silver, 62.2 oz. per ton; lead, 27.3 %; with a considerable quantity of antimony.

The *Silver King* mineral claim, owned by A. Nelson, is directly above
Silver King Claim. Rush and Baggs' cabin, the highest workings being at about 500 feet greater elevation. Several open cuts have been made which show a quartz impregnation of the schist dipping vertically, and outcropping up and down the hill. This carries some blend with a little pyrites and galena. A selected sample of the mineral gave, upon assay:—Gold, 0.02 oz.; silver, 43 oz. per ton; zinc, 19 %.

Lake View Nos. 1 and 2 mineral claims are owned by Messrs. Bebeau
Lake View Group. and McKay. To reach these claims the main trail up the south side of Glacier creek is followed for 1½ miles, then Bebeau and McKay's trail turns off to the left and follows up a small creek a distance of about three-quarters of a mile. The trail rises rapidly at first, but towards the top flattens out considerably. At an altitude of 2,200 feet above Bear river a quartz vein outcrops in a small creek. This has been prospected by trenches and open cuts for a distance of 200 feet. These cuts and trenches have been sunk to the vein through two feet of peaty mould and two feet of broken schist. The work has not been sufficient to determine with certainty the nature of the country rock or how the vein occurs, but it appears to be a quartz vein in schist, cutting diagonally across the country rock, and having an average width of about 4 feet. The lead is well mineralised, and carries a considerable quantity of high grade ore in banded formation, the mineralisation being fine-grained galena and pyrites. An assay of the best ore gave the following result:—Gold, 0.08 oz. per ton; silver, 44.00 oz. per ton; lead, 16 %; zinc, 13.5 %.

The *Mother Lode* mineral claim, owned by Jas. McKay, is on a small
Mother Lode Claim. creek flowing into Bear river from the east, five and a half miles from the north of Bear river. At a quarter of a mile up the side of the hill from Bear river, and 300 feet above it, is a quartz impregnation in a granitoid rock* with a strong quartz vein some eight inches wide and a number of stringers parallel

* The following is a report by Dr. J. A. Dresser, of Montreal, of a microscopic examination of these rocks:—

"No. 4,205.—*Country Rock, Mother Lode Claim, above Glacier Creek.*—This specimen is a pinkish gray granolithic rock of medium texture. The only minerals distinguishable in the hand specimen are feldspar, which seems to make up the body of the rock, and black specks of some bisilicate mineral. In the thin section it is found to consist of feldspar, quartz and hornblende, and with which a small amount of biotite is intergrown and accessory amounts of sphene. The feldspar consists of orthoclase and of finely striated plagioclase, evidently of the oligoclase-andesine type. The rock is a hornblende-biotite-granite.

"No. 4,208.—*Agglomerate, Mother Lode Claim, above Glacier Creek, Portland Canal.*—This is a gray, finely mottled rock, containing what appear in the hand specimen to be a few pebbles of granite, of ¼ to ½ inch in diameter. The thin section is taken wholly from what seems to be the matrix of the rock.

to it, in all about four feet wide. This shows considerable mineralisation, with iron pyrites and a little jamesonite in places. The vein outcrops across the hill N. 10° W., and dips 60° to the east. Assays of ore gave: gold, 0.05 oz. per ton; silver, 4.2 oz. per ton.

The American Girl Group, owned by G. Stewart, is situated on American Girl can creek, some 15 or 20 miles from salt water, following up Bear river. American Girl Group. This claim was not visited owing to high water in American creek making the crossing dangerous. According to general report, there is on these claims a very considerable showing of galena or jamesonite, carrying, in places, high values in silver.

In addition to the claims already mentioned, there are, in the district, a large number of claims which it was impossible, under the circumstances, to visit, on the most of which comparatively little development work has been done. The owners of a number of these claims supplied the writer with samples of ore from their respective claims, which samples were assayed at the Government Laboratory, Victoria, and the results are given as follows, in order to indicate further the class of ore so far encountered in the district, without assuming responsibility except for the assays:—

The *Black Knight* mineral claim is situated on the east side of Portland canal, comparatively near the water. The sample received appeared to be nearly solid galena and zinblendé, with little gangue matter, and contained: lead, 43.0 %; zinc, 28.0 %; silver, 16.4 oz. to the ton.

The *Silver Bow* claim, owned by G. Starke and M. K. Rodgers, is situated about three miles up Glacier creek from its junction with Bear river, and at an altitude of over 3000 feet. The sample assayed consisted of mixed sulphides of lead, antimony and zinc, containing: lead, 17.1 %; zinc, 8.0 %; antimony, about 20 %; silver, 8.2 oz. to ton; gold 0.04 oz. to ton.

The *Roosevelt M. C.* is on Bitter creek, a tributary of Bear river, about 14 miles from Portland canal, and is owned by F. Rainey, of Stewart, B. C. The sample received assayed: lead, 24.7 %; copper, 1.5 %; silver, 20.0 oz. to ton; gold, 0.02 oz. to ton.

The *Franklin No. 1* mineral claim, also owned by F. Rainey, is located on the west side of Bear river. The samples received assayed: copper, 6.2 %; nickel, none; silver, 2.2 oz., and gold, 0.02 oz. to ton.

KEMANO RIVER.

The Kemano river flows into Gardner canal on the north-east side, 30 miles from the mouth of the canal. It is a stream of considerable size and is navigable for canoes a distance of 20 miles, but is so swift flowing as to require "poling" or "lining" all the way. At the mouth of the river there is a good harbour, with anchorage in not too deep water. The mountains, which rise abruptly to a height of 4,000 or 5,000 feet, seem to be entirely granitic and show very marked glaciation to a height of 2,000 feet or more. At eight miles from the mouth of the river, Pintledanne creek flows in from the north. From this creek there is a good trail, with an easy grade, to Tatsa lake, which in turn flows into Ootsa lake. The height of the pass is said to be 4,000 feet and the distance from Gardner canal to Tatsa lake, 20 miles. This pass seems to afford an easy route to the Ootsa lake country.

(Continued from previous page.)

This consists of a finely crystalline ground mass, evidently of quartz and feldspar, which contains phenocrysts of feldspar. The feldspar is found to have a composition of oligoclase, or some variety near the acid end of the plagioclase series. A few specks of pyrite are also present. The rock is a quartzless porphyrite."

(This rock occurs some distance above the *Mother Lode* claim, at an elevation of about 4,000 feet, and there forms an important member of the general country rock formation.)

The *Pintledanne Group* of mineral claims was staked in the spring of 1906 by Messrs. Dakin & Pocklington, of Victoria. The claims are reached from the north side of Gardner canal by following up the Kemano river to the mouth of Pintledanne creek, a tributary flowing in from the north.

There is an old Indian trail following up this creek and over the summit to Tatsa lake, in the Interior. This follows the north bank of the creek up for a distance of about $2\frac{1}{2}$ miles, when it crosses the creek to the south side and rapidly ascends the mountain, reaching, at an altitude of a little over 2,000 feet, the claims in question.

Pintledanne creek runs through high granitic mountains, which rise on either side to an altitude of 4,000 feet. On the mountain on the left side of the creek, two miles from its junction with the Kemano river, is a large and well-defined quartz vein. This is easily seen where the vein crosses the gulches which run down the mountain side. The vein has an approximate width of 100 feet and crosses diagonally in a north-westerly direction over the range, a distance of several thousand feet. On this vein the *Pintledanne Group* of claims has been staked. The vein was examined where it crossed the two gulches at an altitude of 2,000 feet above the Kemano river, and at a distance from it of about two miles. The vein is well and strongly defined, with a frozen contact with granite on the lower side and diabase on the upper side. The diabase dyke is of a later date than either the vein or the granite. The vein-matter is rather sparsely mineralised with copper pyrites, bornite and molybdenite unevenly disseminated through the mass, and it is doubtful, with the present showing on the property, whether it would pay to work. The ore, however, appears to be well suited for concentration, there is ample water power to operate a mill and the transportation problem could also be easily solved. Careful prospecting might disclose pay chutes in the vein which would materially help the property.

UNUK RIVER.

The following description of the Unuk river district is taken from the Summary Report for 1905 of the Canadian Geological Survey, the Director of which introduces it as follows:—

While investigating the geology of Southern Alaska, under instructions from Professor Alfred H. Brooks, geologist in charge, Dr. Frederick E. Wright, of the United States Geological Survey, explored the Unuk river, which flows into Behm canal, opposite Prince of Wales island. Dr. Wright's work having been principally within British Columbia, the United States Survey has generously placed his results at our disposal, as if he had done this work for our department, and they are published as a short report in the present volume.

THE UNUK RIVER MINING REGION OF BRITISH COLUMBIA.

Fred. Eugene Wright.

The occurrence of valuable ore deposits and placer gold near the headwaters of Unuk river, British Columbia, has been known in a vague way for many years, and during the past two seasons definite steps have been taken to develop its resources systematically. Interest has been shown by prospectors and miners, not alone in this locality, but also in the entire mineral belt situated along the eastern flank of the Coast Range granite and not far distant from the International Boundary line. Discoveries of ore bodies, which appear to warrant careful investigation, have been made at several points in this zone recently, notably near the head of Portland

canal, also up Unuk and Stikine rivers, and farther north near Caribou Crossing (Windy Arm). From a geologic and economic standpoint, these regions are practically unknown, and, with the exception of brief notes by Dawson (a) and Brooks (b), have not been described in detail.

In September, 1905, the writer made a hasty reconnaissance trip to one of the localities by way of Behm canal for the purpose of examining its prospects and collecting data of geologic interest. He is much indebted to Mr. J. W. Daily, manager of the Unuk River Company, for many courtesies extended, which aided greatly in furthering the investigation. During the past year the International Boundary line has been permanently established by the Commission, and the uncertainty which has heretofore existed as to its exact position thus removed.

GEOGRAPHY.

Unuk (or "Junuch" = "Dream" in the language of the Tlingit Indians) river is one of the four large transmontane streams which rise in British Columbia either beyond or well within the Coast Range, and crossing the International Boundary line, enter tide water on the Alaskan coast. Unuk river is about 54 miles in length, and with its tributaries drains the Pacific side of the Coast Range divide between Stikine river on the north and Portland canal on the south. At its mouth the river has formed a wide delta deposit which is gradually filling Burroughs bay, a deep water indentation adjoining Behm canal, about 60 miles north-east of Ketchikan, Revillagigedo island, South-eastern Alaska. The river is swift and too shallow to permit river transportation on a large scale, and is furthermore obstructed by three canyons which can be passed only during periods of low water and then by canoes or small boats alone.

At its source a narrow divide leads over to a branch of Iskut river, along which prospectors can pass and enter the rolling plateau lands of British Columbia. This natural entrance from the coast into British Columbia has long been known, and would have been used many years ago had the natural obstacles at the start on Unuk river been less formidable. Within the past three years, however, these conditions have been improved by the construction of a waggon road from the mouth of Unuk river to a prospect 42 miles inland. The road is at present 25 miles in length, and when completed will furnish easy access into the mineral belt, and thus increase its value materially.

The fiord-like valley of Unuk river is bounded by steep glaciated mountains 4,000 to 10,000 feet high, frequently rising sheer from its valley floor. It has been shown by Messrs. Spencer and Brooks (c) of the U. S. Geological Survey, that the large rivers which traverse the Coast Range are probably antecedent in character and have preserved their original drainage courses during the mountain uplift.

In glacial times the ice streams followed these same lines, scouring them thoroughly and even making deep incisions into the country rock itself, so that at present the land forms are those of an intensely glaciated region. The usual features of glaciation—U-shaped valleys, hanging valleys, glacial terraces, rounded mountain tops, glacial erratics, flutings and grooves—abound and show by their freshness that only a small amount of erosion has been accomplished since the glacial epoch. On several of the mountain slopes the work of ice erosion is still being continued by small ice streams, the last remnants of the huge ice sheets which formerly covered this entire area to a depth of over 6,000 feet.

(a.) Dawson, G. M., The Yukon District, N. W. T., Geol. Nat. Hist. Survey, Canada, new series, Vol. III., Pt. I., 1887-1888 B.

(b.) Brooks, A. H. Preliminary Report on the Ketchikan Mining District. Prof. Paper No. 1, U. S. Geol. Survey, 1901.

(c.) Spencer, A. C., Pacific Mountain System in British Columbia and Alaska: Bull. Geol. Soc. Amer., Vol. 14, pp. 117-132.

Brooks, A. H., Ketchikan Mining District, Prof. Papers, No. 1. U. S. Geol. Survey.

Along the banks of Unuk river timber of good quality occurs in occasional patches, and consists chiefly of spruce, hemlock, cedar, cottonwood, with some balsam fir trees near its head. Trees of spruce and hemlock, four to six feet in diameter, are not uncommon, and are reported by lumbermen to be of fair quality. The quantity and supply of timber are sufficient to supply mining purposes for many years. The underbrush is dense, and together with the wet climate and the malevolent Devil's club (*Echinopanax horridum*), adds to the difficulties to be overcome by the prospector.

GEOLOGY.

The geologic section exposed by the deep Unuk river cut affords an unusual opportunity for the study of the Coast Range from many different view points. In a broad way its consideration may be resolved into a study of the intrusive Coast Range granite and the adjoining belts of altered sedimentary rocks on the east and west.

The Coast Range granite belt, which is traversed by Unuk river, is a small part of an immense granite batholite (a) nearly 1,000 miles in length and 30 to 60 miles in width which extends from Fraser river in British Columbia in a north-westerly direction, parallel to the coast, to the White river basin in the Yukon district. The Coast Range granite is one of the master features of the geology of this entire coastal strip and deserves careful study, not only by the geologist, but also by the prospector, since the major portion of the ore bodies which have been discovered probably have a genetic relation to the intrusive granite (b). From evidence obtained at other points it has been shown that the intrusion of the Coast Range granite took place between Upper Jurassic and Middle Cretaceous times.

Petrographically the field term, granite, applies to only a small part of the intrusive rock types. The prevalent type is less siliceous and ranges from grano-diorite to diorite and gabbro in composition with hornblende and biotite as coloured constituents and titanite as a frequent accessory component. As a general rule hornblende appears to be more abundant near the coast, while biotite predominates near the inland border of the batholite. Near the coast the granite is also more noticeably gneissoid in aspect and contains abundant inclusions of the intruded schists near its contact. These inclusions become more and more coarsely crystalline as the contact recedes, until finally they resemble basic or acid differentiation products and are gradually lost sight of. It is a characteristic feature that while aplitic and particularly pegmatitic dikes are extremely abundant near the western contact of the granite and form an intricate network in the adjoining schist areas, they are rare and practically absent in the central parts of the massif. On its eastern flanks acid dikes occur frequently but are far less abundant than on the coastal side. The absence of minette and similar basic differentiation dike products is noteworthy and may be due to the fact that the acid dikes are pegmatic rather than aplitic in character and therefore are not, strictly speaking, differentiation products.

The importance of the pegmatites becomes apparent when their mode of formation from solutions emanating from the intrusive mass is considered. They represent only a small part of the work accomplished by the pneumatolytic solutions of the granite, and are a silent but convincing witness of the great volume of pneumatolytic solutions which accompanied the batholithic intrusion. The intimate connexion of ore bodies in south-eastern Alaska with the intrusive masses has been proved directly in several instances and is inferred in a number of the remaining deposits.

Considered as a whole, the Coast Range granite has not produced the ordinary type of contact metamorphism in the rocks which it intrudes. On approaching its western contact

(a.) See Geologic Map of the Dominion of Canada, Western sheet No. 783. Edition of 1901.

(b.) Spencer, A. C., the magnetic origin of vein forming waters in South-eastern Alaska. Trans. A.I. M.E., Vol. XXXVI., pp. 971-978.

Brooks, A. H., Ketchikan Mining District. Prof. Paper No. 1, U.S. Geol. Survey, 1901.

from the coastal side, as exposed along the shores of Behm canal, a change in the invaded sedimentary rocks is noted from slates and argillites to phyllites and mica schists and, still nearer, often to gneiss. The many types of contact hornfels are rare and spotted schists do not form an integral part of the complex. The strata are intensely folded, and were undoubtedly deeply buried at the time of the granite invasion. In that position, deep seated metamorphic forces were active, and had undoubtedly heated and altered the rocks to such an extent that the granite intrusion did not disturb their equilibrium greatly; its chief effect was rather to accentuate the process of crystallization already in force and to increase their power than to replace them by others. This coastal strip, whose contact with the granite can at present be traced only with difficulty, offers, therefore, an excellent example of the metamorphic changes produced by granite at a deep seated level.

It is significant that in the Ketchikan district no ore bodies of consequence have been found in this zone of deep seated metamorphism, while rocks farther away from the granite and at the same time nearer the surface during its invasion, frequently show traces of contact metamorphism (spotted schists and the like) and contain valuable metalliferous deposits. The folded character and lack of uniform structure of the strata near the granite contact may also account, in part, for the absence of commercial ore deposits, since they offer no decided lines along which concentration could take place as in the isoclinal schists of the Juneau district.

East of the inland border of the granite the character of the invaded rocks is noticeably different. The slates and sandstones are less altered and typical schists and gneisses are rare. Folding, and particularly faulting, are common and characteristic of the entire complex. The granite contact line is sharp, and frequently traverses the bedding planes of the invaded strata. Although its general trend is parallel to the Coast Range, the actual line in the Unuk river exposures undulates locally and crosscuts the strata at variable angles. The intruded rocks are often indurated and heavily mineralised with sulphides near the contact, and show their evidence of metamorphism by the intrusive mass.

On comparing the metamorphic effects of the intrusive granite along its western and eastern flanks decided differences are thus apparent. On the coastal side, near the contact, the metamorphism is of the deep seated type, gneisses and schists predominate, and are cut by innumerable pegmatite dikes ramifying from the granite. Mineralisation by sulphides is not pronounced. Farther to the west, and at some distance from the contact, evidences of contact metamorphism increase, as also the degree of mineralisation; valuable ore bodies have been discovered within this latter zone. Along the eastern border of the granite, on the other hand, the metamorphism is of the contact type, argillites and slates predominate, and are often indurated and heavily impregnated with sulphides. Well defined ore bodies have been found in the near vicinity of the granite contact. The geologic interpretation of these data indicates clearly that the rocks to the east of the granite were less deeply buried at the time of its invasion than those on the coastal side. In other words, the inland rocks were then above the zone of deep seated metamorphism (rock flowage), and were, therefore, profoundly affected by the invading intrusives and accompanying pneumatolytic solutions. Furthermore, the mineral-bearing solutions emanating from the granite encountered new conditions of temperature and pressure on invading the adjacent sedimentary rocks, and deposited then, as supersaturated solutions in their new environment, a portion of their dissolved contents, especially the metallic sulphides.

Although in such a large belt the phenomena of contact metamorphism are not so pronounced and concentrated as in the contact aureole of a small intrusive boss, they are more extensive and, on a large scale, equally as varied. It has been frequently observed that in a small contact aureole different contact minerals are found at different distances from the

intrusive mass and that under similar conditions an evident relation exists between a given contact mineral and its distance from the invading rocks; and in a general way this law has been found to hold true for this eastern contact zone of mineralized sedimentary rocks.

The age of sedimentary complex east of the granite has not yet been determined accurately because of insufficient fossil evidence. It is probable, however, from the work of Dawson on Stikine and Skeena rivers that they were deposited chiefly during the Palæozoic Era.

Occasional belts of included sedimentary rocks were observed within the granite belt and found to be in a highly metamorphosed condition. They vary from argillites to mica, hornblende and calc schists of various types, and occur in long bands, often intensely folded, and trending usually parallel to the course of the range. As a general rule they appear more frequently near the mountain tops than in the valley. During the past summer two prospectors located a claim, the Cheechacho, about a mile below the International Boundary line on a vein two feet wide in such an included schist band, striking east and west and dipping 50° north. The vein carries pyrite, chalcopyrite, and pyrrhotite and is reported to give low assay values in gold. The schist band is cut by numerous offshoots from the intrusive batholite and deserves mention, since it contains the only vein on which work has been accomplished within the Alaskan portion of the Unuk river section.

Of interest are comparatively recent lava flows which are extruded near the granite contact, and, following Canyon creek and Blue river valleys to Unuk river, spread over its valley floor and forced its waters over to the south wall, where they now pass by way of the three narrow canyons indicated on the map. The volcanic ash from these eruptions can still be seen as black patches on the glaciers of the mountain peaks 8 to 10 miles distant. A few miles from the mouth of Blue river, the lava has dammed the valley to such an extent that a long lake has been formed and serves as a natural settling tank into which the turbid glacial stream flows, and from which it issues practically free from sediment.

The foregoing considerations tend to show that the belt of sedimentary rocks east of the Coast Range granite is a favourable one for prospecting, and deserves thorough investigation. As the inland border of granite lies entirely on the Canadian side of the International Boundary line, the Coast Range mineral belt is in British Columbia, and locations must be made in accordance with its laws.

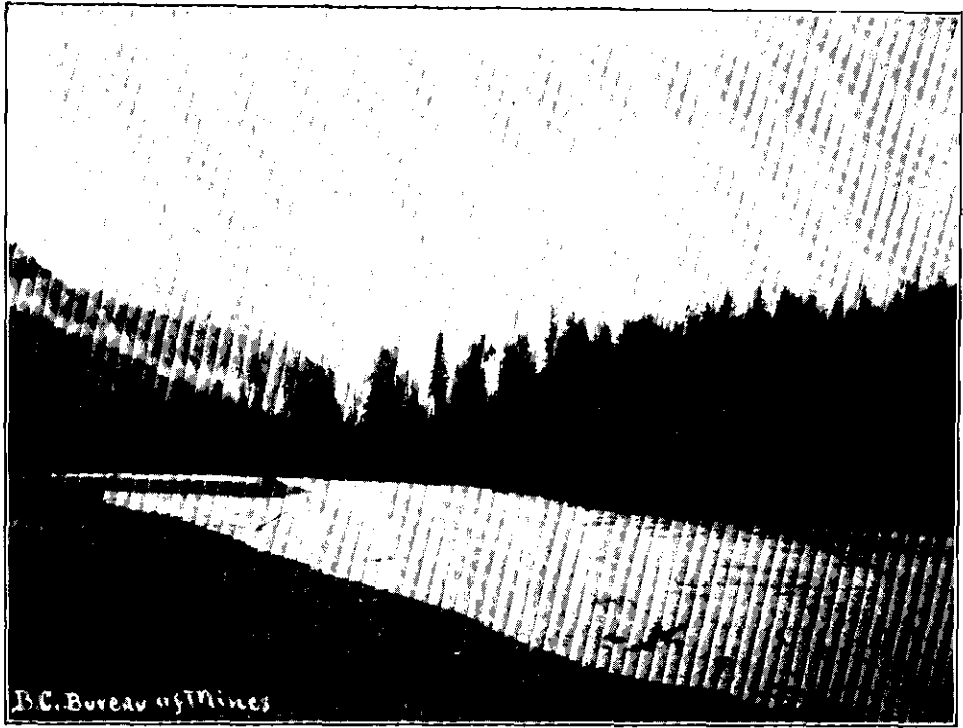
MINERAL DEPOSITS.

The occurrence of placer gold near the headwaters of Unuk river and its tributaries has been known for many years. In the earlier eighties prospectors discovered gold-bearing gravels up Sulphide creek and spent several seasons profitably extracting the gold by means of rockers and other primitive methods. The difficulties of transportation, however, were so great that they ultimately abandoned their claims. In the succeeding years occasional prospectors visited the region, relocated the placer deposits, and also discovered well mineralised veins carrying good values in silver, gold and lead. A primitive trail was built along the north bank of the river, and access to the region thus facilitated. The present waggon road follows approximately the blazes of this old trail.

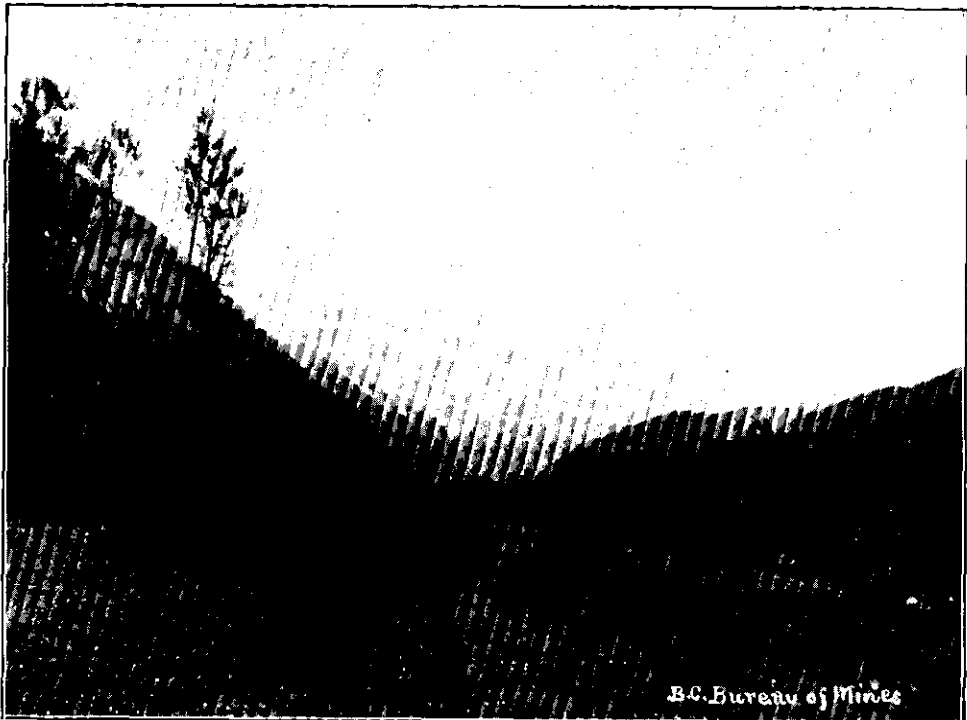
The most promising claims which have been staked are situated on Sulphide creek, and have been acquired by the company interested in construction of the waggon road. Other locations have been made near the head of South Fork, also near Boulder creek and Canyon creek.

SULPHIDE CREEK.

Recent discoveries have been made on this creek near its mouth, and consist of two veins which have been developed by several short drifts and open cuts. One of the veins outcrops along a narrow gulch and has been traced about one thousand feet up the gulch. It strikes



BEAR RIVER, PORTLAND CANAL DISTRICT, B. C.



BEAR RIVER VALLEY, PORTLAND CANAL DISTRICT, B. C.

usually N. 25° W., dips 30°-60° N. E. and varies in width from 2 to 8 inches. The vein minerals are chiefly tetrahedrite (gray copper) pyrite, sphalerite, galena and native silver; near the surface they are usually altered and enveloped in a soft ferruginous matrix of weathering products. The native silver is a product of the superficial alteration of gray copper. About 100 tons of ore are reported to have been taken from this vein and to have given high assay returns, particularly in silver. The country rock consists of altered limestone and breccia with some quartzite and slate, cut by intrusives of several types. The second vein outcrops a short distance south of the first vein, and is exposed along the face of a steep cliff where it is easily recognised by its brown oxidised coating. At the surface it appears to be 20 to 30 feet wide and is heavily mineralised in spots with pyrite, fine galena (steel galena) and occasional sphalerite and chalcopyrite. Native gold is said to have been observed in the oxidised portions of this vein which has been prospected by a short tunnel 25 feet long at 1,400 feet elevation above sea-level. The vein shows distinct banding and strikes N 5° W. with dip 80° to 85° E. A fine-grained basic dyke is exposed along the west side of the tunnel. On both these veins the development work which has been accomplished is not sufficient to permit definite statements in regard to their future. The indications, however, appear sufficiently favourable to warrant the test which the company plans to give the property in the near future.

At the junction of Sulphide creek and Unuk river the river gravels contain some free gold, and fine colours can be seen in every pan of material tested. The gold is flaky and considerably worn. No thorough sampling has yet been done and depth to bedrock is unknown. As the river valley, however, is wide and has passed through a long period of glacial erosion, it is probable that bedrock is at some distance from the surface. Local irregularities were observed in the bedrock floor near the placer gravels and similar variations may also be expected at the claims. It appears that these placers might be exploited by dredging, but large boulders are likely to be encountered.

South Fork.—Near the headwaters of South Fork, below Sulphide creek, a second group of claims has been located 16 miles above its junction with the Unuk river, on veins within the sedimentary belt east of the Coast Range granite. These claims were not visited by the writer. Well defined deposits are reported and plans for future development are contemplated.

Boulder Creek.—Below South Fork on the same side of Unuk river prospects have been located on similar veins near Boulder creek, a glacial stream, about 10 miles in length and rising near the Coast Range contact.

North Fork.—The territory drained by North Fork and by Glacier creek, two glacier-fed streams reported to be about 15 to 18 miles long respectively, has not been prospected systematically. The ore-bodies which have been discovered are similar to others in this belt, and are frequently rich in galena, with good values in silver. The same statement applies to the region near the headwaters of Unuk river.

Canyon Creek.—In the vicinity of Canyon creek several ore-bodies have been discovered, and are significant because of their close proximity to the granite contact along which Canyon creek has cut its course. The principal prospects near Canyon creek are the Black Bear claim and the Daily Boy group. The first is located on a vein 2 feet wide, outcropping along the selvage of a diorite porphyrite dike, and contains auriferous pyrite and pyrrotite. The Daily Boy group is located in a gulch adjacent to Canyon creek, on veins occurring in altered black slates, argillites and quartzites. The entire assemblage of strata is folded and faulted considerably, and is characterised by intense induration and mineralisation by sulphides, especially pyrite. On weathering they often become covered with a deep brown crust of ferruginous compounds, not unlike brown paint in appearance. The complex is cut by lamprophyric dikes

of variable width and loose contact selvages. The veins which have been discovered in this gulch contain, besides pyrite, pyrrhotite and occasionally galena and sphalerite. No development work of note has been done on either of these prospects.

SUMMARY.

The geologic cross-section exposed by the Unuk river valley, across part of the Coast Range, consists of two parts: on the west, a wide belt of Mesozoic granitic masses, formed during the same general period and grouped into one great unit, the Coast Range batholite, which on the east intrudes partially metamorphosed, and probably Palæozoic sedimentary rocks in which ore deposits have been discovered. A discussion of the type of metamorphism of this rock-complex leads to the inference that its metamorphic changes were largely due to the contact action of the intrusive granite; that the impregnation of these rocks by metallic sulphides was essentially concomitant with their contact metamorphism; that at the time of the granitic invasion this sedimentary belt was nearer the surface than the invaded strata on the coastal side of the batholite; and that the different physical conditions resulting from differences in relative position to an intrusive are important factors in determining, not only the type and intensity of metamorphism, but also the kind and degree of sulphide mineralisation.

From these considerations it is inferred that the sedimentary belt to the east of the Coast Range granite in the Unuk river section merits investigation and may reward careful prospecting for ore-bodies. The difficulties of transportation which have been encountered heretofore will be materially decreased by the completion of the waggon road to Sulphide creek. Prospectors will then be able to devote a large part of their energy to the search for and development of metalliferous veins in the region.

QUEEN CHARLOTTE ISLANDS.

Dr. R. W. Ells, of the Dominion Geological Survey, spent the greater part of the season of 1905 in examining Graham island, the most northerly of the Queen Charlotte group.

"In the work of exploration particular attention was given to the coal areas of the Interior, which were discovered 20 years ago and where several large and valuable seams are disclosed."

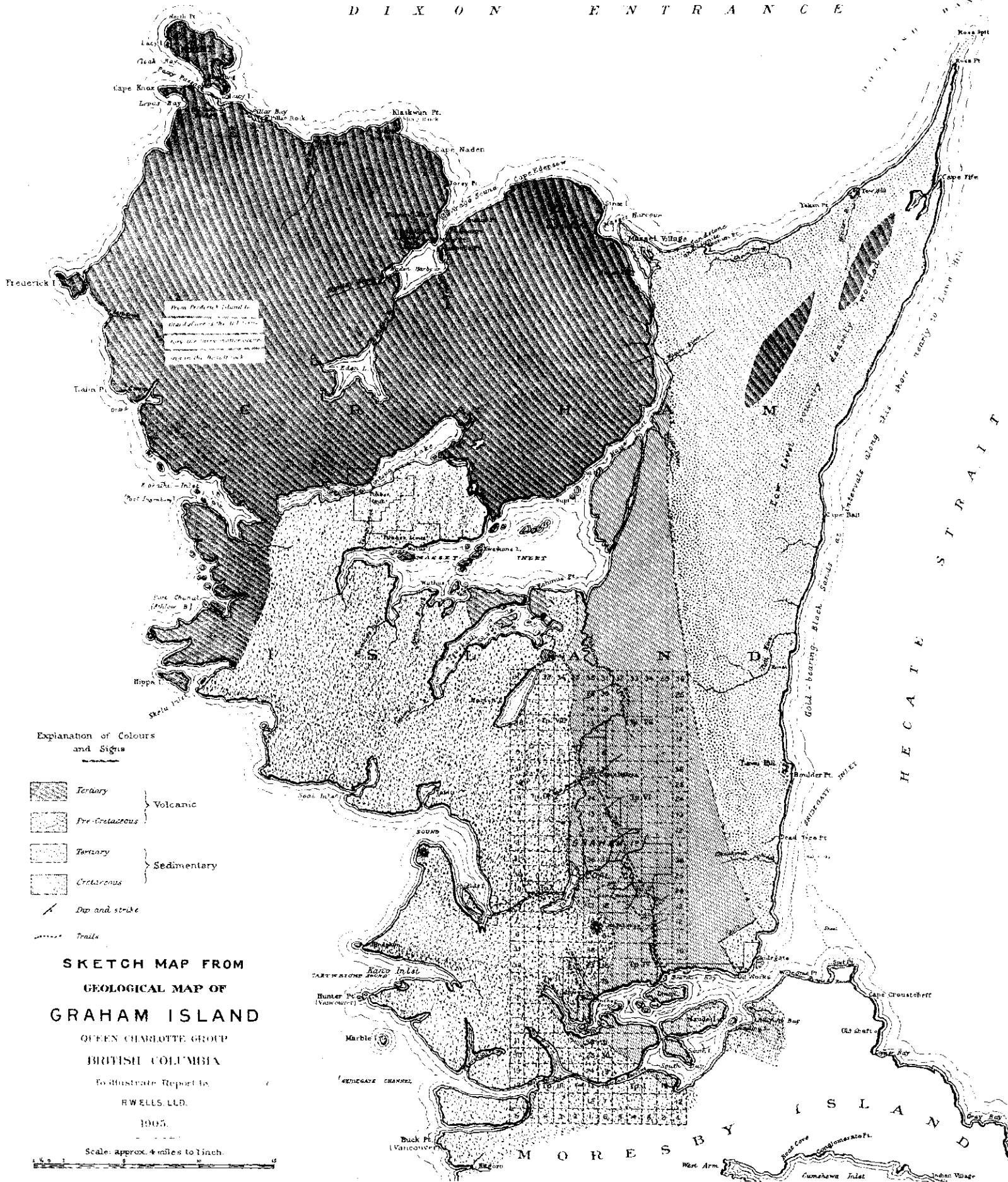
The full text of Dr. Ells' report is given in Part B of Vol. XVI., Annual Report, Geological Survey. In the first part of his report Dr. Ells gives a very full description of the island, which is too extended for reproduction here, in place of which is given Dr. Ells' summary of his trip, as contained in the Summary Report of Geological Survey for 1905, followed by his description of the geology of the island taken from his full report.

GRAHAM ISLAND (OF THE QUEEN CHARLOTTE GROUP, B. C.)

By Dr. R. W. Ells.

The greater part of the season of 1905 was devoted to an examination of the coal deposits and other possible mineral resources of Graham island, the largest and most northerly of the Queen Charlotte group of British Columbia. The party left Ottawa on May 10th, and after a week spent in a further examination of the Quilchena and other coal areas in the Nicola valley, which had been examined in detail the previous year, reached Vancouver on May 21st. Here, after hiring men and securing outfit and supplies, we sailed by the *Princess Beatrice* on the 26th, and reached Skidegate, via Port Simpson, on the evening of May 31st.

D I X O N E N T R A N C E



From Frederick Island to
 the middle of the island
 the rocks are Tertiary volcanic
 and are covered with
 sand and gravel.

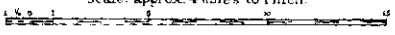
- Explanation of Colours and Signs
- Tertiary } Volcanic
 - Pre-Cretaceous } Volcanic
 - Tertiary } Sedimentary
 - Cretaceous } Sedimentary
 - Dip and strike
 - Trails

SKETCH MAP FROM
 GEOLOGICAL MAP OF
 GRAHAM ISLAND

QUEEN CHARLOTTE GROUP
 BRITISH COLUMBIA

To illustrate Report by
 R. WELLS, L.L.D.
 1905.

Scale: approx. 4 miles to 1 inch.



It was here found necessary to pack our supplies and outfit inland to the coal locations, and for this purpose a number of Indian packers were secured for several days. The first three weeks were spent in examining the coal outcrops at Camps Robertson and Wilson. The former of these is situated about eight miles north-west of Skidegate harbour, the trail taking off inland at the mouth of the Honna river, which is about four miles west of Skidegate post office (oil works), the Indian village being rather more than two miles farther east. Camp Wilson is situated about eight miles north of Camp Robertson. The trails were bad in places, the country being very rough and hilly. Several large seams were found; the shafts and tunnels, made some years ago, were pumped out, and the area was carefully studied in order to arrive, if possible, at some definite conclusion as regards the actual structure of the district. The details of this work will be published in the regular report on the resources of the island, now being prepared.

It was found impossible to force a way across the centre of the island from these camps to the head of Masset inlet and we were, therefore, after finishing our investigations on these coal seams, obliged to return to Skidegate. Here, after some delay, a fishing boat was secured, and though no one could be found who knew the western coast, and though the chart of this part of the island was practically worthless as regards details, we started from the village by way of Skidegate channel westward. This channel affords a passage for boats at high water only, and after reaching the western entrance we examined the west and north coasts as far as Masset on the north end of the island, studying on the way the so-called oil-bearing rocks south of Frederick island, and the lignite deposits of Virago sound and Masset inlet, and the coast about five miles east of the entrance.

The shores of the large lake-like expansions near the centre of the island were examined, and here our party divided, my assistant and one man with a light canoe ascending the Yakoun river to the lake at the head (Yakoun lake), a very difficult trip owing to the low condition of the water and also to the fact that, for much of the distance, the river was obstructed by heavy log-jams. It was found impracticable to take the canoe all the way to the lake, and the party, therefore, forced its way through the jungle along the stream until it struck a trail leading across to Camp Robertson, whence they made their way out to Skidegate.

After coming back with the boat to Masset village the examination of the north and east coast was continued, but owing to a very heavy and prolonged gale we were detained for ten days at Tow hill, through the impossibility of rounding the dangerous north-east corner of the island known as Rose point. The black gold-bearing sands of the east coast were examined, and they were found to extend south from Cape Fife nearly to Lawn hill, or to within about fourteen miles of Skidegate. This place was reached on August 2nd and the boat for Vancouver was taken on the 8th, that city being reached on the 13th. As there is only one boat a month to the island this was the only possible course to pursue, the stormy season setting in before we left the island.

General Geology.

The formations found on Graham island may be considered under four heads :—

I. Post Tertiary; including sands, gravels, and clays, the latter often holding marine shells and pieces of lignite.

II. Tertiary; comprising shales, sandstone and conglomerate, with beds of lignite, fossiliferous.

III. Cretaceous; shales, sandstone and conglomerate, with thin limestones, and with large deposits of bituminous coal which sometimes passes into anthracite; also fossiliferous.

IV. Igneous rocks, comprising Pre-Cretaceous and later Tertiary.

 POST-TERTIARY.

The general aspect of the sands, clays and gravels has been well described in the Report by Dr. G. M. Dawson, 1878-79, and lists of fossils collected from them at different points have been given. It will be necessary, therefore, merely to give, briefly, the leading features relating to the formation.

Along the east and north coasts the surface deposits of clays and sands are best exposed. The south and west coasts are rocky and generally rough, with high hills rising almost from the sea shore and the Post-Tertiary deposits, if ever deposited, have been largely removed.

Along the east and north shores, which are low, rock outcrops are rarely seen east of the entrance to Masset inlet. Along this part of the coast, sands and gravels abound, and are frequently underlaid by a hard, tough, bluish-grey clay, which at a distance resembles a hard, grey sandstone and from the lower part of which collections of marine shells were made by Dr. G. M. Dawson in 1878, and were determined by Dr. J. F. Whiteaves.

These beds of clay and sand are exposed at a number of places, not only along the shore line but in the interior. Their distribution has been wide-spread. Among places where their relations can be well studied may be mentioned the following:—

The shore north of Lawn point; Cape Ball and for several miles north; the entrance to Masset inlet, opposite the village; the east shore of the inlet at Watun river, eleven miles above the village; at Echinus point, about two miles west of the mouth of Yakoun river on the south side of Masset inlet expansion; the Mamin river (a small stream flowing into the inner Masset expansion known as Tsuskatli); on the north shore at Mary point, just outside the narrows of Virago sound; the shore inside, opposite the old Kung Indian village; and at Lignite brook on the east side of Naden harbour.

At all these places the characters of the deposits are practically the same. A section made of the occurrence at Mary point gives in descending order:—

Sandy layers, upper shell bed	3 feet.
Sands with pebbles having the aspect of a well solidified conglomerate,	5 feet.
Stiff grey clay, with pieces of lignite and thick deposits of shells, many of which are of large size	3 feet.
Beach with lignite pieces.	

Among the species of shells found in these deposits, those collected at Watun river, in Masset inlet, may be given as fairly representing those found elsewhere. They include *Hemathyris psittacea*, Lim. *Modiolaria Nigra*, Grey. *Saxicava rugosa*, Lamarck. *Puncturella galeata*, Gould. *Balanus*?

A very common shell at most of these places is the large variety of the clam, still found in great quantities and used for food, known as *Schizochærus Nuttalli*, some specimens of which measure seven inches by five.

An interesting feature in these clays is the frequent occurrence of lignite. The quantity observed is usually small, and from the decay of the banks it is often picked up along the shore, leading to the supposition on the part of some people that its presence in such places may indicate the occurrence of beds of this material in workable quantities. In no case where seen is this indicated by the conditions of deposit. The largest pieces found were on the bank of a small creek on the south side of Masset inlet, opposite the Indian village, where the lignite occurs in pieces up to four or five feet long and with a thickness of several inches. It is of very inferior quality and unsuitable for fuel. The occurrence at Lignite brook, in Naden harbour, is similar, but the amount of observed lignite is much less, the pieces being merely fragments picked up on the beach. At neither of these places are any sedimentary rocks other than clay exposed.

The country east of Masset inlet is usually low, or broken with occasional ridges of no great elevation. It is largely drift-covered, and rock outcrops are practically unknown. Even the streams, which are short, are cut in sand and gravel, so far as they have been examined. On the north shore, from Masset to Rose point, there is nothing but sand, gravel and boulders with the exception of the rock outcrops at Tow hill, and at two places between this point and the entrance to the inlet. The sands are often blown into great ridges which have invaded the edge of the forest growth that skirts the shore. Along the portion between the mouth of Hiellen river, at Tow hill, and Rose point, the upper part of the beach is composed of great quantities of rounded pebbles, mostly of igneous rocks, while the outer portion of the point consists of great masses of blown sand or dunes. These dunes continue south from Rose point on the east side for several miles, and, with the exception of the clay outcrops already noted near Lawn hill and Cape Ball, the sandy character predominates. Between these two places there are great quantities of boulders which extend seaward for some distance and have to be guarded against in boat navigation at low water. At the high-water harbour of Cape Fife, where a shelter for boats is formed by a projecting gravel bar, which extends northward parallel to the coast for several hundred yards, the banks are stratified sand and gravel which overlie clays containing layers of pebbles and, in places, shell beds, to a height of ten feet above high-water mark. A small lake close to the shore at this place is partly surrounded by a stratum of peat which overlies the sand and gravel.

This portion of the coast has assumed some importance in recent years owing to the presence of gold-bearing black sands that extend southward from the vicinity of Cape Fife. They were traced in this direction nearly to Lawn hill. During the past season (1905) a number of mining claims were taken up along the shore near the former place, and it is proposed to erect a washing plant for the extraction of the gold. The original source of the metal is unknown, but the present accumulation of the black and ruby sands is evidently due to the destruction of the sand banks along the shore and not from any rocks in place. The thickness of the sands, so far as could be ascertained, did not appear to be great.

Rose point, which terminates seaward in Rose spit, is one of the most dangerous places, as regards navigation, on the whole island. The sand dunes on the former extend northward for some miles and form a long area of shallows upon which, in any but a south wind, tremendous seas occur. There are occasional gaps in the sand of the spit, through which boats can pass at certain stages of the tide in calm weather, but at other times boats and canoes rarely make the attempt and much delay is often experienced before a safe passage can be effected. During our trip around this point we were delayed for ten days in the high-water harbour at Tow hill owing to the impossibility of launching a boat in the surf that broke all along the shore, and many lives have been lost in the attempt to round the spit, or through being caught in heavy weather on this part of the coast.

Indications of ice movement were observed at only one place around the island. On the shore two miles west of Skidegate post office stræ were seen having a direction of N. 40° E. or in the line of Skidegate channel, the result probably of local ice movement from the high hills to the west.

TERTIARY.

The Tertiary rocks of Graham island are divisible into two parts, viz.: the sedimentary, comprising sandstones, shales and conglomerates, with occasional beds of lignite; and the igneous, which form a large part of the western coast north of Rennell sound, and are exposed at intervals along the north shore, west of Masset inlet. The rocks of the second division will be discussed under the head of Igneous.

The general distribution of the Tertiary sediments must be, to some extent, inferred. So great is the mantle of drift, and so extensive the forest growth, that rock outcrops are rarely seen. From the evidence obtainable it would appear that the part of the island east of a line drawn from a point a short distance east of the Indian village of Skidegate, across country to near the village of Masset, is underlaid by these rocks, outcrops of which are seen at Chinukundl brook, between Skidegate and Lawn hill on the south, and at Skonun point, about four or five miles east of Masset entrance. These rocks are also seen on the north shore of Tow hill, underlying the trap rocks which form that headland, and on the shore of Yakan point, two miles west. On the east coast no rock exposures are seen, with the exception of those in the brook just mentioned and the igneous mass of Lawn hill; but, from the fact that pieces of lignite, which may be torn by storms from beds which lie out to sea, are frequently seen along this shore, it is possible that a portion of the wide passage between this island and the group of islands lying along the British Columbia coast is underlaid by the Tertiary sandstones and coals.

The character of the sandstones belonging to this formation can be well seen at the points on the north shore east of Masset. Thus, at Yakan point, two miles west of Tow hill, the rocks are generally coarse greyish quartzose grits, having a calcareous cement and holding scattered pebbles. They show much false bedding and irregularity of deposition, so that the exact dip of the formation at this point cannot be accurately determined.

Thin beds of shale also occur, both grey and blackish, on the whole similar to those seen at Skonun point on the west, except that no lignite is seen here; as a whole, however, the rocks are quite distinct from those of the Cretaceous as exposed along the Skidegate shore and about the Honna river. The sandstones are often perforated by holes, apparently the work of rock borers.

The outcrops at Skonun point, about five miles east of the entrance to Masset inlet, are mostly of a grey grit with bands of shale and conglomerate. Certain bands contain fossil shells in abundance, and plant stems occur in the shales. The rocks are seen in two ledges situated about a fourth of a mile apart and located on the beach at about half-tide. At the more westerly the dip is N. 75° E. < 15°, but in the more easterly this dip swings round to N. 40° W. < 25°. The sandstone here carries a bed of lignite of fairly good quality at the surface, though as the outcrop is seen only at low water but little can be said as to its actual value, and no analysis has been made. The thickness of the lignite varies at different points, but at one place is at least four feet. The bed dips northward, and if the formation is regular should not reappear inland; but from the statement of the Rev. Charles Harrison, of Masset, that lignite occurs in the flat country south of the beach at this place, it is possible that other deposits exist or that the bed seen on the beach is repeated by a fault, of which nothing definite can now be asserted owing to the absence of rock exposures.

The matter could be tested at small expense by hand boring, as the place is easy of access from Mr. Harrison's farm, and the whole country in this direction is low.

The four-foot bed continues along the shore for several hundred yards with a course of N. 65° E., the average dip of this portion being N. 25° W. < 30°. At the most easterly point of the outcrop the dip changes, through gradual curving of the strata, to N. 50° W. < 15°-20°.

Under the mass of Tow hill, which stands at the west side of the mouth of Hiellen river, there is at low water a good outcrop of shales, the position below the mass of igneous rock which forms the hill being well seen. These shales are brown and grey and are directly capped by the bedded trap, the surface of the shales appearing as if denuded before the trap overflow. They are somewhat altered along the contact, the reddish tint being changed to grey with a hardening of the contact layers. Ten feet west of the direct capping of the trap the shales

become almost black and contain a thin band of greyish sandstone and a conglomerate made up of pebbles of volcanic rock in a gritty paste, interbedded with which there is a thin sheet of black diabase.

Inland, these rocks have not been recognised, except by Dr. Dawson at a point on the Mamin river, near the extreme head of the Inlet and a short distance west of the Yakoun river. Here, a thin deposit of fine-grained argillaceous shale occurs, resting on basaltic rocks and holding thin layers of lignite of no economic importance. The shale has a tufaceous character and holds obscure impressions of plants, among which a coniferous twig was recognised. It was impossible for the writer to visit this place, but from their character, as described by Dr. Dawson, these rocks somewhat resemble the lowest beds seen on the Coldwater river in the Nicola valley, which are also of Tertiary age. Similar lignitic occurrences were reported, though not seen, in the area south of Yakoun lake, but these, also, can be of no economic importance.

The rocks of Chinukundl brook, north of Skidegate village, as described by Dr. Dawson are "hard, thin-bedded arenaceous clays, grey in colour, and frequently with bedding planes covered with shining micaceous particles. There are also hard, coarse, sandy beds and clayey gravels, holding well-rounded pebbles, associated with argillaceous lignite, and including trunks and branches of trees which are converted into coal-black lignite though, still retaining their woody texture. The beds on the whole appear to be nearly or quite horizontal." The description of these beds somewhat resembles that of the Post-Tertiary deposits already described at different points along the coast.

With the exception of the ledges seen on the coast east of Masset the Tertiary rocks showed but small signs of organic remains.

THE CRETACEOUS OR COAL-BEARING ROCKS.

The Cretaceous rocks of the island comprise a considerable thickness of shale, sandstone and conglomerate with thin limestone bands, the measurement of which, in the faulted condition of much of the strata and the absence of good sections, it is difficult to calculate. The Cretaceous rocks have an exposed breadth along the north shore of Skidegate harbour of about ten miles, namely, from the point west of Skidegate post office, or what is known as the "oil works," to the old Cowgitz anthracite mine.

Northward, they extend along the eastern flank of the mountain range, composed of pre-existing igneous rocks, probably to the mouth of Masset inlet, where the village of Masset is situated; but since the greater portion of this area is covered with timber and soil, and exposures are almost entirely absent, the exact line of demarcation cannot be definitely determined beyond the fact that they do not appear to occur west of Masset inlet, with the exception of a small outlier near the south end of North island, at the extreme north-west corner of Graham island. The most northerly outcrops of this formation seen in the interior of the island were certain exposures of sandstone on the Yakoun river, about midway between the lake at the head and the upper end of the Inlet; and of sandstone and conglomerate at the mouth of the Nadu river, which enters the Inlet about twelve miles from the village of Masset. Similar exposures are also seen in the channel east of the large island about one mile south of the Nadu. These outcrops help to fix the western limit of the formation, since the rocks bordering the Inlet on the west are apparently all of igneous origin.

The rocks of the Skidegate shore were described in 1872 by Mr. James Richardson, when he visited the Cowgitz mine on behalf of the Geological Survey, and later (1878), by Dr. G. M. Dawson. Large collections of fossils were made by both parties, and were supplemented

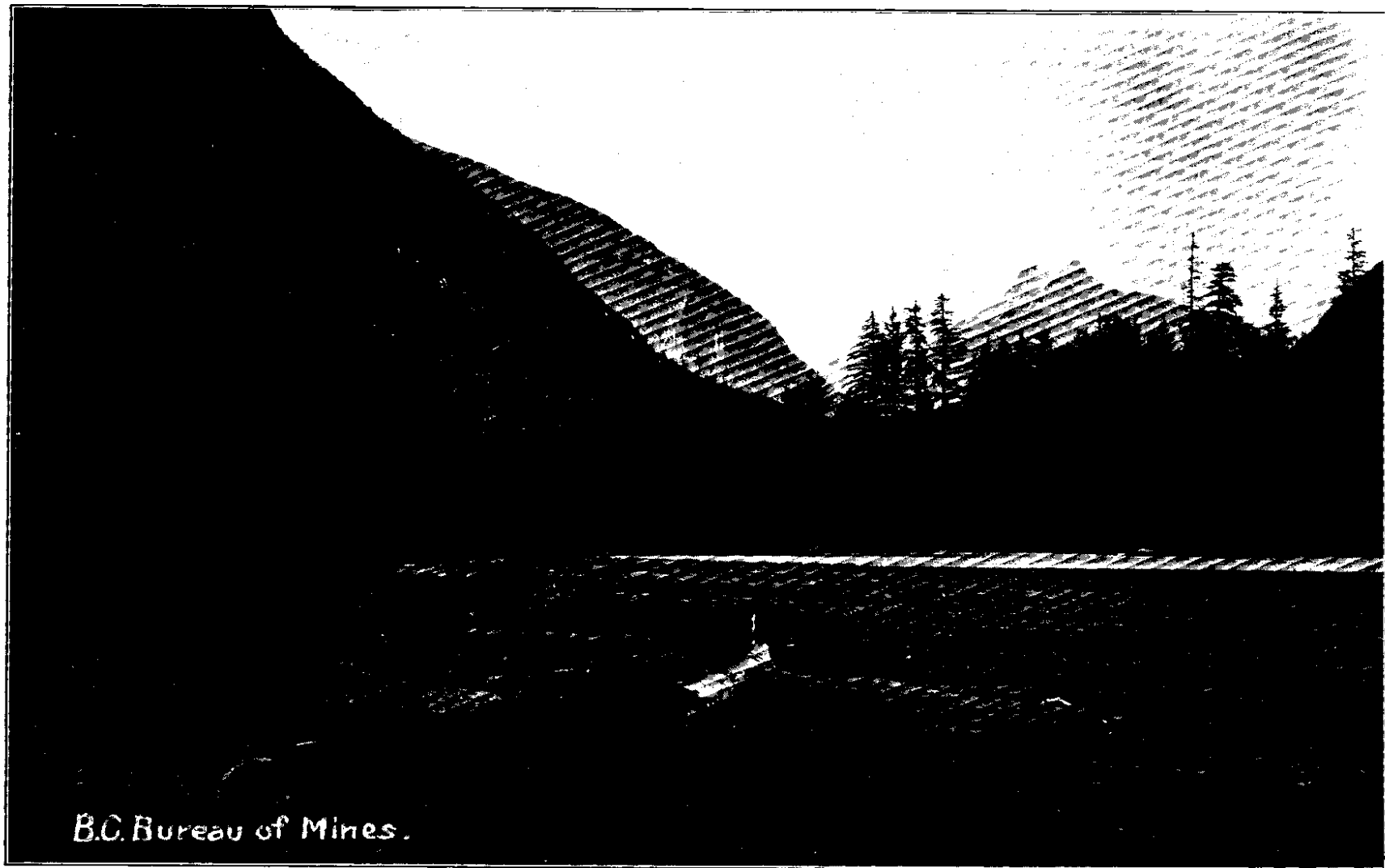
(1895-97) by Dr. C. F. Newcombe. These collections were examined by Dr. J. F. Whiteaves, and the results of his work were published in several bulletins on "Mesozoic fossils" from 1876 to 1900.

At Skidegate village there is a large area of igneous rock, comprising diabase, felsite, agglomerate, etc., which have been described by Dr. G. M. Dawson as older than the Cretaceous. These rocks extend from the point north-east of the Indian village as far west as the point beyond the oil-works at the post-office, a distance along the shore of about three miles. These are probably the oldest rocks on the island, unless we except certain small areas of sandstones, shale and limestone, which occur on several islands in Skidegate harbour, and also near the west entrance of Skidegate channel. These may be of Triassic age.

The structure of the sandstone, shale and conglomerate, which are the rocks of the Cretaceous formation along the coast west of the oil-works point, is quite simple. These rocks lie in the form of two synclines, separated near the mouth of the Honna river by a low anticline, which extends from the shore north-west up the valley of that stream. The lower beds, which rest on the igneous rocks on the east side of this basin, are somewhat coarse sandstones, with interstratified beds of shale, generally greyish, but sometimes blackish-grey. The sandy beds contain scattered pebbles of igneous rocks, sometimes of large size, mostly of a fine-grained diabase. The dip of the sediments for several miles is about S. 30° W. < 20°-30°. Ribbed shells (*Inoceramus*) are found in some of the beds, and the lists of fossils collected at different times will be found in Mesozoic Fossils, vol. I., pt. IV., 1900, pp. 305-7, by Dr. J. F. Whiteaves. Owing to the general strike of the beds in the eastern part of the shore section almost directly across the beach, and the unequal weathering of the shales and hard beds, this part of the shore is somewhat rough; but going west the sandy beds gradually decrease, and shales, with occasional bands of ochreous dolomite, come in and extend beyond the mouth of the Honna river. The dip of these beds, for a mile or more west of Maple island, is west, or varies a few degrees to the north or south, at angles of five to ten degrees. Approaching the small point a quarter of a mile east of the Honna, the dip gradually inclines to the north and at one place is N. 10° E. < 7°, showing the presence of a low anticline. In this stretch several dikes of fine-grained diabase cut the strata in a direction of N. 50°-75° E. These dikes are from two to three feet thick and sometimes stand up as walls along the beach.

Approaching the mouth of the Honna, which enters the harbour inside Lena island, the dip of the shales, which, on the small point east, is to the north at an angle of 30 degrees, gradually swings round to south-west < 30°-40°. A fourth of a mile west of the mouth of the river, near the commencement of the Narrows separating Lena island from Graham island, a heavy mass of conglomerate comes in and forms high hills to the north and a rough shore for some hundred yards westward. This rock also appears on the west side of Lena island. It separates the lower series of shales, just described, from what has been called the "upper shale and sandstone series" by Richardson and Dawson. It conforms in dip with the underlying shales and is an integral part of the series. In the lower part it contains beds of grey grit, which, by the addition of pebbles, soon passes into conglomerate proper.

The pebbles in this rock are of all sizes, and comprise granite, diabase, sandstone and shale. The conglomerate extends along the shore past the Narrows for half a mile, and then passes up into the upper series. The rocks of this upper series closely resemble portions of the lower series, and continue westward along the shore to within half a mile of Slate Chuck creek. The intervening upper shales, about midway of this distance, show a synclinal structure. They are usually greyish, but in places become reddish-brown, and are sometimes thin and papery. The dip near the intermediate conglomerate is about S. 20° W. 10°-30°.



B.C. Bureau of Mines.

KEMANO RIVER, GARDNER CANAL, B. C.

Just west of a deep bay about one mile from the edge of the conglomerate belt the shales, which have been dipping uniformly to the south-west, show local foldings, and are probably near the centre of the synclinal just mentioned. A short distance farther on, the dip changes to the east and continues thus to within a short distance of the Slate Chuck, where the conglomerates of the Honna area again appear. As elsewhere, the slates are cut across by dikes of basalt, and traces of fossils are seen at several places. The conglomerates east of Slate Chuck contain well-rounded pebbles of igneous rocks and fragments of slate, and are evidently the equivalents of the large area of these rocks seen at the Narrows, forming here the under portion of the shale synclinal. Mixed bands of slate and conglomerate with intrusive dikes extend thence along the shore to a point several hundred yards west of the creek, where they are much faulted. At the mouth of a small creek half a mile west of Slate Chuck creek the black and grey shales are sometimes much crushed. They become associated with heavy masses of the grey, coarse conglomerate that forms the shore southward to the end of the tramway in Anchor cove, which leads up to the Anthracite mine. This part of the shore is very rough. The rocks are much broken with occasional dips both to the east and west, and dikes of dark green diabase cut both shale and conglomerate. Between this part of the shore and Cowgitz mine, a distance of three-fourths of a mile west in a straight line, the black and grey shales again appear and are cut by dikes. The coal is in close proximity to the underlying igneous rocks, which extend thence westward to the west side of the island. The rocks at the mine containing the coal are much broken up and crushed, and the original lignite of the formation has been converted to the variety of anthracite there found. This is due to heat induced by pressure of the shales and sandstones against the Pre-Cretaceous igneous rock mass at the back. In fact, so great has been the crushing strain at this place that much of the coal, when mined, is found in the form of powder, and is quite useless for economic purposes, while, as in other outcrops on the island, the coal and black shale are so closely mixed that their separation is almost impossible.

Mining has been carried on at this place at intervals for many years. The original company, apparently formed in Victoria in 1865, was the Queen Charlotte Coal Mining Co. A somewhat full description of the earlier work done at the mine is given in Mr. Richardson's report (1872) and Dr. Dawson's report (1878-9). The last attempt to mine this deposit seems to have been made about fifteen years ago. None of these efforts has ever been attended with much success. The workings have long since been abandoned, and the tunnels having fallen in, any exploration of them at the present time would be very dangerous. In view of this fact, and because no information other than already in our possession seemed obtainable, no detailed examination of this mine was made during our visit. The approaches along the old tram-road from the wharf to the mine are already thickly grown over with bushes and will require considerable clearing before the place can be accessible.

Along the valley of Slate Chuck creek a band of sandstone with areas of black slate, more massive than the ordinary slates of the shore section, comes in and extends north-westward. As described by Mr. Richardson (Rep. Prog. 1872-73, p. 61), "the shale occurs in lenticular patches of two to three feet in the thickest part and from eight to twenty feet long which are interstratified with a light-grey, not very hard sandstone. In the patches occur an abundance of flattened stems and leaves, sometimes infiltrated with a greenish mineral and many thin irregular patches of anthracite sometimes a tenth of an inch thick."

This is the rock from which the Indians (Haidas) of Skidegate carve small totems and other interesting ornaments. A quarry has been opened in the slate by a Victoria company, and the material is shipped in the rough to that place and there manufactured. The place was visited by my assistant, Mr. S. C. Ells, B. A., last summer and the following description, taken from his notes, may be given :—

"Slate Chuck creek is, during the summer months, a small but rapid stream, and in high water rarely exceeds thirty feet in width. From the temperature and colour of the water, as also from the comparative shortness of the stream and the rapidity of its descent, the chief source of the water supply is evidently the melting snow that caps the high ridges on both sides of the valley.

"This valley is one of the many short indentations which penetrate the mountains of the west and south-west coasts of the island. The extreme length of the valley appears to be three and a half to four miles, and the width varies from a half to three-quarters of a mile; on the east and west sides the mountains rise to elevations of 1,500 to 3,500 feet above sea-level.

"For about half a mile above tide-water the bed of the creek consists for the most part of drift, derived partly from sedimentary, but largely from igneous rocks. In this part of the stream are a few minor outcrops of black shale, not the soft and workable variety but a more brittle rock. From this on, the rise is more rapid, with occasional falls of five to twenty feet over ledges of slate, with agglomerate and other igneous rocks.

"About two miles from the mouth of the creek, and at an elevation of 175 feet, the slate, in a soft and easily worked condition, is obtained, sometimes directly underlaid by the igneous rocks, while occasionally this, or a similar slate, occupies the bed of the stream. The slate is obtained, usually, in masses, varying in weight from a few hundred pounds to several tons. The surface of these blocks is in many cases slickensided and at times an alteration to a chloritic condition is seen. It is probable that this broken character extends downward through the main body of the slate, though in the creek bottom the slate ledges are in places quite undisturbed. Generally there is a band of agglomerate between the slates and the underlying diabase rock."

This rock was analyzed by Dr. Harrington from samples brought by Mr. Richardson, in 1872, and found to be a hydrated silica of alumina and iron, with a large percentage of carbonaceous matter, the composition being:—

Silica	44.78
Alumina	36.94
Peroxide of iron	8.46
Lime	traces
Magnesia	"
Water	7.15
Carbonaceous matter	3.18

100.51

A similar carbonaceous shale or rock is reported by Richardson as occurring in Wilkes' tunnel, at the Cowgitz mine. The shales and associated rocks just described as occurring in the Skidegate shore section are continuous northward along the valley of the Honna river, probably as far north at least as the head of Masset inlet. They also occupy the area east of the Yakoun lake and river. West of the Cowgitz coal mine they are not seen except as a small basin-shaped area along the shores of Long Arm, which extends north from Skidegate channel as a somewhat deep inlet west of the ridge on which the Cowgitz mine is situated.

These rocks rest against the igneous rocks of the west half of the island which rise in a great series of hills to elevations of over 4,000 feet above the sea. They continue up the west shore to about the middle of the island, when the hills gradually die down and the rest of the area to North island is comparatively low or broken by scattered elevations. A similar series of hills rises east of Slate Chuck creek, and include the Slate Chuck mountains, the Nipple, Mount Genevieve, etc., with elevations up to 3,600 feet. This area of igneous rocks terminates

northward in Mount Etheline, 2,540 feet high, situated several miles south-east of Yakoun lake, from the summit of which, on a clear day, an extensive view which includes a large portion of the northern half of the island, can be obtained.

This high range of mountains northward from Skidegate effectually bounds the coal formation on the west. The older or Pre-Cretaceous portion underlies the sedimentaries, but the newer and more basic, often basaltic, portions which form a great part of the north half of the island west of Masset inlet, are, as already indicated, probably later Tertiary, which have invaded the stratified rocks as well as the older igneous, and have in places spread over a wide area, though in the southern part they are confined largely to dykes and outcrops of limited extent. These tertiary volcanics, west of the Masset inlet, occupy a comparatively level country, broken here and there by high ridges, as in the area south of Naden harbour.

In the bed of the Honna, for several miles from the mouth, ledges of sandstone and shale are exposed at intervals, as also along the rough trail that follows this stream for several miles and then turns off to Camp Robertson, which is about eight miles from the shore. From this camp two other trails branch off, one leading west to Yakoun lake, three miles distant, the other to Camp Wilson, about nine miles north-west.

On the Robertson trail, after leaving the Honna valley at a distance of about four miles, the hills rise steeply, and the trail crosses the eastern flank over a mass of conglomerates, which is probably a part of the ridge seen on the shore west of Honna camp. In several of the small streams that cross the trail between this and Camp Robertson, grey sandstone and shale, usually dipping at a low angle, are exposed, the angle of dip rarely exceeding ten degrees.

On the trail from this camp to Yakoun lake, similar rocks are seen on several streams which flow northward, and a ridge of amygdaloidal trap crosses the trail a short distance before the lake is reached. Near the point where the trail strikes the shore are outcrops of a coarse yellowish grit, which extend along the shore for several hundred yards. It holds scattered pebbles of quartz, bluish-grey felsite, etc., and while bedding planes are somewhat obscure has an apparent dip of east $< 8^\circ$. These grits seem to represent the lowest beds of the coal formation at this place and to rest against the igneous rocks that rise steeply from the western shore of the lake. In character they resemble the coarse, yellowish-grey sandstones of the Nanaimo coal basin.

Going south along the east shore of the lake from the end of the trail, these grey grits are exposed for a fourth of a mile. They here overlie hard, bluish-grey, igneous-looking rocks that are probably a spur from the hill range to the south, where similar rocks are seen on Mount Etheline. South of this there are small outcrops of black shale containing a little shaly coal, with outcrops of a hard, fine-grained, green diabase, which are part of the underlying series. Still farther south, and near the south-east angle of the lake, there is a small basin of coaly shale in which occurs a small deposit of impure anthracite. This was prospected some years ago by a small shaft sunk to a depth of about six feet at a point 100 feet from the lake shore. The rocks passed through were a mixture of crushed black shale and irregular stringers of impure anthracite coal, which does not appear to be of economic value. Farther west, between the shore of the lake and Rennell sound, along which a trail, through what is called the Rennell sound pass, was partially cleared some years ago, small patches of fossiliferous Cretaceous shales occur, resting on the igneous rocks. Fossils from these deposits show them to belong to the upper part of this formation.

Yakoun lake has an elevation, by aneroid, of 210 feet above sea-level. The country to the north, through which the Yakoun river flows to Masset inlet, is low, but is bounded by high hills a short distance west of the lake and stream. Occasional ledges of sandstone out

crop along the river, and at a point about midway between the lake and the inlet the volcanics approach in a large spur from the main mass. The contact of the sedimentary rocks with the igneous is, therefore, not far distant from the west bank of the stream.

On the inland bays or lakes at the head of Masset inlet, the igneous rocks are everywhere exposed, either in ledges or in masses along the beach, and no trace of sedimentary rocks is seen in this direction south of the junction of the Nadu river. The valley of the river itself is densely wooded and almost impenetrable to one on foot. The only indication of sedimentary rocks in the area west of the river is a small outcrop of Tertiary shales with traces of lignite, recorded by Dr. Dawson as occurring on Mamin river, a tributary of Tsuskatli lake, and already referred to.

In the area between the Skidegate shore and the Yakoun lake, coal has been found in at least three places, besides the unimportant occurrences mentioned above. A considerable extent of country has been blocked out into townships and lots by the Government of British Columbia, so that these outcrops may be definitely located. Of these coal areas, the most northerly is that known as Camp Wilson, on Lot 36, Township IX.; the second large deposit is on Lot 20, Township V., named Camp Robertson, after the discoverer of the coal field, and the outcrop of anthracite on a small creek on Lot 17, Township V.; the outcrop of the last being on the strike of the Robertson seam, though the connection cannot be traced across the intervening country.

The area in which these several outcrops are located is rugged and hilly. It is covered with a heavy forest growth and is intersected by several small streams, that flow northward into the east branch of the Yakoun river. The surface is difficult to traverse owing to its generally rough character and to the impediments from fallen timber and dense scrub. The small streams are frequently almost impassable, owing to boulders and drift timber, and great care is requisite to prevent serious accidents in traversing these.

The sandstone and shale which, with occasional outcrops of igneous, are the only rocks seen in this part of the island, are similar in many respects to those seen along the Honna shore. Fossils, generally poorly preserved, are seen in some of the beds, and indicate the general horizon of the formation as Upper Cretaceous. The conglomerate on the trail to Camp Robertson probably represents the northern extension of the similar rocks seen on the shore near the mouth of the Honna, where there is an apparent anticline which should carry these rocks north-west on their strike, or in the direction of the conglomerate outcrops on the trail near the six-mile camp.

The only means of access to the mining camps at Robertson and Wilson, is by means of the trail up the Honna. This keeps close to the river for about four miles, to what is called the "Four-mile" camp, which is just at the crossing of the west branch. The rise in this distance is 220 feet, so that the fall in this part of the stream is quite rapid. Thence the trail rises quickly and passes along the east flank of a rugged and hilly country, till, in two miles, at the six-mile camp, the elevation is 900 feet, the rocks at this place being conglomerates associated with black shales and grey sandstone. From the "Six-mile" camp the trail winds around the eastern flank of the hills at elevations varying from 830 to 960 feet, to a small brook that crosses the trail about one mile south-east of Camp Robertson, at an elevation of 900 feet. This stream, named Fall creek, flows over a series of grey sandstones with bands of shale lying nearly flat; but in the next third of a mile the trail reaches the summit of a ridge at an elevation of 1,150 feet, about three-fourths of a mile east of the coal outcrops at Robertson camp. Thence it descends rather rapidly to 950 feet, which is the height of Camp Robertson above sea level. The distance from the shore by this trail is not far from eight miles; and the path is, in places, in very bad condition.

Camp Wilson can be reached by trail from Camp Robertson, a distance of about nine miles, or by following up the valley of the Honna from the "Four-mile" camp direct. Taking the route from Camp Robertson, the trail first passes over the Robertson ridge to the north, and then descends somewhat rapidly for 600 feet in a mile and a half to the valley of the east branch of the Yakoun. It then passes across a comparatively low area, till it meets the main trail from the mouth of the Honna direct to Camp Wilson, and then rises abruptly to top of a ridge 960 feet high, or a little above the level of the other camp. This is a short distance south of the half-way camp, and thence the trail descends in four miles to Camp Wilson, the height of which above sea level, by aneroid, is 180 feet. On the ridge, midway, hard, felsitic and diabase rocks of the older series outcrop along the trail, and were seen, also, on some of the small streams which cross to the north between the half-way camp and the coal outcrops. Parts of this trail, also, are difficult to traverse.

Good exposures of shale and sandstone with, occasionally, conglomerate, are seen on a number of these small brooks that rise to the south-west of the Robertson trail. In places, these are cut by dikes and masses of volcanic rock, and are, as a consequence, much disturbed, but where these sources of disturbance are absent the coal-formation rocks lie nearly flat or dip at angles of five to fifteen degrees.

The third outcrop, marked on the plan as Camp Anthracite, is on a small brook half a mile south-east of Fall creek by trail. Beds of the ordinary grey shale and sandstone are seen at the crossing, and on the stream, about 250 yards above the trail, there are other exposures of similar rock in which the coal seam is located. Work was done on this outcrop some years ago, principally by a tunnel driven into the east bank to a distance of about forty feet. The shale and coal, where opened up, were much broken, the latter, generally—from the samples seen—of impure quality, and the economic value of the deposit is small. The strike of the rocks at the outcrop is about N. 80° W., the dip north-east, at a high angle, but as the opening is on the east side of a steep gully it is probable that the surface rocks are somewhat displaced by the overlying mass of the hill. The overhanging wall appears to be a rotten shaly sandstone.

The rocks along this stream, which we have named Anthracite creek, were examined for some distance above this outcrop. At about 100 yards the shale and sandstone change the strike to N. 60° W., with an east dip. Several small partings or streaks of coaly matter were observed; the rocks are nearly vertical and the shale is much crushed. A few yards farther up, large ledges of bluish-grey sandstone, similar to the rock on Fall creek, are exposed in a small fall of 15 to 20 feet, and dip S. 10° E. < 5°-7°. It is probable that the coal of the mine on this brook is not far from the underlying igneous rock and, as in the case of the Cowgitz mine, has been crushed by pressure and altered by heat induced by rock movements.

Going south-west on this brook toward Mount Etheline similar flat-lying sandstone and shale are exposed for several hundred yards. Crossing in the same direction to the upper part of Fall brook they are again seen in broad flat ledges. The elevation of this outcrop is 1,000 feet, or 150 feet above Camp Robertson. From the upper part of this brook, still on the same course, another stream is crossed, which flows past the eastern side of Mount Etheline and enters the east branch of Yakoun river a short distance from the lake. In this also the outcrops, similar to those on Fall creek, are apparently quite regular, but approaching the mountain which is of the older igneous rock, the measures become somewhat disturbed. To the north of Mount Etheline considerable areas of peaty land occur, with small pools and scrubby timber.

From this place an ascent of the mountain was made on the east flank. It is composed for the most part of very hard, rubbly, greyish weathering felsite, somewhat flinty and occasion-

ally with a banded structure. It is a part of the underlying Pre-Cretaceous series of the island, or what has been styled by Dr. Dawson the "Vancouver series." The elevation of this mountain is 2,540 feet above sea level, by aneroid.

From Camp Robertson to Yakoun lake is about three miles, the descent in this distance being 640 feet, so that the elevation of the lake should be 210 feet. The geological features of this lake basin have already been stated. On the trail several creeks are crossed where ledges of the usual grey sandstone outcrop, the dip in the larger creek midway being N. 20° E. < 10°-12°. The rocks in this area are not steeply inclined.

Returning to Fall creek, one mile south-east of Camp Robertson, the sandstone and shale in broad, nearly flat, ledges extend down the stream for some hundred yards, and in places show the presence of shells and plant stems. At about 300 yards below the trail crossing there is a fall of 45 feet over well-bedded sandstone, with a dip of S. 65° W. < 8°, interbedded with grey shale. This is the usual character of the coal-measure sandstone throughout the district.

A good section of the rocks near the camp is afforded on a small branch of the east Yakoun stream which flows past the camp. The openings here on the main seam consist of several shafts and tunnels which will presently be described, and the containing rocks are greyish sandstone and shale, both grey and black. About ten chains east of the camp, a large bank of crushed black coaly shale is exposed, succeeded down stream by sandstone and shale, also somewhat disturbed, but with a general dip of S. 30°-40° E. Two brooks join the stream from the south near this point, both of which flow to the west of the high ridge which lies to the south-east of the camp. These both show outcrops of the ordinary grey sandstone.

The rocks along the lower part of this stream are very much broken up. Intrusions of igneous rocks are frequently seen, and several sharp anticlinals occur. Thus, a short distance below the forks of the creeks just mentioned, the shales have a dip of S. 10° W., which in ten chains further down changes to S. 30° W. < 60°, declining in a few yards to < 40° in the same direction. There is an anticline in this part of the stream, or possibly a roll in the measures. Ten chains lower down the dip is reversed to N. 40° E. < 85°, showing a sharp anticline and probable fault.

From this, down stream to the forks of Fall creek, coarse and fine sandstone with greyish shales are exposed at frequent intervals. All are highly inclined at angles 80°-90°, with much broken and faulted strata and occasional masses and dikes of newer volcanics. These tilted strata extend up Fall creek for several hundred yards, the falls being about half a mile above the forks of the stream. From this fork down to the fork of Anthracite creek, the prevailing rock is the ordinary grey sandstone, showing plant stems occasionally. These rocks are much broken up and angles of dip are high. At the forks of Anthracite creek bluish shales occur, and in a distance of fifty yards the dip of these is only eight degrees to the north-east. The shale contains numerous black, rounded concretions, having a central point of iron pyrite. The dips are irregular, and hard, broken, altered sandstones and shale extend for 100 yards to black and grey shale, with a S. W. dip 40°.

Thence down the stream for some distance outcrops are lacking, the banks being low. The descent from the mine to this place, a distance of about one mile and a half, is nearly 400 feet. The bed of the stream is in places choked with drift trees and boulders of green conglomerate, rendering walking both difficult and dangerous. Where the rocks are exposed they are usually much disturbed.

Just below a small brook from the left bank, which rises a short distance north of Camp Robertson, heavy beds of hard, green conglomerate outcrop, with well banded, grey sandstone,

dipping S. W. $< 50^\circ$, the dip changing in 50 yards to S. 60° W. $< 35^\circ$, and a fourth of a mile farther to N. $< 80^\circ$, the area being evidently affected by faults. A hundred yards below this the dip is north-east, the shales are sandy and very ochreous, and continue for some yards with the same dip and at an angle of 25 degrees. One hundred and fifty yards down the stream the angle increases to 75 degrees, and the rocks are again much broken up, and at the last exposure on this stream the dip is N. 50° E. $< 50^\circ$. Below this to the lake the banks are usually low and show no rock exposures, with the exception of a small ledge about half a mile east of the forks of the Yakoun river. The descent to the valley of this stream where the trail to Camp Wilson crosses is about 600 feet below Camp Robertson, the distance by trail being one mile and a half.

The broken character of many of the rocks along this part of the stream, which probably affects the best section across the coal-measures in the vicinity of this camp, together with the exposures of igneous rocks in association, shows that the ground in the vicinity must be greatly disturbed. This disturbance is also seen at the outcrop of the Robertson seams near the camp, where the coal appears to be cut off sharply on the south-west by a fault, and is tilted on edge along the contact for some yards. The same tilted and crushed character in the coal bed is seen in the tunnel at the eastern limit of the coal outcrop.

Between Camps Robertson and Wilson but few rocks show on the trail. On the crest of the ridge north of the former an outcrop of grey sandstone is seen, but with this exception nothing was observed till the top of the next ridge between the east branch of the Yakoun and Camp Wilson was reached. Here, in the bed of a small creek, igneous rocks, apparently of the underlying series, are exposed, and seem to indicate that a division exists between the seams of the two camps. On a creek that crosses the trail a short distance north of the half-way camp on Lot 18, Township VI., however, good exposures of sandstone and shale appear. These streams were traversed for a distance of two miles or more east of the trail, till the banks of the stream became low, and for a mile west of the trail. This stream was named Three-mile creek. West of the trail on this creek frequent exposures of sandstone, shale and conglomerate occur, associated with green diabase and hard, red-brown felsitic rock. The dips vary from north to N. 70° W. $< 10^\circ$ - 30° . The igneous rocks are well exposed for about half a mile, but above this, on the stream, the sandstones are more regular and have a dip of N. 20° E. $< 10^\circ$.

From the notes of survey of that portion east of the trail the rocks are, for the most part, sandstone with fine conglomerates; an occasional dike of volcanic rock cuts these, but is rarely seen. The dips are usually low, ranging from 10 to 20 degrees. For the first mile these are a few degrees west of north, but lower on the stream the prevailing dip is north-easterly.

About twenty-four chains east of the trail sandstone, with bands of fine conglomerate, contain particles of coal up to an inch in size, but no outcrops of coal veins were seen in the distance traversed. The formation in this direction appears to be fairly uniform, and local disturbances are rare.

The principal coal outcrops in this area are seen on Wilson creek, about three-fourths of a mile east of its forks with the Yakoun river. The seam of coal is here exposed along the creek bottom for a distance of seven chains. It is cut off by a fault along the south-west portion of the outcrop, as in the case of the Robertson seam, the lower part of the seam being tilted on edge.

East of the outcrop survey was made of this creek for over one mile. The rocks are sandstones with some shales, but no trace of volcanic rocks in place was observed. The dips were usually low, but low undulations were seen, though on the whole the strata were nowhere greatly disturbed. It is possible, however, that where outcrops are concealed such disturbances

may occur. The country along the creek is not so rugged as in the vicinity of Camp Robertson, but a high ridge, apparently of sandstone, rises to the north-east of the coal outcrop on this creek, and extends south-east from near the Yakoun river for nearly three miles.

To the north-west of the outcrop, on a small tributary of the Yakoun, there are other outcrops of shale and sandstone in which much higher dips are found; and while they conform to the general strike of the coal seam in this direction, they may also indicate the general run of the fault which is there observed. At one point near the river a band of black coaly shale was observed, with a thickness of 12 to 18 inches, but the large seam of Camp Wilson was not seen in this direction. The conditions for its extension to the south-east appear to be more favourable than in the case of the Robertson seam, while the quality of the coal is much superior. The thickness of this seam, as measured in the tunnel driven in from the creek, is $17\frac{1}{2}$ feet, with a parting of six inches to one foot of sandstone, the upper bench showing 12 ft. 4 in. clear coal. The dip of the coal in the lower part of the outcrop, or south end of the tunnel, is N. 40° E $< 75^{\circ}$. This is near the line of the fault. The dip at the edge of the fault is N.E. $< 85^{\circ}$, but at the inner end of the tunnel has become much less, in this way resembling the outcrop of the Robertson seam.

It is impossible from surface indications to determine the exact value of this coal seam. It has been opened at one place only, on the north side of Wilson creek, by a tunnel and small shaft. The seam itself is of large dimensions and the quality of the coal is excellent. It can be traced in a course S. 43° E. from the opening for about seven chains to another small tunnel, beyond which it has not been located. The underlying rock is a grey sandstone, and the overwall appears to be practically the same; but in the creek on which the opening is made, and a short distance below, there is a heavy outcrop of dark grey shale. In the creek also, forty feet above the upper tunnel, is a bed of rather coarse conglomerate of a brown-grey colour, resembling the conglomerate seen on the creek three miles to the south. In character the coal of this seam does not resemble that of Camp Robertson, and should be stratigraphically higher in the formation. It is an excellent gas coal with a low percentage of ash, in both these respects contrasting strongly with that from the Robertson seam. (*See analyses.*)

The measures seen on the creek, both to the east and west, are comparatively undisturbed, dipping usually at low angles, but with low undulations. On the creek, just by the main opening, a fault—the one disclosed in the tunnel on the seam—is seen in the sandstone. The extent of this is not known, but it may be small, since there is no change in the character of rock on either side.

The work done on this Wilson seam consists of a small drift run in from the bank of the creek directly on the crop of the coal to a distance of 47 feet, in a direction N. 10° E., the dip of the coal bed being N. E. $< 75^{\circ}$ - 80° . Midway of the distance a shaft, 14 ft. deep, has been sunk on the coal, and from the foot of the shaft a drift was made towards the creek, and at 14 ft. struck the fault already mentioned as bounding the coal on the south. A side drift was also run across the seam westward for only a few feet, so that but little work has been done on the area.

As for the coal itself, the contact with the foot-wall of sandstone is, as already indicated, by a fault and at an angle of 85 degrees. The seam itself measures from the bottom upwards.

	feet.	inches.
Coal of good quality	4	
Grey sandstone parting	0	6
Coal of fine quality with parting of 2 inches sandstone	12	6
Sandstone roof		

The thin parting as seen in the cross-drift dies out in the direction of the creek.



B.C. Bureau of Mines

PINTLEDANNE PASS, LOOKING EAST.
(Between Kemano River and Ootsa Lake, B. C.)



B.C. Bureau of Mines

LOOKING UP THE KEMANO RIVER, B. C.

The analysis of this coal, as made by Dr. J. T. Donald, of Montreal, is :—

Moisture	2.47
Ash	2.92
Vol. Comb.....	35.25
Fixed Carbon	59.36
Coke firm and coherent.	

Two chains west of this opening, on the strike of the seam, a small drift was run into the bank in search of the coal, but failed to find it. It is probable that in this distance it has been displaced by the fault.

The coal at Camp Robertson presents somewhat different features as contrasted with that just described. It has been opened along the creek for a total distance, measured from the first shaft at the west end to the end of the tunnel on the east, of 295 feet on a course 127 degrees. In this distance four small shafts have been sunk and two drifts.

In shaft No. 1, which is nearest the camp, there is a large body of coal and shale, the width of which, at surface, is from 20 to 24 feet. The lower edge of the coal is vertical, resting against a grey sandstone by a fault plane. Of this entire thickness of coal and shale the portion opened up by the shaft is about as follows :—

	Feet
Coal at bottom	4
Sandstone parting	1
Coal	2
Coal, with small partings of shale mixed	2

This probably represents the lower portion of two seams which appear to exist in this area, the exact relations of which are not easy to determine at one point merely. To ascertain as clearly as possible the actual conditions of the coals at this place, as to which some discrepancy of opinion exists in the several reports on the property by mining engineers, a careful examination was made.

A measured line was run from No. 1 shaft to the entrance of the tunnel on a course of 127° for 295 feet. Another shaft, to the south of the camp about 175 feet west of shaft No. 1, found no coal, probably being to the south of the line of fault, which can be traced from the first shaft into the tunnel on a course S. 65° E.

The tunnel at the east end of the outcrop was driven on a course of 76° for 82 feet, or at an oblique angle to the run of the coal, and later, was continued on a course of 5° for about 60 feet. In the latter course, at 10 feet, the lower seam was struck, the angle of dip at bottom being 75 degrees, indicating a fault; the dip speedily declined and in a distance of 14 feet was only 37 degrees, the coal and shales being much crushed. The thickness of this seam of coal and shale is about 12 feet 6 inches, of which the amount of coal will total about 8 feet. A large part of the seam near the outcrop is badly broken up, the coal and shale being crushed together. In general character this lower seam corresponds quite closely with the lower portion of the seam disclosed in shaft No. 1.

The second, or upper seam, as seen in the tunnel, is separated from the lower by about eight feet of shale. The dip of 37 degrees in the upper part of the lower seam decreases to 16° at the bottom of the upper seam, the measures flattening out rapidly. The inner end of the tunnel could not be reached owing to water, but the seam as measured gave :—

	Feet	Inches
Coal	1	3
Shale parting.....	1	1
Coal	5	0

The last is, in places, mixed with shale, owing, apparently, to local crushing.

It would appear, therefore, that the two seams seen in the tunnel, when traced westward to shaft No. 1, approach each other, and the shale parting becomes much less. This feature is seen in a small shaft and tunnel, No. 3, nearly midway. Here the dip of the coal at the entrance of the slope is N. 15° E. < 37°, agreeing with that of the top of the lower seam at the tunnel, with a bunch of coal next the foot-wall, but this part of the seam was not proved at a lower depth. Then come black and brown shales to the back of the tunnel, a distance of about 15 feet, when the tunnel turns to the right and continues for 15 feet more. This is in coal, the thickness of which could not be ascertained, but 30 inches could be seen. The dip appears to incline to the east, and decreases in angle, so that it appears the principal excavation here, in No. 3, is above the lower seam seen in the tunnel, and penetrates the upper seam without passing through it. It thus tends to confirm the identity of the two seams at this camp.

In view of the fact that a considerable sum of money has been spent at this place, it is to be regretted that its expenditure has not been carried out on a more scientific basis, since far more intelligible results, as regards the structure of this part of the field, should have been obtained. The difficulty in bringing in supplies and machinery from the coast, with the appliances available, was, however, great, and the actual location of the outcrops, at a time when the whole place was densely forested, was almost an impossibility. A couple of boreholes, well placed, would have been more economical, in the circumstances, and would have given more actual information as to the extension and condition of the coal seams that have already been located.

It will be seen from the above remarks that a large area of coal exists at both Camps Robertson and Wilson. The extension of the seams at either place can only be ascertained by borings, but it seems probable that the Robertson seams form a basin separate from the Wilson area and bounded on the east by the high ridge between the two camps. This would indicate a strong probability of finding seams in the valley of the east branch of the Yakoun. East of the outcrop of the Wilson seam, the regularity of the measures, in so far as they could be seen, indicates conditions favourable to the occurrence of coal, but, in the absence of exposures, such probability can only be assumed.

The extension of the Robertson seams in the valley of the Honna is also quite probable. The sandstone and shale, where seen in that area, between the mouth of the Honna and the creeks which flow west into the Yakoun, are comparatively undisturbed though the lack of exposures here also interferes with the determination of this problem. Along the north shore of Skidegate harbour, east of the *Cowgitz* mine, there is also an extended area of the shales, etc., of the coal formation, and while outcrops of coal itself are not disclosed at the surface, it seems possible that the anthracite of the *Cowgitz* mine should be found in a less altered condition at some point between this place and the igneous rocks west of Skidegate. This also is a matter to be determined by judicious boring operations.

The question of shipping facilities is also a very important one as regards the future development of this coal field. There are only three places where these can be found, viz., first, at Skidegate on the south; second, by way of Masset inlet on the north, and third, from Rennell sound on the west coast.

In the present practically unsurveyed condition of these termini, but little can be said as to choice of route, but in any case a railway will have to be built in order to reach a seaboard.

The conditions for the occurrence of lignite in economic quantities from the Tertiary rocks of the eastern portion of the island are not very favourable. There are no shipping ports available on the east side, while the presence of the lignite itself has only been ascer-

tained on the north shore, east of Masset, below high water mark. The statement is, however, made by Rev. C. Harrison to the effect that the lignite exists in the flat country adjacent to the south, but no information as to quantity or quality can be ascertained. In fact, to determine actual conditions in this respect, a systematic series of borings will have to be made under proper direction at well selected spots.

The analysis of the coal from the Robertson seam shows it to differ in a marked degree from that of Camp Wilson. From a specimen examined by Dr. J. T. Donald, of Montreal, the following result was obtained:—

CAMP ROBERTSON, LOWER SEAM, 1905.

Moisture	1.33
Vol. com.	35.25
Fixed carbon	48.89
Ash	20.85
	100.00

An analysis of the coals from the seams at Camps Robertson, Wilson and Anthracite, from samples furnished Dr. G. M. Dawson by the first explorer of the area, Mr. W. A. Robertson, gave the following results:—

	Water.	Vol. Combust.	Fixed Carbon.	Ash.
Camp Robertson	0.80	23.27	51.39	24.54
Camp Wilson	1.06	43.48	46.01	9.45
Camp Anthracite	1.52	8.69	80.07	9.72

An analysis of the coals from these two camps from specimens obtained during the past summer has been made by Mr. M. F. Connor, in the laboratory of the Geological Survey, and is as follows:—

	Camp Robertson.	Camp Wilson.
Moisture	1.20	1.91
Volatile matter	29.13	35.24
Fixed carbon	47.52	59.39
Ash	22.15	3.46
	100.00	100.00

No. 1 yields a firm coke and yellowish-grey ash.

No. 2 yields a more friable coke and ash of a light red tint.

M. F. CONNOR.

February 3rd, 1906.

An analysis by Dr. Harrington of the anthracite from the *Cowgitz* mine, from specimens collected by Dr. Richardson, gave:—

Water	1.60
Vol. comb.	5.02
Fixed carbon ..	83.09
Sulphur	1.53
Ash	8.76
	100.00

A second sample from the so-called 3-foot seam gave:—

Water	1.89
Vol. comb.	4.77
Fixed carbon ..	85.76
Sulphur	0.89
Ash	6.69
	100.00

A sample from Camp Anthracite inland gave:—

Water	1.52
Vol. comb	8.69
Fixed carbon	80.07
Ash	9.72
	100.00

As for the probable occurrence of coal in the Cretaceous area outside of the territory possessed by the Victoria syndicate, which controls some 30,000 acres to the east of Yakoun lake, it can only be said that there is no apparent reason why seams of coal which may be the extension eastward of those already known to exist on the property of that company, may not exist. Owing, however, to the difficulty of obtaining outcrops over the greater portion of the district, such exploration to determine the presence of coals in workable quantity can only be economically carried on by means of boring, in which case the cable drill will possess some features superior to the diamond drill, owing to the comparative cheapness with which it can be operated in such a wilderness country.

The only place where the Cretaceous rocks were seen outside of the principal area which extends across the eastern centre of the island was an isolated patch on the south-east corner of North island. Here shales and sandstones with conglomerates, precisely similar to the sediments seen along the north side of Skidegate channel, in the vicinity of the Honna river, are exposed along the shore for nearly a mile. They dip generally S. 50° E. < 30°-40°, with a roll midway to where the dip is changed for 100 yards to N. 60° E. At the northern end of the basin the shales pass beneath a mass of coarse greyish conglomerate which exactly resembles that at the Narrows west of Honna, and which there marks the base of the upper series of shales and sandstone of Richardson. These conglomerates contain pebbles of granite, hard fine-grained diabase, hard altered slate, quartz, etc., with inter-stratified beds of coarse grits. These beds extend south-eastward to the eastern entrance of the main channel between the two islands, but here they are badly mixed up with the later Tertiary eruptive rocks. In this area their distribution has been defined by Dr. Dawson (Rep. 1878-79). No trace of coals was seen in this area, which is very limited, and apparently of no economic importance.

IGNEOUS ROCKS.

The rocks of the west coast, and, in fact, of the greatest portion west of a line drawn from the mouth of the Honna to Masset, are included under the head of Igneous. These are divisible into two classes, viz., those of Pre-Cretaceous and those of the later Tertiary. The former are the extension of the coast rocks of Vancouver Island and the greater part of the southern islands of the Queen Charlotte group, named by Dawson the "Vancouver series." They comprise large areas of green, generally fine-grained, diabase, felsitic rocks, sometimes porphyritic, agglomerates, etc., with which in places are limestones which contain traces of fossils, though generally of but little value for determination of horizons. These igneous rocks are the oldest known on this part of the coast. They certainly underlie the Cretaceous rocks which have just been described, and may therefore be regarded as older than that series. They are penetrated by dikes and sometimes by large masses of granite, as well as by blackish green diabase rock, which is more recent than the Cretaceous shales.

In these rocks, which come across from Moresby island, traces of copper were observed at several points. The mineral wealth of the series, however, appears to be small, and nothing of importance was seen in any part of the island. These rocks occupy the southern portion of the western half of the island to the vicinity of Hippa island, when the country becomes gradually lower and the rocks of the second series appear in increasing volume.

The second group of igneous rocks is for the most part of the age of the later Tertiary. They not only cut the Cretaceous shale and sandstone, but in places rest upon the Tertiary sedimentary shales, as at Tow hill and several other points. They are generally basic, often basaltic, dark green somewhat rough trap rocks, in places showing an apparent bedded structure, but roughly divided into four-square blocks. In places, as at Tow hill, the lower portion of the mass, which has a height of 275 feet, is bedded in sheets or layers of one foot to eighteen inches thick, while the upper part is of the columnar variety to the top of the exposure.

The columnar form is well seen at a number of places along the northern half of the west coast, and at some points on the southern sea-board, as along the western entrance of Skidegate channel. In the islands of Masset inlet, volcanic conglomerates are met with, frequently interbedded with columnar trap flows, and at one island near the lower end of the inlet expansion the rocks contain masses of obsidian. The northern portion of this inlet expansion, from the entrance past the Big island to the head beyond the Ain river, shows frequent exposures of the latter diabase, which cuts across the Pre-Cretaceous igneous rocks and forms large masses. In places these bedded newer volcanics strongly resemble at a distance roughly bedded sandstones, but their crystalline character is easily recognised on closer inspection. No minerals of economic importance were seen in the rocks of this newer series.

On the west shore of the island, between Frederick island and Tiahn point, a distance of about ten miles along the coast, these rocks are well exposed, and form a very large portion of the shore. An interesting occurrence in this locality is the presence of thickened petroleum, now in the form of a viscous tar, which fills cavities in the blackish diabase, and which, when the rock is broken, can be drawn out into strings. There are no indications of sedimentary rocks anywhere in the area. About ten miles in length of this part of the coast was taken up as a mining district during the past summer (1905), the object being a search for petroleum. The preliminary investigations were not attended with any great measure of success.

THE TELKWA MINING DISTRICT.

BY W. W. LEACH.

(From Summary Report Geological Survey, 1906.)

In accordance with your instructions, I left Vancouver on May 25, travelling to the Skeena river by way of Ashcroft and Quesnel, this route having been chosen in preference to that via the coast and river on account of the reported scarcity of men and horses in the Bulkley valley.

THE BULKLEY VALLEY.

It is only within the past few years that much attention has been paid to prospecting in this region, at least in regard to quartz and coal, as the whole of this country has previously been run over by prospectors in search of placer gold. In recent years, however, many claims have been staked at various points in or adjacent to this valley; the most important localities being the Babine range, the headwaters of the Zymoetz or Copper river, and on the Telkwa river and its tributaries. It was considered advisable to confine operations for this season to the last-named district.

The Telkwa river joins the Bulkley at a point about sixty miles above Hazelton (at the mouth of the Bulkley), where the new town of Aldermere is situated. The only means of communication with the outside world at present is by pack trail either to Quesnel, 300 miles to the south, or to Hazelton and thence down the Skeena to Essington by river steamer; as, however, the Skeena is navigable only at certain stages, this route cannot always be depended on.

At the junction of the Bulkley and the Telkwa rivers, the former occupies a wide valley, the river itself being confined to a narrow secondary valley cut through gravel terraces to a depth of from 100 to 150 feet. The Telkwa valley is also terraced for a distance of about 20 miles, when the bottom of the valley rises above the level of the terraces.

About 30 or 40 miles west of the Bulkley lies the main Coast range, an exceedingly rugged and alpine chain of mountains, flanked on the eastern slopes by a series of volcanic ridges in which the Telkwa takes its rise. These ridges give the general impression of a desiccated plateau with a general and gentle slope towards the south and west, showing precipitous faces towards the north and east. The topography generally is very irregular, the various streams, as a rule, heading in comparatively low passes and following erratic courses to the main valleys, leaving in many cases isolated areas of flat-topped mountains.

The Coast range itself presents an unusually unbroken front, stretching in a continuous array of sharp and jagged peaks as far as the eye can see in a north-westerly and south-easterly direction. Numerous and large glaciers are constantly in view along the eastern slopes of the range.

GEOLOGY.

The rocks of the Telkwa valley may be roughly subdivided into four main divisions consisting, in ascending order of:—1st. The crystalline rocks of the Coast range. 2nd. A great thickness of volcanics. 3rd. The coal-bearing beds; and, 4th. A series of eruptives more recent than any of the above mentioned.

Of the first little can be said; they constitute the back-bone of the Coast range and where seen consist of gneisses, schists, granites, etc., but were in no case closely examined.

Younger than these, and overlying the greater part of the Telkwa watershed, is a great series of volcanic rocks consisting chiefly of tuffs, agglomerates, andesites and other flow rocks. These rocks are more or less regularly bedded and vary greatly in appearance in different parts of the field. No attempt was made to ascertain their thickness, but it is probably not less than 5,000 feet. These rocks probably belong to what Dr. Dawson has named the 'Porphyrite group' (Report of Progress, 1876-77, p. 90, and Report of Progress, 1879-80, p. 101 B.) of the Cretaceous, but, as no fossils were found this season, no evidence of their age beyond their lithological resemblance to those described by Dr. Dawson is forthcoming. Generally speaking, it may be said that red colours predominate towards the top of the series, the beds consisting of reddish andesites, breccias and tuffs, in many cases amygdaloidal with inclusions of calcite and zeolites. Green is the characteristic colour of the base of the series, the beds being composed largely of fine-grained greenish feldspathic rocks, often amygdaloidal and containing much calcite and epidote.

These beds are important, inasmuch as the majority of the mineral claims which have been staked in the district are located in them.

Immediately overlying these rocks and possibly unconformable to them, although both have been subsequently folded and faulted to such an extent that their immediate relationship to one another is somewhat doubtful, occurs a series of rocks composed chiefly of clay shales and containing a number of important coal seams. The lower member of these beds consists

of a coarse, loosely-cemented conglomerate mainly composed of pebbles of the underlying volcanics, in places shading into a close grit and not more than 60 feet in thickness in any place seen, but on account of its characteristic appearance and permanency throughout the field it affords a very valuable reference horizon when prospecting for coal. This is followed by some thin clay shales, with a few soft, thin, crumly beds of light-coloured sandstone succeeded by more clay shales and coal, the shales being often carbonaceous and containing many beds carrying numerous yellow-weathering clay ironstone nodules. These are the youngest sedimentary rocks represented in the district and, although not of great thickness (in no case seen showing more than 300 feet in all), they are of considerable importance on account of the coal contained therein.

All of the above rocks are cut by a series of eruptives consisting of coarsely crystalline porphyritic rocks which have thrown out dikes in all directions and have crumpled and dislocated the volcanic flows and coal-bearing strata along their contact to a very great extent. Their importance is great as they have apparently afforded a channel for the ascent of the mineral-bearing solutions, as it is along their contact with the volcanics that practically all the mineral claims have been staked. Their influence on the coal has been very great, as it has been found that, as the main eruptive areas are approached, with the resulting increased disturbance of the strata, the coal becomes much more anthracitic in character. The coal seams themselves have been cut by numerous dikes, in many cases accompanied by faulting; a fact which will materially affect future mining operations.

COAL.

The problem of delimiting the coal areas in this district is one of extreme difficulty. The exceeding soft nature of the coal-bearing rocks, and their consequent failure to resist erosion, has resulted in their removal everywhere from the higher ridges, only a few isolated patches remaining in the valleys. The total thickness of the coal formation being small, probably not in excess of 300 feet, and the folding and faulting being considerable, it is probable that even in the lower valleys the volcanic rocks occupy a large extent of the area, the coal rocks having been removed by denudation; this is proved to a certain extent by the volcanic outcroppings in various places in the valleys of Goat creek, Mud creek and the Telkwa river, usually brought up by the action of faulting but in several instances cropping along the axis of a denuded anticline.

The only natural exposures are to be found in the creek bottoms in a few places where the streams have cut through the heavy covering of drift of the wide-terraced valleys. Away from the creeks no exposures need be looked for until the higher ridges are reached, and these are, in all cases, composed of volcanic rocks, the contact being invariably masked by a drift covering. It will, therefore, require very close prospecting before the extent of the coal areas is proved.

There are, at present, four companies holding coal locations in this neighbourhood, all of which have done some prospecting in a desultory nature.

The Cassiar Coal Company, whose property lies in part on Goat creek, a large tributary of the Telkwa from the south-west, have stripped several seams about six miles up that stream. The following section, in descending order, was measured by the writer, in 1903:—

	Feet	Inches
Clay shale		
Top seam—		
Coal, with a few small clay partings	12	0
Clean coal	7	7
Clay	2	0
Grey, sandy shale, and covered, about	30	0

	Feet.	Inches.
Middle seam—		
Coal	1	5
Clay shale	2	7
Coal, with a few irregular clay partings.....	14	5
Shale, with ironstone nodules	3	3
Coal	2	0
Grey, clay shale, with nodular ironstone bands, about.....	50	0
Bottom seam—		
Carbonaceous shale and coal.....	2	0
Coal	1	5
Shale	0	5
Coal, with small, irregular, clay partings.....	9	0
Clay shale.....		

Analyses of the above coals gave the following results:—

	Moisture.	Vol. Com., Mat.	Fixed Carbon.	Ash.
1. Lower 7 feet of top seam.....	1.92 %	30.45 %	61.30 %	6.33 %
2. Lower 7 feet, middle bench, middle seam	4.70	30.40	60.80	4.10
3. Middle bench (14 ft., 5 in) middle seam	6.60	29.00	56.90	7.50

No. 3 analysis is by the British Columbia Provincial Assayer (*See Report of Minister of Mines, B. C., 1905*). No. 1 gave a dense and non-expansive coke, while Nos. 2 and 3 were non-coking. No. 3, the only one of these tested for sulphur, showed 0.52 per cent.

This coal should make an excellent fuel, as it is fairly hard and well able to stand considerable handling without much loss in slack; it is, however, apparently not suited for the manufacture of coke.

The strata here dip irregularly at low angles and show several small faults.

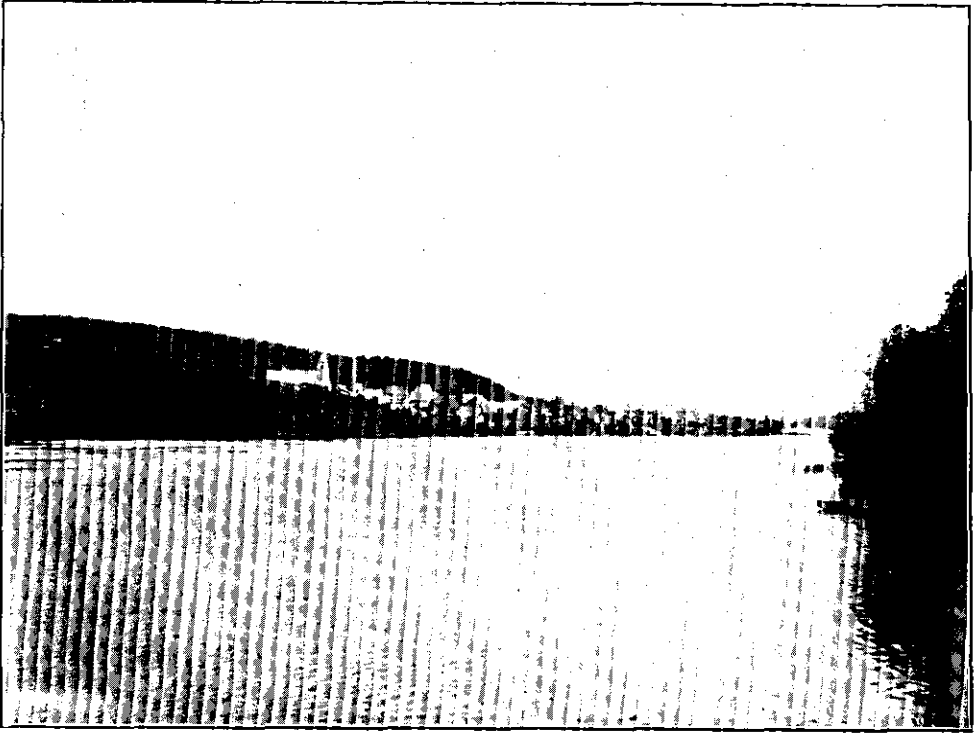
A short distance above these openings, in a high cut bank, what are probably the same beds are seen, but, in this case, it appears that the two upper seams have been burnt, leaving in their place thin beds of ash and slaggy material, and colouring the neighbouring shales a brick red. A fourth seam overlies the other outcrops at the top of the cut bank; it shows about two feet of coal, but no regular roof was seen, the present overlying material being the gravel wash of the terrace. It does not seem probable that the burning extends over any large area here, as there is no further sign of it higher up the creek, although a couple of miles down Goat creek a similar occurrence was noted.

These exposures give what is probably the best section of the coal measures in the district, about 200 feet of strata being uncovered between the creek bed and the top of the terrace, but it is by no means complete.

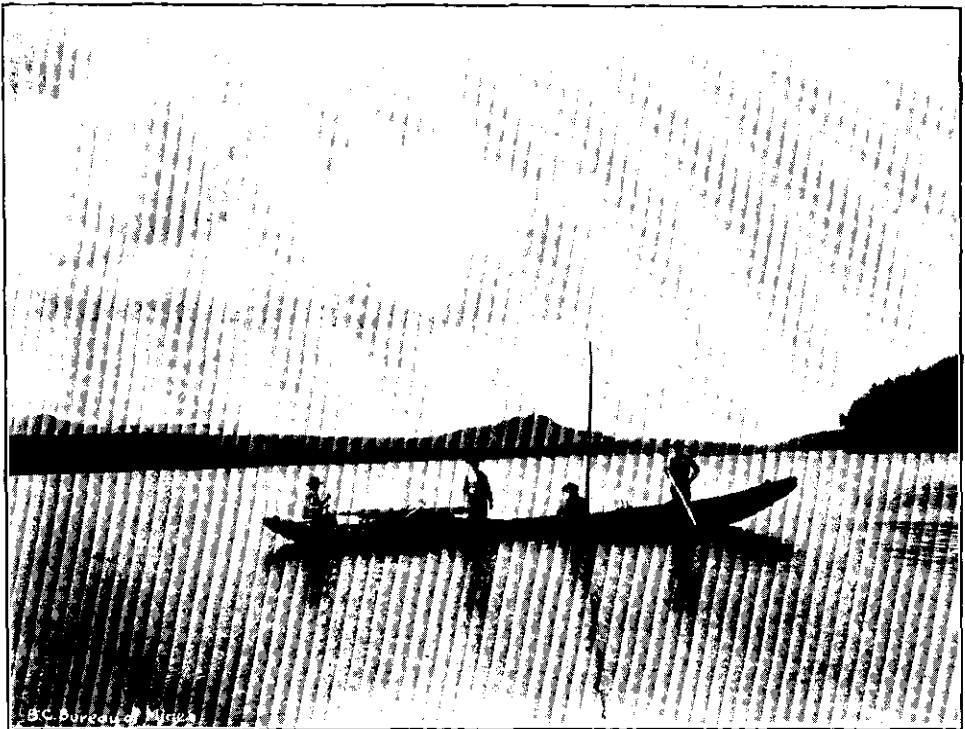
Several other small coal exposures were seen on the property of this company farther down Goat creek, but no other work of any extent has been done.

To the north and west of this property a number of locations are held by the Kitimat Development Syndicate. No work has been done beyond merely surface stripping at various places. On Mud creek, a branch of Goat creek from the south-west, near its mouth, and on the Telkwa river a few miles above the mouth of Goat creek, the coal has been exposed by the action of the streams; several good seams are uncovered, of a nature very similar to those of the Cassiar Company, but in all cases are subject to faulting as elsewhere in the field.

The coal lands of the Transcontinental Development Syndicate are situated on Goat creek above those of the Cassiar Coal Company. During the past season two prospecting tunnels have been driven and a shaft sunk with the intention of proving the number, size and



BABINE VILLAGE, B. C., AND OUTLET OF BABINE LAKE, LOOKING SOUTH.



ON BABINE LAKE, B. C., LOOKING NORTH.

condition of the seams at this point. At the time of the writer's visit No. 1 tunnel had been driven a distance of eighty-five feet across the strike of the measures, the strata here dipping at about thirty degrees. Three seams had been cut, in ascending order, four feet, three feet three inches and four feet, respectively, in thickness.

No. 2 tunnel, seventy-six feet in length, also cross-cutting, had passed through two seams, the lower six feet and the upper four feet thick. The roof of the six-foot seam is missing, a fault having cut through the seam here, but it is probable that this is the same bed that has been shown in a natural exposure a short distance down the creek, where about ten feet of coal is in sight.

No. 2 tunnel cuts the strata at a slightly higher horizon than No. 1, and it is possible that other seams exist between the end of No. 1 and the entrance to No. 2.

Near the entry to No. 1 tunnel a shaft had been sunk to a depth of twenty-three feet to prospect the strata at a lower horizon than could be reached by the tunnels, but no coal had been found.

The coal measures at this point being nearer to the later eruptive areas are more highly flexed than those farther down Goat creek, evidences of faulting are abundant, and the basin has narrowed down to a great extent. Although in all probability the same seams are represented here as those mentioned before on the Cassiar Company's land the character of the coal is entirely different, as the following analyses show :—

	Moisture. %	Vol. com. mat. %	Fixed carbon. %	Ash. %
1. Seam 2 ft. 4 in. 200 feet down creek from No. 1 tunnel (non-coking)	0.80	8.20	81.60	9.40
2. Six foot seam of No 2 tunnel (non-coking)	0.90	9.90	75.80	13.40

No. 1 analysis by the British Columbia Provincial Assayer (*See Report of Minister of Mines, B. C. 1905*).

This coal is firm and bright and may be classed as a semi-anthracite, and should make a most excellent fuel of its class.

As has already been mentioned, on the nearer approach to the newer eruptive areas the older rocks, including the coal beds, have been highly disturbed, and the resultant heat and pressure have had a marked effect on the coal, altering it from a bituminous to a semi-anthracite; it must be expected, however, that more difficulties will be met with in mining, due to the probable greater frequency of faulting and increased intensity of the folding.

Similar conditions, probably if anything intensified, prevail at the property of the Telkwa Mining, Milling and Development Company, situated on Coal creek, a small stream running into Goldstream, one of the headwaters of the Morice river, and not far from the head of the south fork of the Telkwa river; here a number of seams of good coal have been opened up. The disconnected nature of the work done, with the disturbed condition of the strata, renders it almost impossible to be sure of the relative positions of the seams and whether several of the openings are on the same or different seams. It is fairly certain, however, that four different workable seams have been uncovered; in descending order these have the following respective thickness:—Four feet two inches, four and one-half feet, four feet, and seven feet three inches. No analyses have, as yet, been obtained from this coal, but in general appearance it bears a strong resemblance to that from the Transcontinental Syndicate's property; if anything, even more anthracitic in nature.

Where these seams have been uncovered the area of coal-bearing rocks is very narrow, probably not more than a few hundred feet in width. It appears to lie on the line of, and on the downthrow side of, a great fault, and represents a small remnant of a once great coal field now mostly removed by erosion; it is probable, however, that to the south-east in the main valley of Goldstream, a much wider belt of coal land will be found to exist.

With regard to this field as a whole, it may be said that wherever the coal formation has been exposed faults were seen, not, as a rule, of any great size, but in such numbers as to be a matter of serious importance to future mining operations. The coal has also been cut by numerous dikes and nearly everywhere is somewhat severely flexed. These facts, taken in connection with the uncertain extent of the several areas, seem to render it imperative that systematic and careful prospecting should be undertaken, well in advance of regular mining. Some method of boring could possibly be utilised to determine the position and the nature of the strata underlying the great gravel deposits of the terraces; until something of this sort is done it will be impossible to define the limits of the several coal areas. It is possible that in certain cases mining could be successfully carried on by stripping the overlying gravel and shales from the coal, where not of too great depth, a method that has been somewhat extensively utilised in the anthracite fields of Pennsylvania.

MINERAL CLAIMS.

Hunter basin, situated at the head of Cabin or Four-mile creek, a tributary of Goat creek, was the first locality visited. The country rock here consists of bedded volcanic rocks, red and greenish andesites, agglomerates, etc., tilted at comparatively low angles, but occasionally showing locally more severe crumpling, often accompanied by faulting. Across the ridge to the south, at the head of Glacier and Webster creeks, an intrusive area of coarsely-crystalline granitic rocks is found which seems to have had an important relationship to the mineralisation of the district, as it is along the borders of this area that many claims have been staked, notably in Hunter basin, Hankin basin, Dominion basin (at the head of Goldstream), and various locations on the heads of Sunrise and Glacier creeks. The eruptive mass is itself in places impregnated with iron pyrites, which has resulted in the weathering of the rocks to a bright rusty yellow, giving a characteristic colouring to the mountains.

In Hunter basin the veins are, as a rule, small, and appear either in narrow irregular fissures or as replacements along lines of crushing. The *King* and *Rainbow* claims are good examples of the former. On the *King* a shaft had been sunk, said to be fifty feet in depth, but full of water when seen. The vein, at this point, is about two and one-half feet wide and is in places well mineralised with bornite and chalcopyrite, the ore occurring in irregular lenses or pockets; it is reported to carry good values in silver and copper.

On the *Rainbow* ore of a different class is found, consisting chiefly of highly micaceous specular iron with some iron pyrites, bornite, chalcopyrite and copper carbonates. There appear to be two or more small irregular veins, more or less parallel. Where the most work had been done on one vein it varied from one to ten inches in width, practically all mineral.

On the *Waresco* claim the ore seems to occur along a crushed zone from four and a half to five feet in width, the country rock having been decomposed and replaced in part by minerals consisting of copper carbonates, copper glance, chalcopyrite and bornite.

Numerous other claims of a similar nature are to be found in this neighbourhood, but very little work has as yet been done in proving them.

Dominion basin at the head of Goldstream is near the opposite border of the Glacier Creek granite area. The country rock here is composed of grey and greenish volcanics not so much disturbed as at Hunter basin, but with generally regular light dips to the south-west.

These rocks are cut by a fine-grained, brownish-coloured dike, about forty-five feet in width, which can be plainly seen on both sides of the valley which it crosses about at right angles. It is along the edges of this dike that various mineral claims have been staked, the *Dominion* and the *Black Jack* being the most important. It would appear that this dike has afforded a channel for the ascent of the mineral-bearing solutions which have penetrated laterally along the bedding planes of the volcanics, where most readily attacked, decomposing and replacing the country rock in part with secondary minerals and ore.

It seems reasonable to suppose, therefore, that the ore bodies will be found to occur in a succession of steps, where the more readily decomposed strata of the volcanics are met with, and will meet their maximum thickness in the immediate neighbourhood of the dike, gradually disappearing at increased distances from it. The ore consists chiefly of micaceous specular iron, chalcopyrite, copper glance and copper carbonates, with a gangue of altered country rock, quartz, calcite and epidote.

Another and larger area of intrusive rocks occurs near the head of Scallon creek, an important tributary to the south fork of the Telkwa from the west, extending across the divide to the headwaters of the Morice and main branch of the Telkwa. This rock has sent out numerous dikes in all directions into the surrounding volcanics, and has also caught up and included in it many patches of the latter. Near the contact of these two formations and along the dikes from the former, a large number of mineral locations have been made, including the *Duchess*, the *Anna-Eva* and the *Evening* groups on Howson creek, the *Starr* group on Starr creek and numerous other claims.

The *Duchess* group, owned by the Telkwa Mines, Limited, is situated on the north side of Howson creek, near its head. This property has been opened up by a short tunnel about twelve feet long, all in ore. The ground about here is rather heavily drift-covered and, as yet, but little work has been done, so that it is very difficult to gain an idea of the nature of the deposit. It appears probable, however, that the ore occurs in a large dike from the neighbouring eruptive rocks at or near its contact with the volcanic country rock, the volcanics themselves, near the dike, being largely decomposed and in places mineralised and with much epidote developed. The extent of the ore body is not yet shown, but at the entrance to the tunnel it is at least twelve feet wide and can be traced longitudinally for several hundred feet, the whole mass being more or less highly mineralised with pyrites, chalcopyrite and hematite, weathering to a well-defined iron-cap on the surface. The gangue consists largely of the decomposed and highly altered dike rock, with many small quartz stringers parallel to the dike walls.

A short distance down the creek, on the same side, the *Evening* group is situated, the property of the Telkwa Mining, Milling and Development Company. This appears to be of a very similar nature to the *Duchess*, but the hillside here being less heavily drift-covered and the ore can be traced more rapidly. The mineral apparently is contained in a dike from twenty-five to thirty feet in width, cutting, at a narrow angle, the bedded volcanics, which are here tilted at high angles and in places much altered; the whole width is more or less mineralised with irregularly distributed lenses and bands of higher grade ore, as in the *Duchess*, consisting of chalcopyrite, pyrite and hematite, with considerable quartz and remnants of the original dike rock. This deposit has been opened up by cuts at irregular intervals for a distance of about 1,500 feet, in all of which ore is shown.

On the ridge on the opposite side of Howson creek, and considerably farther away from the eruptive rocks, a number of claims have been staked, including the *Anna-Eva* group, the *Iron Horse* group, the *War Eagle*, *Granville*, *Strathcona*, *Homestake*, *Walter* and many others.

All of these show a somewhat similar condition of affairs to that noted at the *Duchess and Evening*; the mineral occurring in dikes, in streaks parallel to, and generally richer near the walls, and usually is associated with quartz, serpentine, calcite, epidote and other secondary minerals. In places the volcanic country rock is likewise decomposed and mineralised alongside of the dikes. None of these claims appear to be so heavily mineralised as are those across the creek.

Across the ridge, at the head and to the west of Howson and Scallon creeks, in Starr basin, a number of claims are located. The ore here is usually found at the contact of the eruptive and volcanic rocks. This contact is very irregular in outline as the volcanics have been much shattered, and many patches of varying size have been caught up in the intrusive rocks; these small areas are usually highly altered and often somewhat mineralised.

At the *Starr* group, the ore seems to be developed along two parallel crushed zones in the volcanics near the contact, about two and three feet in width, respectively. The mineral, which is irregularly distributed, consists of pyrite, chalcopyrite and copper carbonates, in a gangue of quartz, calcite and altered country rock.

Although time was not available to visit the headwaters of the Zymoetz (Copper) river or the Babine mountains, where many claims have been located, it may be of interest to note here that many good looking specimens of galena ore, said to be from these localities, were seen by the writer.

A great part of this district has been over-run by forest fires, but sufficient timber remains in many of the valleys to furnish mine props, &c., as well as supplying the local lumber market, for many years. The principal trees are jackpine, spruce and balsam.

Enough information was obtained for the compilation of a map covering the greater part of the Telkwa basin and immediate neighbourhood. Triangulation (using British Columbia government township surveys as a base), panoramic sketches and traverses of the main trails and streams was the method adopted.

ESSINGTON TO EDMONTON.

Via Skeena River, Babine and Stuart Lakes and Peace River.

REPORT BY WM. FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

Under instructions from the Hon. the Minister of Mines, the Provincial Mineralogist, during the summer of 1906, made a trip to, and an examination of, that portion of British Columbia lying east of the Rocky mountains, but to the west of the 120th Meridian of west longitude, and known as the Peace River Valley District of British Columbia. As this portion of the Province is at present most remote from transportation facilities of any sort, the time occupied in reaching it from Victoria was greater than was required to make the examination of the district.

A route was selected embracing a stretch of British Columbia of which little authentic information was available and about which such was desired.

This report must necessarily partake largely of a description of the country along the route travelled or adjacent thereto, but, since the line of travel was "crossing the formations," both physical and geological, the features noted will, in all probability, be found to extend a certain distance north and south of the section traversed.

The route taken on this trip was parallel to, but a little farther north than, that travelled over in 1905 across the Northern Interior Plateau, and the description of the major physical features contained in the Report of 1905 are applicable to this more northerly route.

The party consisted of the Provincial Mineralogist, with Mr. Harold Nation as an assistant, and, for part of the time only, a cook.

A general description of the route taken is as follows:—From Victoria and Vancouver to Essington, at the mouth of the Skeena river, by Canadian Pacific Railway Co.'s steamer, a distance of 645 miles. From Essington up the Skeena river to Hazelton by Hudson Bay Co.'s steamer, a distance of 180 miles. From Hazelton to Babine lake by pack-train, 70 miles. From Babine, up Babine lake by canoe, across a portage of 12 miles to Stuart lake by waggon road, and, again by canoe, down Stuart lake to Fort St. James, at the outlet, a total distance of 150 miles. From Fort St. James to McLeod lake by pack-train, a distance of 85 miles.

McLeod lake is on the headwaters of the Peace river, and here canoes were taken to the head of the canyon of the Peace, a distance of 182 miles, where the canoes had to be abandoned and a portage of 14 miles made around the canyon to Hudson Hope, the party packing all its supplies and camp outfit across the portage.

From Hudson Hope to Fort St. John, on the Peace river, is a distance of 60 miles by the river, which it was expected would have to be made on a raft, but, being so fortunate as to encounter an Indian with horses, a side trip was made to Moberly lake and the Pine river district to the south, arriving at Fort St. John overland, after a trip by pack-train of some 90 miles.

From Fort St. John another trip by pack-train was made to the south, to the Pouce Coupé prairie, returning to Fort St. John after travelling by pack-train some 185 miles.

A short trip was also made from this point to the north, on foot, as no horses could be obtained on the north side of the river.

At Fort St. John a bateau was obtained from the Hudson Bay Company, and the party, here reduced to two, floated down stream to Peace River Crossing, at the junction of the Smoky with the Peace river, a distance of 180 miles, crossing the Provincial Boundary into Alberta some 45 miles below Fort St. John.

From Peace River Crossing the party went by a freight waggon to the upper end of Lesser Slave lake, a distance of 100 miles, travelling from that point in a Peterboro' canoe, kindly loaned by the Royal North-West Mounted Police, down Lesser Slave lake and river and the Athabaska river to Athabaska Landing, a distance estimated at 200 miles, from which point to Edmonton is 100 miles by a good waggon road.

At Edmonton railway facilities were again obtainable and the party proceeded by the Canadian Pacific Railway to Victoria.

The distance travelled was estimated at, approximately, 3,120 miles, divided as follows:—
By steamer, 910 miles; by pack-train or on foot, 470 miles; by canoe or bateau, 700 miles; by waggon, 200 miles; and by railway, 840 miles. These distances and the modes of travelling are set forth in tabular form in the following table:—

TABLE OF DISTANCES TRAVELLED, SUMMER OF 1906.

FROM	To	Steamer.	Railway	Pack-train or on foot.	Waggon	Canoe.	Total.
Victoria	Vancouver	85					
Vancouver	Essington	560					
Essington	Hazelton	180					
Hazelton	Babine Post			70			
	On Babine lake					105	
	Portage			12			
	Stuart lake					33	
Fort St. James	McLeod lake			85			
	Paok river					20	
	Parsnip river					72	
Head of Peace	Cust House					90	
Cust House	Hudson Hope			14			
Hudson Hope	St. John via Moberly lake			90			
St. John	Pouce Coupé and return			185			
	North of river			14			
"	Peace River Crossing					180	
Peace River Crossing	Lesser Slave lake				100		
	On " " river					200	
	On Athabaska "						
Athabaska Landing	Edmonton				100		
Edmonton	Calgary		195				
Calgary	Vancouver		645				
Vancouver	Victoria	85					
		910	840	470	200	700	3,120

The time occupied between transportation points, viz., Hazelton and Edmonton, was 77 days, including Sundays, in which time 58 camps, or moves, were made. The route taken, while seemingly longer than necessary to reach and return from the district inspected, proved that "the longest way around is sometimes the shortest way home," as it was almost entirely down stream on the waterways, in which direction 40 miles a day could be covered with little labour or expense; whereas, going up stream, only about 10 miles a day could have been made, and three or four Indians would have been required to "track" the canoes up stream.

Summary.

A detailed description of the country passed through is given later on in this report, in diary form, but the following is a summary of the same:—

MINERAL POSSIBILITIES.

The Babine range of mountains, over which the trail from Hazelton to Babine leads, rises to heights of 7,000 feet in the peaks, and its rock formation consists of schists, quartzites, shales, etc., cut by numerous porphyritic dikes. This range is practically the length of Babine lake, forming its southern shore and watershed, dying out both to the east and west of the lake. The range has only begun to be prospected, and its potentialities are as yet undemonstrated; but, at the same time, there have been a number of claims staked there, as yet quite undeveloped, which produce at least samples of copper, silver and gold ores that indicate possibilities and lead to the hope of greater things in the future.

On the north side of Babine lake the country is so covered with recent superficial deposits, of Glacial age, that few exposures of solid formation occur to tempt the investigation of the prospector, particularly as the adjacent formations to the south have not as yet been proven.

To the south of Stuart lake there is a range of rocky hills which does not attain to the dignity of being called a mountain range, in which there are exposures of solid formation, chiefly sedimentaries of Palaeozoic age, more or less disturbed, but which, as far as could be observed, have not been cut by the igneous dikes which elsewhere appear in some way to have been, if not the cause of, at least formed at the time when the mineralisation took place, and which dikes form, to the prospector, the visible sign of a possible mineralisation.

On the north side of Stuart lake, until within a few miles of its eastern end, the country is covered with glacial deposits, and, from a mineral view-point, is unpromising, and from this district we have no record of even placer gold indications ever having been discovered.

Within a few miles of the eastern end of the lake a great knob of the underlying limestone protrudes, from which there are probably exposures of the same rock extending to the north-west, but this point was not investigated. The borders of this limestone area may prove worthy of investigation by the prospector, but the apparent absence of any serious igneous action is here also against the chances of its proving a profitable field. Such igneous action may be found to have occurred farther to the north and have as yet escaped notice, since the lake provides such an easy line of travel as to have left the adjacent country practically untravellered, save by the local Indians.

The line of the trail from Fort St. James to McLeod lake is uninteresting in a mineral sense, as it is covered deep in gravel, clay, etc., and the few exposures of rock seen were mostly unpromising sedimentaries.

The course down the Pack and Parsnip rivers was through similar country and lay at the base of the western foot-hills of the Rockies, a range which, as we know it in the more southern part of the Province, where the geological formation and conditions are very similar, has not, as yet, proved productive of mineral wealth, although a few prospects have been located therein.

The Peace river, formed by the confluence of the Parsnip and Finlay rivers, derives from the latter tributary, wash from the north-west, from the vicinity of Manson creek, a district in which placer gold has been already found in various localities and in considerable quantities. Consequently, as might be expected, the bed of the Peace river shows black sand and indications of placer gold throughout its explored length, some of the bars giving "colours"

quite sufficient to offer inducements to prospect for dredging or steam-shovel ground, but, so far as is known, at no place have the bars contained a sufficient proportion of gold to be profitably worked by what has been called "individual" methods.

Unlike most of the streams in the southern part of the Province on which dredging has so far been attempted, the bars on the Peace river are found to be free from boulders of any material size, a fact which should greatly favour dredging operations and render possible the working of a deposit of a grade which might not be profitable where such conditions did not exist. These remarks apply not only to the bed of the present river, but also, to a certain extent, to the banks of the river, which were at one time the bars in the greater valley of the ancient river into which the present river has cut. It was in banks of this description, some miles below Fort St. John, that small quantities of gold were found in 1905, which led to the staking of numerous claims and the rather sensational newspaper articles about them attributed to members of the Dominion Government Peace River Exploration party.

COAL.

So far as is known, there have been no indications of coal found in the section of country passed through between Hazelton and the head of the Peace river, although there is a possibility that lignite, at least, may be found under some of the glacial drift to the north of Babine and Stuart lakes. It seems unlikely that the western slope and foot-hills of the Rockies will be found to be coal-bearing, as, at this latitude, the coal measures appear to be almost exclusively on the eastern slope of these mountains.

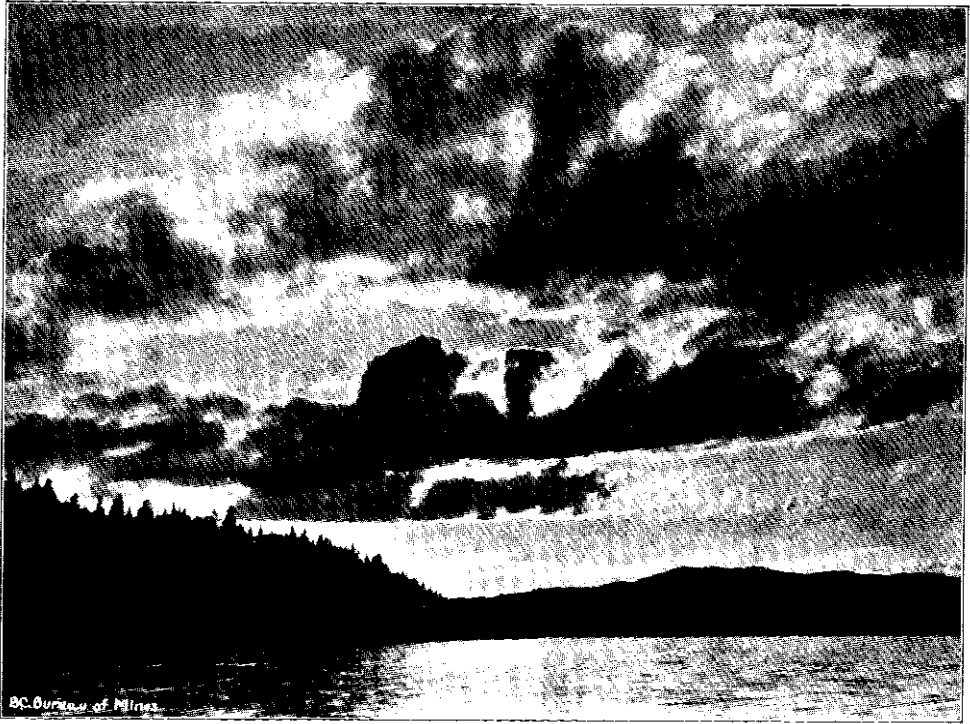
On passing down the Peace river through the main range the foot-hills are reached, where rocks of the coal-bearing formation are seen and continue to below the Canyon, some 75 miles to the east, in which extensive region it is possible that, in the future, coal may be developed at many points.

Up to the present time the whole district to the east of the mountains has been under Government Reserve, so that no coal or other land might be staked or recorded there, which fact has prevented the district from being prospected or settled. A few prospectors, either in ignorance or in disregard of the reserve, located and staked coal lands in the vicinity of the Canyon, but as a record of these claims was refused by the Provincial Government, the prospectors and those interested are extremely reticent as to their finds, hoping to re-stake as soon as the reserve is opened, and it is felt that it is but right that the location of their discoveries be not made public.

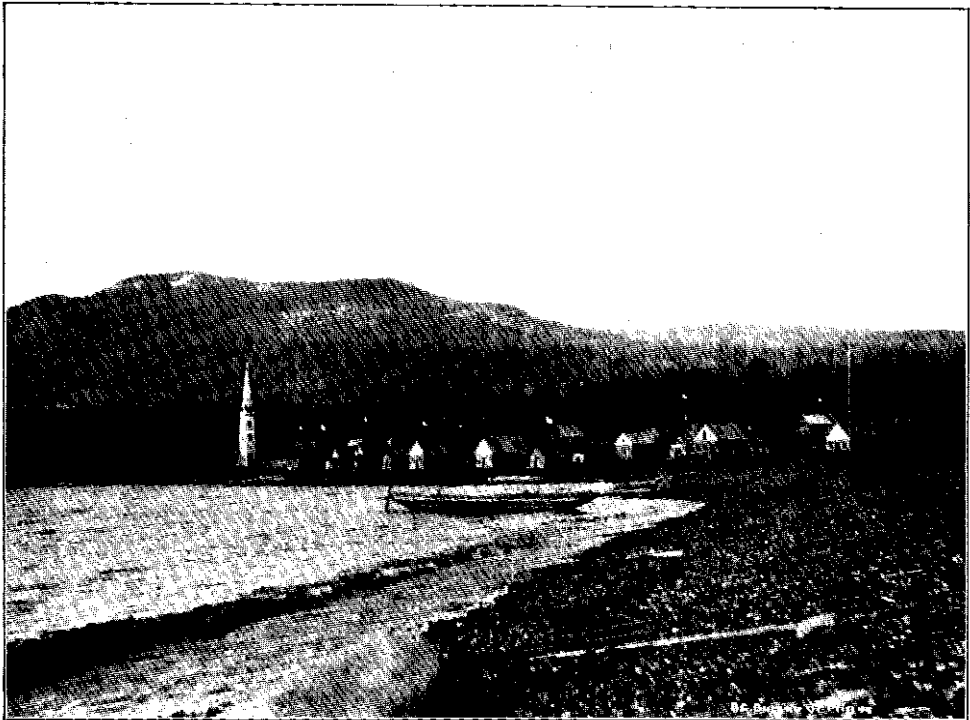
The coal found appears to be a bituminous coal of very fair quality, in beds of workable thickness.

Some distance east of the Canyon and south of the Peace river, on Coal creek, a tributary of the South Pine, and on the headwaters of Muddy river and other streams of that vicinity, coal has been reported as found; the latest mention of such being by Mr. J. A. Macdonnell, in the report of his explorations of the district for the Dominion Government, in which he mentions finding a good bituminous coal.

The writer, who followed his trail through the district for a considerable distance, found lignite, but was unable to see any bituminous coal, which, it is expected, would be found to be confined to the district more closely bordering on the main mountain range. It is thought that, as soon as railway transportation through the district becomes an established fact, a number of workable deposits of coal will be developed, but under the present conditions any such deposit would be without value.



SUNSET ON STUART LAKE, B. C.



R. C. MISSION AT STUART LAKE, B. C.

TIMBER.

Of timber, such as is called timber on the Coast, there is none in the district travelled through. Such timber as there is, is spruce, hemlock, balsam and jack pine, the best of it ranging from 12 to 24 inches in diameter, and not tall for that diameter, with numerous knots, etc. Timber line in the Interior, at this latitude, may be placed at, approximately, 4,000 feet above sea level, although a few scrub trees and bushes range higher. Timber which would be even locally merchantable for lumber is scarce, the repeated forest fires having pretty thoroughly cleared out the greater portion of it, leaving only a few isolated patches of the older trees, while the subsequent growth has not as yet reached a size to make it of value for this purpose. Of these patches, probably the best is to the south of Babine lake, towards its south-eastern end, where there is a very fair body of spruce timber. There is a very limited area of fir on Stuart lake, near the portage, and a few isolated patches of spruce at intervals along the south shore of the lake. There is an area of very fair spruce to the east of McLeod lake, but along the Parsnip river there is no timber fit for lumber, with the exception of isolated spruce trees and large cottonwoods, which may be utilised and now serve for making the dugout canoes used in the district. These latter trees grow very plentifully and sometimes very large on the river bottoms of the streams of the northern watershed.

To the east of the mountains, on the upper benches, there is little or no timber, as a rule, the whole country having been burned over. There are, however, on the trail to the Pouce Coupé, a couple of small areas which escaped the general conflagration and are correspondingly the more valuable.

A few tamarack (*Larix Americana*) trees were seen east of the mountains, but that such do not grow west of the mountains here may be inferred by the fact that the Indians from Stuart lake had never seen and did not know the tree.

AGRICULTURAL LANDS.

In the district passed through there are, to the west of the Rockies, no large blocks of land suitable for agriculture or even grazing, although there are a number of strips of such land, some of them of considerable area.

On the south shore of Babine lake, near its outlet, there is a small area of good land, but the remainder of this south shore did not appear promising, good land only being found around the mouths of the few creeks. On the north shore of the lake there is a quantity of very good land. There is a strip of this land extending almost continuously from the outlet up the lake for some 40 miles, and extending from the shore at least a mile back. The greater part of this area is open, free from trees, clear, and supports a magnificent crop of wild hay, which in July was being mowed by the Indians for winter horse and cattle feed, the stock in summer finding good grazing on the higher land, further back from the lake. This was one of the finest strips of land seen on the trip. The soil is a clayey loam; the slope from the lake is gradual, with a southern exposure, and would support grain of all sorts, as well as vegetables.

The district is at present remote from transportation, but the lake is eminently suited for navigation, with a low valley opening from its south-eastern end towards Fraser lake, through which a road could be easily built, and it seems probable that connection will thus be made with the main line of the Grand Trunk Pacific Railway, soon after that road is built.

In this valley just mentioned there is good agricultural land extending up the valley for miles, but not exceeding in width one or two miles.

To the south of both Babine and Stuart lakes the hills rise from the water's edge, and, except in a few instances around the mouths of creeks, there is no land suitable for agriculture. At the east end of Stuart lake there is a considerable area of fine land to the south-east, which was fully described in the Report of 1905.

The trail from Stuart lake to McLeod lake passes along the height of land separating three drainage areas, and the greater part of the land in this section consists of gravel benches, barely supporting a scanty growth of jack pine. There are, however, a few patches of land in bottoms which is very fair, and a few good hay meadows, but these are too isolated to be of any general importance. These conditions prevail all the way down the Pack and Parsnip rivers to the Peace river.

In passing down the Peace river, the mountains occupy the land for some distance, followed by the foot-hills as far as the Canyon, and it does not seem to offer any inducement to the agriculturist. Possibly, when the country is more developed, a few valleys in the foot-hills, of very limited area, may eventually prove of use.

From the Canyon east to the boundary of the Province a considerable proportion of this great area, as far as the soil, etc., is concerned, is quite suitable for cultivation, being rolling prairie bench land, some 800 to 1,000 feet higher than the Peace river, and requiring little or no clearing, such tree growth as there is being small poplar and willow. The stream courses are cut down into this bench land to such an extent as to preclude all possibility of irrigation for the greater part of the district, but from observation in a dry season and from information picked up, it would seem that the summer rainfall and dews are quite sufficient for ordinary crops, while the streams and numerous small lakes provide all the water needed for stock.

Of this large area of land, which will some day be utilised for farming, the choicest parts seen were at the Pouce Coupé prairie and around the ends of Moberly lake, the former about 40 miles long by 25 miles wide, a solid block of fine rolling prairie, clear of trees and covered with grass suitable for hay, well watered and with splendid soil, the analysis of which is given in the detailed report. This is probably the largest solid block of farming land in British Columbia. Detailed descriptions of the land along the route are given elsewhere in this Report.

AGRICULTURAL POSSIBILITIES.

In the whole of the district passed through there are no settlers or settlements, except the isolated posts of the Hudson Bay Co., which are primarily fur-trading posts. Cultivation of the soil being a question of inclination of the Factor, there have been few attempts at cultivation from which to draw definite conclusions as to the agricultural possibilities of the region. At Babine Post the ordinary root crops and summer vegetables are grown without difficulty, although occasionally summer frosts trouble the potatoes. Hay and other wild grasses grow so prolifically that it is considered there would be no difficulty experienced with barley, rye, oats, wheat, etc. The summers are reported to be warmer than at Stuart lake, with a greater summer rainfall and heavier snowfall, together with a winter season averaging two weeks longer than at Stuart lake, and probably a lower winter temperature. At Stuart lake, as noted in last year's Report, all the garden vegetables and root crops have been grown successfully, as have the small fruits, such as raspberries, currants, strawberries, etc., both at the Hudson Bay Co.'s post and at the R. C. Mission, a mile farther up the lake, at which latter point barley, rye and oats were seen growing and almost ripe, with fine full heads.

Owing to the difficulty in getting young trees into the district, no attempt has been made to grow fruits, such as apples, plums, etc., but it is not expected that there will be any difficulty in growing these fruit trees. The climate compares very favourably with that of the Province of Quebec, with which the writer is familiar, where fruit is grown equal in flavour to any produced in the Dominion.

At McLeod lake summer vegetables and root crops have, for many years, been grown with success by the Hudson Bay Factor, although the soil around the Post is very poor and requires artificial irrigation. The crop of wild hay here, where the soil was suitable, was good, and the berry crop plentiful and of good quality.

There is no permanent habitation on the Peace river between the Rocky mountains and Fort St. John, but east of the mountains the vegetation was found to be luxuriant, and seemed to indicate a favourable climate. The wild berries were as good as anywhere in the Province, although not as plentiful. The size of the "apples" on the wild rose bushes was particularly noted, as being larger than seen anywhere else in British Columbia.

At Fort St. John the Hudson Bay Co.'s Factor grows vegetables, etc., but has never attempted anything further. In 1906 the potato crop at the Post was very poor, owing to the unusual dryness of the season.

South of Fort St. John, in the Pouce Coupé district, no cultivation has been attempted, but the growth of wild grasses and the general conditions seem to compare favourably with portions of Alberta seen later, and which successfully supported a fine crop of grain.

Around Dunvegan, on the Peace river, in Alberta, vegetables and grain of the usual sorts are grown on the lower benches, but it is reported that attempts to cultivate the higher bench lands, some 600 to 800 feet higher than the river, have not been successful.

At Peace River Crossing, at the junction of the Smoky with the Peace river, the usual garden vegetables were seen growing in the latter part of September, while melons were reported to have been grown nearby, although these were not seen, but the writer ate ripe tomatoes, grown outside by Mrs. Anderson, whose husband, Sergeant Anderson, is in charge of the R. N. W. Mounted Police barracks.

This point is more northerly than any part of the Peace river in British Columbia, and the climate is colder, yet at Vermilion, some 300 miles still farther to the north and down the Peace river, grain is reported to be grown to an extent to justify the existence of the three flour mills in operation there.

CLIMATE.

It might be well to quote from Professor Macoun, Botanist of the Geological Survey, who visited this district in 1872 and 1875. Speaking of the district in the vicinity of Stuart lake, he says:—

"There can be no doubt but that when the forest is cleared, by whatever cause, the soil will become drier, and the climate will be considerably ameliorated. Owing to the latitude, the sun's rays fall obliquely on the forest, and as a natural result there is little evaporation. As Germany was to the Romans, so is much of our North-West to us—a land of marsh and swamp and rigorous winter. Germany has been cleared of her forest and is now one of the finest and most progressive of European countries. May not the clearing of our north-western forests produce a similar result in the distant future of British America."

In the garden of the Hudson Bay Company's post at McLeod lake, he found in June, 1875, "among other vegetables, cabbage, cauliflower, turnips, peas and potatoes—the latter six inches high—growing luxuriantly and not at all injured by frost, although it had been very severe one night shortly before our arrival."

He writes of the vicinity of Hudson Hope:—"I have been extremely surprised at the rankness of the vegetation around here, although there is very little rain at this season and there has been little all spring. Wild peas and vetches grow to an amazing height in the poplar woods, and form almost impenetrable thickets in many places. Vetches, roses, willow herb (fireweed) and grasses of the genera *poa*, *triticum* (bunch grass) and *bromus* fill the woods and cover the burnt ground, and surprise Canadians by their rankness and almost tropical luxuriance.

"Growth is extremely rapid, owing partly to the length of day and cloudless skies, supplemented by heavy dews, and possibly also to the great range of temperature during the twenty-four hours, from 45° at sunrise to 80° Fahrenheit at noon.

"At St. John (on the Peace river) a few minutes' observation tended to show that this point was much warmer than Hudson Hope, that the soil was richer and that the vegetation was in a far more advanced state. Raspberries and service berries were fully ripe and in great abundance. Potatoes, oats, barley, and many varieties of vegetables were in a very flourishing state in 'Nigger Dan's' garden. The oats stood fully five feet high, and the barley had made nearly equal growth.

"I started up the hill in rear of the Fort. We found the level of the country above the river valley to be about 700 feet.

"Clumps of willows and poplars, of various ages, were interspersed with the most astonishing growth of herbaceous plants I ever witnessed.

"Willow herb (fireweed), cow parsnip, *geum*, *triticum* (bunch grass), *poa*, and a number of other tall-growing species, covered the whole region with a thick mass of vegetation that averaged from three to five feet

"The soil must be exceedingly rich to support such a growth year after year.

"My observations all tend to show that, omitting the slopes on the left bank, the flora of this region is almost identical with that of Ontario.

"It would be folly to attempt to depict the appearance of the country, as it was so much beyond what I ever saw before that I dare hardly make use of truthful words to portray it.

"The country passed over in your own (Selwyn's) excursion, ten miles to the north-west, you report to bear a vegetation similarly luxuriant, more so than about Edmonton, or anywhere in the Saskatchewan Country. Rainy river and the Lesser Slave lake marshes are the only regions known to me that are in any way comparable to it.

"The latter, however, is swamp, while this is a plateau, nearly level, and in parts over 700 feet above the river."

Dr. G. M. Dawson, in the Geological Survey report of 1879, writes of this district as follows:—

CLIMATE AND AGRICULTURE.

"With regard to the climate of the Peace river country, we are without such accurate information as might be obtained from a careful meteorological record, embracing even a single year, and its character can, at present, be ascertained merely from notes and observations of a general character, and the appearance of the natural vegetation.

"It may be stated at once that the ascertained facts leave no doubt on the subject of the sufficient length and warmth of the season to ripen wheat, oats and barley, with all the ordinary root crops and vegetables, the only point which may admit of question being to what extent the occurrence of early frosts may interfere with growth. This remark is intended to apply to the whole district previously defined, including both the river valleys and the plateau.

WINTERING STOCK.

"Horses almost invariably winter out well, without requiring to be fed. Hay should be provided for cattle, to ensure perfect safety, for a period of three or four months, though in some seasons it is necessary to feed the animals for a few weeks only. The Indians of the Cree settlement on Sturgeon lake, previously referred to, winter their horses without any difficulty around the borders of a neighbouring lake, the shores of which are partly open. From Hudson Hope the horses are sent southward to Moberly lake to winter, and, according to Mr. Selwyn, do well there. Lesser Slave lake, with its wonderful natural meadows, has long been known as an excellent place for wintering stock, and is referred to as such by Sir. J. Richardson."

Details of the Trip.

July 12th.—The Provincial Mineralogist left Victoria *via* the Canadian Pacific Railway Co.'s steamer "Princess Beatrice" for Port Essington, at the mouth of the Skeena river. The Canadian Pacific Railway Co. and the Union Steamship Co. maintain regular lines of steamers from Victoria and Vancouver to Port Essington, which service is supplemented by occasional boats run by independent owners, so that, during the summer months, passage may be obtained about twice a week. The single, first-class fare, including meals and berth, was, in 1906, \$17.

July 13th.—The steamer was detained in Vancouver, only leaving that port on the morning of the 14th at 2 A.M., and arrived at Port Essington at 8 P.M. on the 15th, a run of 40 hours, including stops at way ports.

July 16th.—Leaving Port Essington at 9 A.M., the party proceeded up the Skeena river by the Hudson Bay Co.'s steamer "Mount Royal." The estuary of the Skeena river at Port Essington is from five to six miles wide, and continues inland, gradually narrowing, until it meets the river some 20 miles up. The river, from this point up to the Canyon, although flowing with a current of three or four miles an hour, wanders about among gravel bars and islands, most of which are submerged at extreme high water.

On one side or other of the river, for the most of the way, is to be found bench land, averaging from a quarter to half a mile wide, extending from the river to the base of the steep granite mountains of the Coast range, the level of these bench lands being only a few feet above high water in the river. This bench or bottom land continues to the Canyon, some 80 miles above Essington, and is covered with a heavy growth of cottonwood and spruce timber. The soil, though light, is excellent, and when cleared is admirably suited to the growth of small fruits and vegetables, as has been fully demonstrated by the two or three settlers who have already cleared small patches and are growing such produce.

The river is navigable by steamers at all stages of the water as far up as the Canyon; above this it is impassable at extremes of high or low water. The trip from Essington to Hazelton occupied the better part of three days, the steamer tying up at night, the first night at the mouth of the Lakelse river, at the head of which the Dominion Government Salmon hatchery is situated, and the second night at the mouth of Lorne creek. The Canyon was passed at noon on the second day.

At Lorne creek are situated the workings of the Dry Hill Hydraulic mines, at a distance of about a mile from the river and at an elevation about 300 feet higher. The ground here is being sluiced for gold in what is supposed to have been the old bed of Lorne creek, which had long ago been filled in by a slide from the mountain, the stream being thereby diverted to its present channel. The ground undoubtedly contains gold in considerable quantities, but its recovery is rendered difficult by an exceedingly irregular bedrock and the presence of a great number of boulders, which require to be broken up before they can be removed by the stream of water at present available through the existing pipe-line and plant. Although, so far, the proposition has not been a paying one, the management has hopes of ultimate success, owing to the marked improvement shown in the character and grade of the bedrock and the narrowing up of the channel.

July 18th.—Arrived at Hazelton about 5 P.M., some five days after leaving Vancouver. The town of Hazelton and its vicinity were fully described in the Report for 1905.

July 19th.—The day was spent in outfitting with provisions, etc., and packing them for transport over the trail. It was considered advisable to obtain provisions here for the whole trip, with the exception of flour and sugar, with which staples the interior Posts of the Hudson Bay Co. are always well supplied. Arrangements had been made in advance with

this Company for supplies, horses, canoes and Indians at the various points west of the mountains along the route, and in every instance preparation was found to have been made and the arrangements were carried out to the letter.

July 20th.—The party was ready to start at 9 A.M., a pack-train having been held in readiness by the Hudson Bay Co., but the old story of "lost horses" delayed the Indian packer until 2.30 P.M. A distance of nine miles was, however, covered that afternoon by 6.30 P.M., when Camp I. was made, on the west side of the Suskwa river.

The Hazelton-Babine trail, on leaving Hazelton, follows up the bench on the north side of the Bulkley river to the junction of the valley of the Suskwa river, which latter valley it follows up to the head of the middle fork of the river and to the divide on the Babine range of mountains, between the drainage areas of the Bulkley river and Babine lake. The pass through which the trail crosses the summit is a level, marshy "draw," some 15 miles long, having an elevation of about 4,000 feet above sea level, or about 3,200 feet higher than the Skeena river at Hazelton, and is flanked on either side by the high peaks and ranges of the Babine mountains, which attain an altitude of from 5,000 to 7,000 feet. The valley of the Bulkley was described in last year's report and, consequently, need not be again mentioned.

The valley of the Suskwa, up to the first fork, the 16-mile bridge, from Hazelton, is narrow, with little or no bottom land, but the hillsides, particularly on the western side of the valley, after the first sudden rise from the river, are gently sloping, with excellent loamy soil, free from stones and affording fine summer grazing. The country was formerly covered with a growth of large spruce trees, but these have been burned off long ago, the present tree growth consisting of small spruce and fir, with poplar trees and willow bushes. There are no areas of merchantable timber in the Suskwa valley.

July 21st.—About 20 miles of trail was covered, and Camp II. was made some 21 miles from the mouth of the Suskwa, on the easy, sloping, west bank of the middle fork, opposite the junction of the East fork, at an altitude of 2,500 feet. This East fork is only two or three miles long and rises in a circular basin, with an altitude of about 1,800 feet, surrounded by hills and containing an area of very good grazing land, possibly fit for cultivation.

July 22nd (Sunday).—Travel this day was over the level elevated valley forming the summit of the pass and having an altitude of 3,800 feet. Only 12 miles was travelled to-day, as the Indians object to travelling *far* on Sunday, and Camp III. was made in the pass, where very fair feed for the horses was found around the small ponds and through the *brulé*.

July 23rd.—The trail continued along the level valley until within about six or eight miles of the outlet of Babine lake, when it begins to descend, dropping in that distance from an altitude of 3,800 feet to one of 2,250 feet, the level of Babine lake. As indicated by this sudden drop in the trail, the Babine mountains rise abruptly from the western side of Babine lake at its northern end, leaving little or no land sufficiently level for cultivation on this side of the lake, except at its very outlet, where there is a flat of some thousands of acres, where a small creek flows into the lake.

Babine is essentially an Indian village only, and is situated at the outlet of the lake, this location having been selected by the Indians owing to the facilities offered for catching salmon as they run up the Babine river from the Skeena, the salmon catch of these Indians having for generations formed their chief staple of food and commodity of barter with the Indians from the north and interior.

There is a good and well kept-up pile bridge across Babine river at the outlet from the lake, across which the trail leads to the village and Indian reserve, situated on the north-east side of the lake at the outlet. The village consists of some 30 log houses and outhouses, with a very well constructed R. C. Church, a branch from the mission at Stuart lake.

Adjoining the Indian reserve on the south-east is the Hudson Bay Co.'s Post, a well equipped post in charge of Mr. Ware, and consisting of a store, warehouse, Agent's residence, etc., together with a number of log cabins, belonging to the Company, which are occupied in summer by passing travellers and in winter by miners from the Omineca District, who come this much nearer to civilization and the source of supplies, finding it cheaper to come to the winter supplies than to have them brought into the camps at Manson creek.

All supplies for the Omineca country pass through Babine, the pack-trail continuing from here easterly to Takla lake, which is crossed by ferry. All supplies for the Stuart lake, McLeod lake and Fort Grahame districts arrive at Babine from Hazelton by pack-train, and are there forwarded in sailing scow up Babine lake to the portage at its south-eastern end, across which they are taken by horses and waggons to Stuart lake, then by another sailing scow down this lake to Fort St. James, at its eastern end, where they are distributed.

Babine river, from the lake to its junction with the Skeena, is some 50 miles long, but in that distance drops some 1,200 feet by a succession of rapids without any distinct falls, and is reported to be in canyon for a considerable portion of its length. That the river is not practically navigable, even for canoes, is indicated by the fact that it has not been used either by the Indians or the Hudson Bay Co. as a route for bringing in supplies from Hazelton, it having been found more economical and safer to transport all the freight for the whole of the northern interior by pack-train over the trail already described, a distance of 70 miles, at a cost of $2\frac{1}{2}$ cents a pound or \$50 a ton—at least, that was the current contract rate charged, even by the regular pack-trains, in 1906.

Arriving at Fort Babine at 12.30 P. M. on the 23rd, the pack-train which had transported the party from Hazelton was dismissed and sent back, when Camp IV. was made in one of the Hudson Bay Co.'s cabins. Two Indians with a large cottonwood dugout canoe were hired to transport the party of three right through to Fort St. James, on Stuart lake, and all arrangements were made for an early start on the following morning.

July 24th.—In the morning the canoe was loaded with the baggage and provisions for the trip, and at 8 A. M. a start was made up Babine lake. Babine lake, while not surveyed, is estimated to be about 105 miles long, with an average width of not over 3 miles, a long, narrow, flooded valley running N. W. and S. E. The water is clear, clean and deep; the shores are gravel or sand, with very little rock or clay. The lake abounds in fish, chiefly trout of various sorts. A troll kept out behind the canoe, without any attempt at fishing, supplied more trout than the party could use, fish running from 4 to 6 lbs., of varieties known to the Indians as *tokoi* and *beet*, both very fine fish, and the more common variety, the ordinary lake trout; all being gamey fish and giving good sport. In the spring excellent fly fishing for trout is to be had in the lake, around the mouths of the various creeks flowing into the lake, but in late summer the fish can only be caught by trolling deep.

The lake also abounds in white fish, probably the most delicious table fish found in the waters of British Columbia, even superior to the celebrated white fish of Lake Winnipeg. These, however, offer no attraction to the sportsman, as they do not take the fly and seldom even a baited hook in summer, but are caught by the Indians in nets in summer and through the ice in winter.

In the season (first salmon arrived at St. James while we were there, July 24th) salmon abound in the lake and are caught in large numbers in nets, while sturgeon of large size are reported to have been caught.

Game is not very plentiful in the vicinity of the lake, except ducks and geese, during the spring and autumn flights; the lake, however, being almost free from sheltered bays, reeds or grassy banks, they do not remain long. There are grouse in the woods, though not many.

Deer, although not often found in the district at present, are gradually working-in from the south. There are goat in the Babine mountains. Of the fur-bearing animals, marten are reported to be the most plentiful, while a few beaver are found in the smaller tributary lakes. Lynx and fox are reasonably abundant, while black and grizzly bear are reported as plentiful in the higher mountains to the south.

This first day, after rowing and paddling some 33 miles, Camp V. was made on a small island about 2 miles north of the "Old Fort," the old Fort Babine of the Hudson Bay Co.

Speaking generally, the country passed during the day was, on the south side of the lake, well wooded with medium-sized spruce, much of which would make lumber, but not first class. The ground, rising gradually and usually rather rapidly to the Babine range of mountains, does not afford any quantity of land deemed fit for cultivation.

On the north-east side of the lake there are no high mountains or hills, the land not exceeding a height of 600 to 800 feet above the lake. The hills are rolling and rounded and have evidently been burned off clean many years ago, the present tree growth being aspen, poplar and willow in patches, leaving many areas, of large extent, of fine grass land. At intervals along this north shore were seen Indian ranches—so called through courtesy—with very fair log houses and possibly a stable or shed each, with perhaps an acre of ground under cultivation, and that of the most primitive description; but such as it was, it proved most conclusively that all the root crops and small fruits can be raised here without difficulty. These Indians have numbers of horses and some fine cattle, for which they have no trouble in cutting sufficient wild hay of the finest quality. This hay they cut wherever seems to them most convenient; there they stack it up and in winter take it on sleds, drawn by horses on the frozen lake, to their ranches.

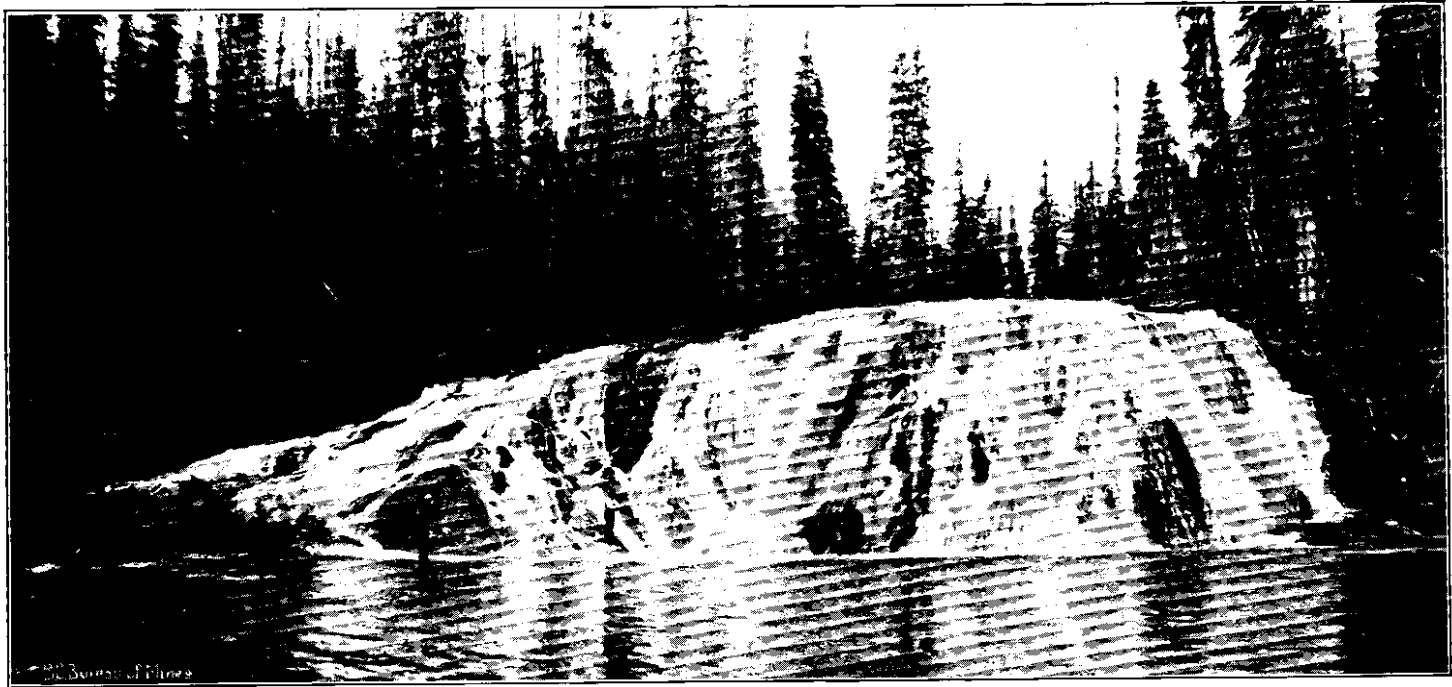
Of these lands on this north shore passed during the day, probably 15 miles of the shore line, and as far back as could be seen, namely, to the hill tops, is the finest of agricultural land, gently sloping to the lake, with a southern exposure, excellent soil and already cleared, or so lightly wooded as to be very easily cleared.

These same conditions prevailed the next day, for another 15 miles, making in all an area of fine agricultural land well worthy of the serious attention of the Government and suitable for immediate settlement.

The climate, of course, could only be learned of from report and such indications as offered, but it would appear that the winter is about five months, the snow is deep, the winter temperature cold, 30° below zero being common, but steady and the air dry. The summer temperature is high, the air fairly dry and with a good summer rainfall. Cattle and horses winter without shelter, but require to be fed, owing to the depth of snow.

July 25th.—The party was under way by 7:45 A. M. and in a short time passed the "Old Fort," the important Indian village of Natakuz, larger than Babine, situated at the south-eastern end of a point or peninsula between two arms of the lake and in the centre of the best of the agricultural land. The village consists of a number of log houses and a few barns, with a new R. C. church and what remains of the old Hudson Bay Post, now abandoned. A considerable portion of this peninsula is Indian reserve, but there remains much land still open to settlement.

Camp was made for the night (Camp VI.) on the south side of the lake, about 22 miles S. E. of the "Old Fort," at the mouth of a creek entering in from the south, which flows in a well marked valley, said by the Indians to connect with a series of beaver lakes, and which valley connects, over a low pass through the Babine mountains, with another valley entering the Bulkley valley near Moricetown.



FALLS ON LAC LONG RIVER, NEAR FORT McLEOD, B. C.

July 26th.—The camp was broken up and the canoe under way again by 7 A. M. A northerly wind having sprung up during the night, the Hudson Bay Co.'s scow, under sail, overtook us and passed the camp about five o'clock in the morning, although it had started from Babine a day later than did the canoe. By noon some 15 miles had been paddled, but after lunch, a favouring wind springing up, a sail was hoisted and the canoe went ahead with greater speed, and with very much less labour, than with oars and paddles. All went well until after rounding the point where the lake takes a bend to the east, when the favouring breeze became a gale, soon stirring up such a heavy sea that safety lay only in running with full sail right before it, since with a heavily laden dugout it was impossible to take a cross sea. The wind was directly astern and, by its assistance, some 35 miles were made in the afternoon, giving the Indians the fastest sail and the worst scare they had ever had. The Portage, at the head of the lake, was reached at 6 P. M., where Camp VII. was made near the H. B. Co.'s warehouse.

The north shore of the lake, towards its upper end, becomes rocky, agricultural land being entirely absent; the tree growth consists of small poplars and birch, of no value.

The rock formation seems to be the same volcanic series seen the previous year in the country south of the Bulkley valley, consisting of tuffs, basalts, etc., and, as far as could be learned, not having been found to contain mineral of value.

The south-western shore of the main lake, and the southern shore of the lake, after it takes the bend to the east, appear to be well wooded with spruce timber of fair size, much of it fit for lumber.

July 27th.—The portage between Babine and Stuart lakes is 12 miles long, from boat-landing to boat-landing, but in portaging canoes they are put into a creek on the Stuart lake side of the divide, some two miles up from that lake. Across this portage the Hudson Bay Company has built, and maintains, a good waggon road, with warehouses at either end. The Company keeps two men here all summer, with two pairs of horses and waggons to transfer freight across. In passing over the divide the waggon road rises about 300 feet above Babine lake and about 350 feet above Stuart lake. At the head of the lake a small stream, the Beaver river, enters from the south, flowing in a flat, open valley at least a mile wide, extending as far south as the eye could reach, and said to continue through to the west end of Fraser lake. This valley contains some very good land, is lightly timbered in parts, and is admirably suited for immediate cultivation. The land on the portage between the lakes, for a width of five or six miles, is excellent, although a small portion on the summit is rather stony; as a rough estimate, about two-thirds of it is good agricultural land.

The Stuart lake end of the portage is at the mouth of a small sluggish river which flows in from the north-west, having its head in a small lake. This stream, called by the Indians Yiko river, is crossed by the waggon road some two miles from Stuart lake, and at this crossing canoes being portaged are launched, while freight is taken right through to the boat-landing on the lake. From the boat-landing at the mouth of the Yiko river to Fort St. James, at the outlet of the lake, is about 33 miles, which may be taken as the length of the lake, although there is a narrower arm of the lake, extending to the north-west from the Yiko, some 10 or 12 miles. The width of the lake proper is from five to six miles. On the north side of the lake, about 10 miles from the western end of the lake proper, the Tatché river flows in from the north-west, out of Trembleur (more properly Tremblay) lake or Cross lake, which receives its water through Middle river from Takla lake. Takla lake is in turn fed by Driftwood river, a stream heading up very near to Bear lake, one of the sources of the Skeena river, where the Hudson Bay Company's Fort Connelly is situated. An Indian portage trail leads from the north-west arm of Stuart lake to Trembleur lake. It was by the

Tatché river, and these connecting waterways, that the Hudson Bay Company formerly transported supplies to Fort Connelly, but, of late years, it has been supplied directly from Babine, across country, by pack-train. This water route is, however, still much used by Indians, and is the best route for prospectors coming from the Interior and bound for the headwaters of the Skeena.

On the south shore of the lake, the hills, rising from the water's edge, are not very steep nor very high, and seemed to be mostly gravel or rock, not affording any land fit for agriculture; except for a few isolated patches, these hills are not covered with timber of commercial size, the whole country having been swept by fire at some remote date. To the north of the lake the hills are rolling and covered with a second growth of spruce and poplar trees, gradually turning into a rolling plateau, having an altitude of about 2,500 feet and dotted with small lakes, affording numerous small hay meadows and patches of agricultural land.

With the assistance of the Hudson Bay Company's teams, the canoe and baggage were portaged across to Stuart lake and a start made down Stuart lake, a distance of some ten miles being covered before Camp VIII. was made, on the south shore.

July 28th.—Early in the morning the party was under way again, proceeding eastward along Stuart lake and arriving at the outlet, the Hudson Bay Company's Fort St. James, at about 5 P.M., just two weeks from the time of leaving Vancouver. This is considered very good time for a party travelling with baggage, but the same distance has been covered by a Hudson Bay Company's official, travelling light, in four days' less time.

The waters of Babine lake empty into the Skeena river, flowing into the Pacific Ocean at Port Essington, while Stuart lake is on another watershed, its waters flowing by the Stuart and Nechako rivers into the Fraser river at Fort George. From this latter point, during the Omineca mining excitement, a steamboat was run up the connecting waterways to the lake, but did not find sufficient business to justify its maintenance; it was consequently allowed to go to pieces.

July 29th and 30th were spent in the Hudson Bay Company's Fort St. James, encamped inside the enclosure (Camp VIII.), the time being spent in getting the Indians to gather up a pack-train to convey the party through to McLeod lake. Fort St. James and surroundings were fully described in last year's Report. In the Factor's garden were seen the usual garden root crops, including potatoes, while the small fruits had also done fairly well. The Roman Catholic Mission, a mile from the fort, is in charge of Father Cocola, and here a fine crop of Russian barley was seen, about ready to be cut. The Indians, many of them, have small patches under grain and vegetables, but do not seem to bother much with cultivation, once the crop is planted.

July 31st.—After some little trouble, a rather motley pack-train was gathered together and a start made at 2 P.M., from Fort St. James, following a well-defined and broad trail leading to the north-east, a distance of 10 miles being covered before Camp IX. was made on the edge of one of the numerous hay meadows, which occur in the beds of old swamps, long since dry.

August 1st.—A summer frost came on during the night, leaving a coating of ice over the water buckets in the morning. The party was in motion by 8 A.M., and by 2 P.M. had travelled some 17 miles, when Camp X. was made on the shore of a small lake, the waters of which drained into the Salmon river, a tributary of the Fraser, which enters it above Fort George. The height of land between the Stuart lake drainage area and that of the Salmon river was crossed during the day, and was found to have an altitude of almost 2,600 feet.

August 2nd.—Only about 10 miles were travelled this day, when at 2 P.M. Camp XI. was pitched on a small beaver meadow, the last water of the Salmon river drainage crossed on the

trail. Travel for the last two days had been along the comparatively level plateau, which forms the headwaters of the Salmon river, and has an altitude of about 2,500 feet. There are a number of hay meadows occurring in depressions, in which a certain amount of good soil has been accumulated, but these are small in extent, the general character of the country consisting of ridges, composed of sand, gravel and clay, having the appearance of moraines but without any marked direction of drift. The whole district has been fire-swept and, wherever completely cleared, there is good pasture land, but, upon the whole, it cannot be said to be capable of cultivation. Black pine (*Pinus nigra*) grows over large areas, indicating barren, gravelly soil.

August 3rd.—Travel was continued over a generally flat country, with ridges and terraces of sand and gravel. The trail formerly crossed Carp lake at the Narrows, but, as now travelled, runs along the hillside to the north of the lake. Carp lake has an altitude of 2,750 feet and flows into Long lake, which, in turn, empties through Long Lake river into McLeod lake, and thence by the Pack, Parsnip and Peace rivers into the Mackenzie river, which flows into the Arctic ocean.

August 4th.—Starting from Camp XIII., at the outlet of Long lake, the trail, after fording the river near the outlet, follows the general course of Long Lake river, but, as the river here makes a curve to the north and west, the trail takes a more direct course to the north-east, crossing the river again, however, at its outlet into McLeod lake and near the Hudson Bay Co.'s post.

Long Lake river, near the outlet of the lake, where the trail crosses and where the water is sluggish, was found to be a stream about 100 feet across and about two or three feet deep. A few hundred yards farther down, however, the river becomes rapid and, within the distance of half a mile, drops by a succession of rapids and falls through a vertical height of about 200 feet, below which point the river continues to flow rapidly in a trough-like valley. Of these falls Prof. Macoun, Botanist of the Geological Survey, wrote in 1875, as follows:—

“We were well repaid for our trouble, the river descending at three great leaps about 120 feet. They formed a lovely and never-to-be-forgotten picture; the rushing water flashing in the sunlight, the sombre spruce, mixed with the light and graceful foliage of the aspens; the grey lichen-covered rocks and the blue sky and the glorious sunshine contributed to make up a picture not often seen in any country, and that once seen can never be erased from the memory.”

The trail continues over the gravel benches to the south-east of the river valley, and some 300 feet higher, but gradually descends over a series of similar terraces until it crosses the river again near McLeod lake. About 3:30 p.m. the H. B. Co.'s post, in charge of Mr. Hammet, was reached and Camp XIV. was pitched inside the Company's enclosure, securing thereby a partial immunity from those pests of the country, half-famished Indian dogs.

The Indian pack-train was here discharged and sent back to Stuart lake.

The distance by trail from Stuart lake to McLeod lake is estimated at about 85 miles. The country passed over is, generally speaking, a rolling plateau, with an altitude varying from 2,600 to 3,000 feet, and made up of gravel and sand ridges and terraces, rather than hills, the surface being gently undulating. The soil consists of gravel, sand and clay, almost completely masking the solid rock formation. The few rock exposures seen, near Carrier lake and on Long Lake river near the falls, were basalt, while in low-lying ground near Carp lake, granite, apparently in place, was found, probably the same classed by Dr. Dawson as of probable Laurentian age. As McLeod lake was approached, small and rather indistinct exposures of schist were noted, apparently coming in from the east.

The first 15 or 20 miles of the trail, after leaving Stuart lake, is on the Stuart lake and Nechako river watershed; next to this is the watershed of the Salmon river, which extends nearly to Carp lake, which latter is an Arctic watershed. The two summits thus passed over are scarcely discernible, the plateau being a level lake country and the source of the various streams which flow to such diverse destinations.

August 5th, being Sunday, was spent in the usual occupations of that day in camp, washing and patching up clothes which were already in need of it.

There seemed to be some question as to how well supplied the Hudson Bay posts on the Peace river might prove to be; they were so distant, the time required to reach them so uncertain, and the facilities for subsequent transport were so doubtful, that it was considered advisable to replenish the camp supplies at McLeod lake and to procure enough of the essentials of camp fare—flour, beans, bacon and sugar—to last throughout the whole trip, as this post had a plentiful supply.

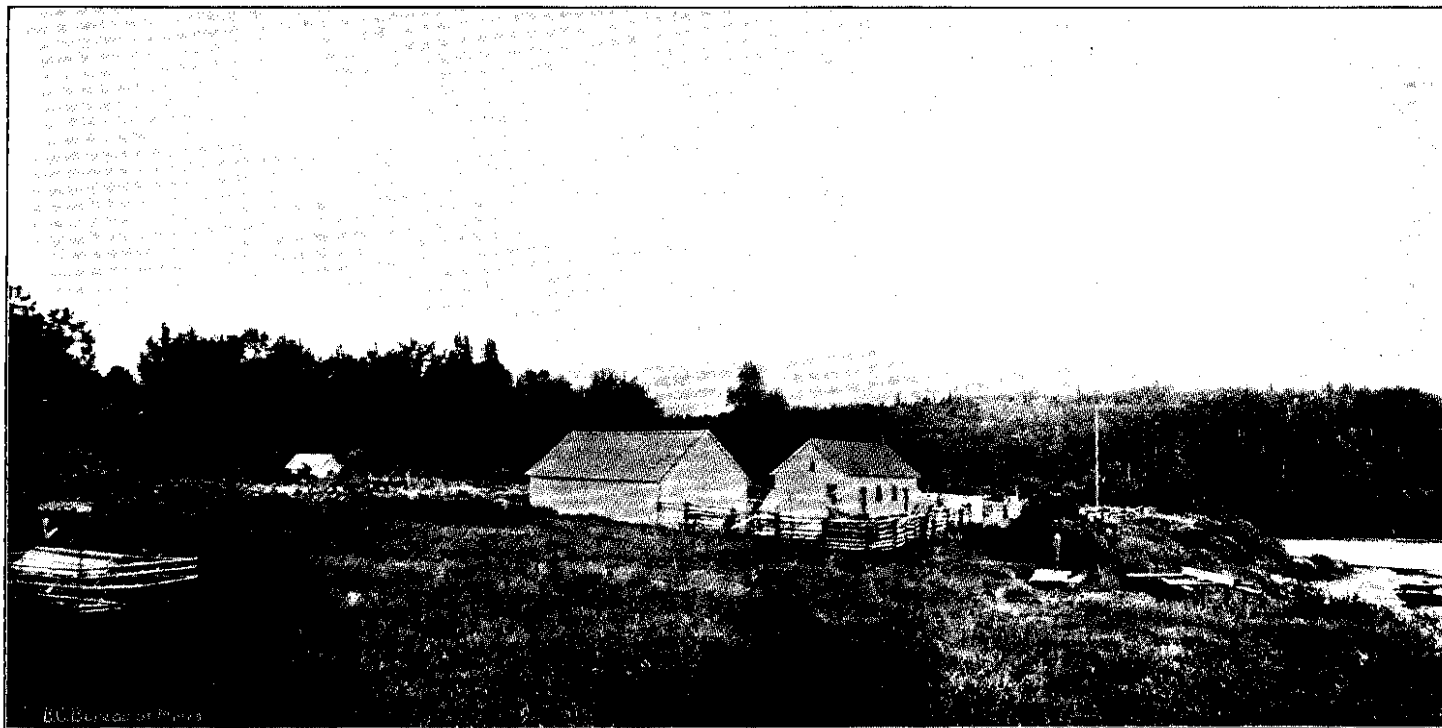
When all supplies and camp dunnage were "sized up," it was apparent that these, with a party of three and two local Indian guides or canoeemen, could not be crowded into one canoe and leave free-board sufficient to be safe in the rough and swift water to be encountered; therefore, in addition to the canoe hired from the Hudson Bay Co., and in which the Indians were to return, a second 38-foot cottonwood dug-out was bought, and the party and supplies divided between them.

McLeod lake discharges to the north through the Pack river, which in turn empties into the Parsnip river. This lake, which is about 17 miles long by $1\frac{1}{2}$ miles wide, lies in a north-west and south-easterly direction, parallel with the Rocky mountains and along the western slope of what might be called a second range of low foothills, separated from the main range by the valley of the Parsnip. The altitude of McLeod lake is about the same as that of Stuart lake, say from 2,250 to 2,300 feet, and the latitude of its outlet, according to Dr. Dawson, is $55^{\circ} 0' 2''$ north.

Around the lake there is a narrow margin of flat land, composed of sand and gravel, covered only superficially with mould and silt, which, while productive of a fine crop of grass, etc., is not deep enough to stand cultivation. On the west side of the lake, back of the flat bottom-land, the hills rise gradually to the plateau level, the whole being densely wooded with poplar, cottonwood, small spruce and balsam. On the east side of the lake the hills rise somewhat more rapidly, to a height of about 600 feet above the lake, and are wooded with spruce of fair size; this side of the lake seemingly having escaped the general conflagration which denuded the plateau to the west.

The geological formation of this section is, superficially, the sand, gravel and clays of the Boulder clay period, which so completely mask and cover the underlying solid rock formation as to leave very few exposures visible, and these are entirely of sedimentary origin, limestones, sandstones, mica, schists, etc., probably a part of the main Rocky mountain formation. This formation seems to continue to the northward, down the valleys of the Pack and Parsnip rivers to the Peace.

August 6th.—The necessary supplies for the long trip of 260 miles to Fort St. John, the next supply point, having been obtained, these and the camp dunnage were divided between the two canoes and, at 11 a.m., the party, consisting of the writer, Mr. Harold Nation as assistant, and a cook, with two Indian canoeemen, Charles Murdock and Patrick Ketloo, one in each canoe, started down the Pack river. These Indians had been brought from Stuart lake, a practice always followed by the Hudson Bay Co., as the McLeod lake Indians are a branch of the Beaver tribe, a tribe of nomadic Indians having no fixed abode or permanent settle-



FORT McLEOD, HUDSON BAY CO. POST, McLEOD LAKE, B. C.

ment, but living summer and winter in tepees, following the game around and, consequently, not to be relied upon to do any work, and in this instance it was found that their village was completely deserted, save for a couple of old men and women.

The Pack river is a rapid stream from 40 to 60 yards across, its bed composed of large boulders and its channel frequently split by islands, in which subdivision the water becomes, in late summer, very shallow even for canoes. The difficulties mentioned, combined log-jams and "weepers"—trees that had grown on the bank and, being undermined by the current, had fallen into the river with their roots still attached to the shore—rendered canoeing anything but safe. The Indians, however, proved to be expert canoeemen and the trip was made without mishap.

About seven miles down, the river widens into a lake, some three miles long and one and a half miles across, locally known as Trout lake. The Pack river, from here to its junction with the Parsnip, is nearly parallel with the latter river, between the two being a strip of low-lying country only a couple of miles across. From the east side of Trout lake, about midway between its ends, there is a portage trail across this strip, about three-quarters of a mile long, to the Parsnip river. This trail is used by the Indians in preference to following one river down for 12 miles to the junction and poling 12 miles up the other. Crossing the Parsnip river, this trail continues eastward through the Pine River pass to Fort St. John, and over it the Indians claim they reach that point in 10 days' travel.

From Trout lake to the junction of the Pack and Parsnip rivers is a distance of about 12 miles, the first portion of which is a succession of rapids; in the last the river is deeper and flows more quietly between banks heavily wooded, chiefly with cottonwood trees (*Populus balsamifera*). On the evening of the 6th, Camp XV. was made on the east bank of Pack river, about three miles above the junction of the Parsnip.

Trout of all sorts abound in the clear waters of the Pack river, the casting of a fly over the pools and eddies, as the canoe passed by, providing more fish than could be disposed of by the camp.

August 7th.—At the junction of the Pack and Parsnip, both rivers are placid and smooth, running between banks of gravel from 8 to 10 feet high, back of which are flats covered with very large cottonwood trees, and here the Indians of the district make most of their large canoes. The waters of the Pack are yellowish, showing their swamp origin, while those of the Parsnip are green, produced from melting snow and ice on the main range of the Rocky mountains, along the base of which the river flows. At this season of the year the Pack river carried about half as much water as did the Parsnip.

Camp XVI. was made on the west bank of the Parsnip, about 15 miles below the junction of the Pack. The Parsnip river is so named from the cow-parship (*Haracleum lanatum*), which grows profusely on the banks.

August 8th.—An early start was made and the canoes once more headed down stream, greater speed being gained from the current, here flowing about 3 miles an hour, than from the paddles, as the day was very warm. At 11 A. M. the mouth of the Nation river was reached and a halt of a couple of hours was made, when some very good fishing was had, chiefly trout and char. Here were caught, for the first time, a number of Arctic trout (*Thymallus signifer*), a beautifully marked fish from 10 to 14 inches long, with most brilliant scales and a dorsal fin sticking up as high as the body is deep.

The distance from the mouth of the Pack to the mouth of the Nation river was estimated at about 30 miles. The Nation river, at this season of the year in about half-water, was from 150 to 200 feet across and about 2 feet deep, with swift running water. The river rises some 60 miles to the south-west in a lake country lying between Stuart lake and the Omineca district.

Looking up the valley of the Nation there could be seen, at a distance of some 20 to 25 miles, a range of mountains, the peaks of which had an estimated altitude of 6,000 feet. From the Parsnip river to the foot-hills of this range the country rises by a succession of gravel and clay benches, the highest of which is some 500 feet above the river.

On the east of the Parsnip the hills rise more abruptly and are densely covered with fair-sized spruce up to 2 feet in diameter, a considerable area of which, however, has been burned over, the burned area bearing aspens (*Populus tremuloides*). That side of the river presents a series of cut-banks, sometimes 200 feet high, composed of clay and sand, with beds of calcareous sandstone of a very soft and easily disintegrated character.

Below the junction of the Nation the Parsnip river is very tortuous; its bed becomes much wider, with numerous sloughs and back channels, at high water forming islands densely wooded with poplar and, on the older islands, with spruce. After travelling down stream about 30 miles, Camp XVII. was made on the east bank of the river, some 15 miles below the mouth of the Nation.

August 9th.—At 8 A. M. the canoes were again under way. The river widens, and again shoals and small rapids were encountered. The river by this time had approached very near to the base of the Rocky mountains, being not more than two or three miles away from Mount Selwyn, a high peak which stands as a sentinel at the gateway by which the Peace river flows through the mountain range.

At about 3 P. M. the junction of the Finlay and Parsnip rivers was reached, the former flowing south-east and the latter north-west, while the combined waters, under the name of the Peace river, flow east through the mountains. Within half a mile from this junction, its origin, the Peace river enters upon the Finlay rapids. At the head of the rapids a landing was made on the south shore, to reconnoitre, as only one of the party, one of the Indians, had ever been on the river before, and it was 17 years since he had been there. These rapids are not more than half a mile long, but the current is very swift, with large curling waves in the centre of the channel, while towards the sides, the numerous large boulders, almost submerged, render that part of the channel very treacherous. While the rapids could easily be run in a Peterboro' or other light canoe, or in a large bateau, they were too rough to be attempted in heavily laden dugouts.

After unloading the better of the two canoes, the Indians attempted to run the rapids light, and succeeded in doing so, although the canoe hung for a minute on a submerged rock in the middle of the rapids, almost upsetting, but finally came off, and the eddy at the foot of the rapids was reached in safety, but with a distinct realization that a very serious calamity and the loss of two or three men had been averted, more by good luck than anything else.

After the experience with the first canoe, it was deemed best to lower the other down with a rope, after having removed most of the load. The dunnage and supplies were carried over the portage, about a quarter of a mile, and by 5 P. M. a start was again made and the river descended for two miles further, when Camp XVIII. was pitched on the south bank of the Peace.

August 10th.—An early start was made from camp, but, after proceeding a few miles, the appearance of a black bear on a green "slide," running down to the water, caused some delay until the animal was brought down and placed in the canoe.

At noon, after travelling some 10 miles, a halt was made at the mouth of Selwyn creek, and it was decided to investigate Mt. Selwyn more particularly; accordingly, Camp XIX. was pitched on the south bank of the river, just below the mouth of Selwyn creek.

Selwyn creek flows in from the south, just to the east of Mt. Selwyn, circling around its eastern base, while at the western base the Parsnip river flows, and on the north the Peace

river, the mountain rising to a height of 7,500 feet, a landmark showing the gateway through the Rocky mountain range by which the waters from the great Interior plateau of British Columbia break through and find their way, down the McKenzie, to the Arctic ocean.

Immediately after lunch, the writer, accompanied by Mr. Nation and one of the men, taking a blanket each and "grub" for a day, started up the valley of Selwyn creek, to approach the mountains from the south, as its northern face is too steep to permit of its being climbed. The mountain range, of which Mount Selwyn is the northern culminating peak, is paralleled on the west by the Parsnip river, while on the east the valley of Selwyn creek runs for some 15 miles along the base of the range, gradually rising to the height of the general hill level, its slopes rising rapidly, but not precipitously, to the ranges on either side, and are covered, to an altitude of about 4,000 feet, with a very fair-sized growth of spruce. After proceeding up the main creek about two miles, a branch coming in from the west was followed up for some three miles, rising rapidly to timber line.

In the absence of any trail or clearing, progress through the unbroken underbrush and network of fallen logs was both slow and arduous, particularly as, during the afternoon, a cold rain began to fall and every bush, when touched, showered down its accumulated water, wetting one to the skin each time and reducing the temperature of the body nearly to the freezing point. At about 7 P.M. timber line was reached, and the night was spent in the rain, under such scant shelter as was afforded by the overhanging branches of a spruce tree.

August 11th.—The climb up the mountain was continued and the summit of the peak was eventually reached by Mr. Nation, the writer "playing out" before reaching the highest summit. Mr. Nation secured from this summit some very comprehensive photographs, some of which accompany this report.

The rock formation exposed at the highest altitudes consists of fine-grained quartzite and micaceous schist, dipping to the south-east. The slope of the mountain on the south-east side follows the inclination of the strata, but on the north-west face of the mountain it is almost vertical, a break right across the formation. This physical feature seems to be common to most of the mountains of the vicinity, and suggests that a series of step-faults accompanied the upheaval of the range. The mountains on the north side of the Peace river show quite different outlines, being more rounded. The high, dome-shaped mountain opposite to Mount Selwyn slopes uniformly, though steeply, in all directions, its upper portions appearing to be an impure limestone, in which a large cave has been weathered out, which is distinctly visible from the river.

August 12th (Sunday).—It rained heavily all day, but cleared up towards evening. No move was made this day, the camp remaining at the foot of Mount Selwyn.

August 13th.—Fine day. An early start was made, and after about four hours' travel down stream, with a three-mile-an-hour current and some paddling, the Parle-pas rapids were reached. The rapids are about 1,000 feet long, and are occasioned by a nearly horizontal bed of sandstone outcropping across the bed of the river, over which, for the greater width, the water flows in a thin sheet, forming a fall of about four feet. Towards the left bank (north side) the sandstone has been broken away, and towards this side of the river most of the water flows, forming, for a width of about 100 feet, short, but very rough, rapids. Along the shore the loaded canoes were lowered down by ropes, the Indians remaining aboard to pole off the rocks. The rapids might be run with a light canoe or bateau without any trouble, but the left side of the river must be taken in doing so. The approach to the rapids, coming down stream, is somewhat treacherous, as the channel from above appears perfectly smooth to the right side of the river and the rapids, true to their name—"Rapide-qui-ne-parle-pas," "Rapid that does not speak"—give no warning of their proximity.

The Parle-pas rapids mark the eastern limits of the Rocky mountain range, in which the peaks rise from 4,000 to 4,500 feet above the river, while to the east, as far as the "Portage of the Mountain of Rocks," the hills are more rounded and only from 1,000 to 2,000 feet above the river. At this point the rocks of the coal-bearing formation begin to show up strongly, continuing to the eastward.

Below the Parle-pas rapids the Peace river is very tortuous, flowing with an almost unbroken surface at the rate of from three to four miles an hour. Its width remains about 500 feet, but the valley between the hills widens to two or three miles, the interval being composed of gravel, sand and clay benches, with valleys of some length and width between the side-hills. These benches and valleys are, on the north side of the river, nearly destitute of trees and covered with a species of bunch-grass, affording possible feed for horses, etc., but the south side of the river presents an almost unbroken forest of small spruce.

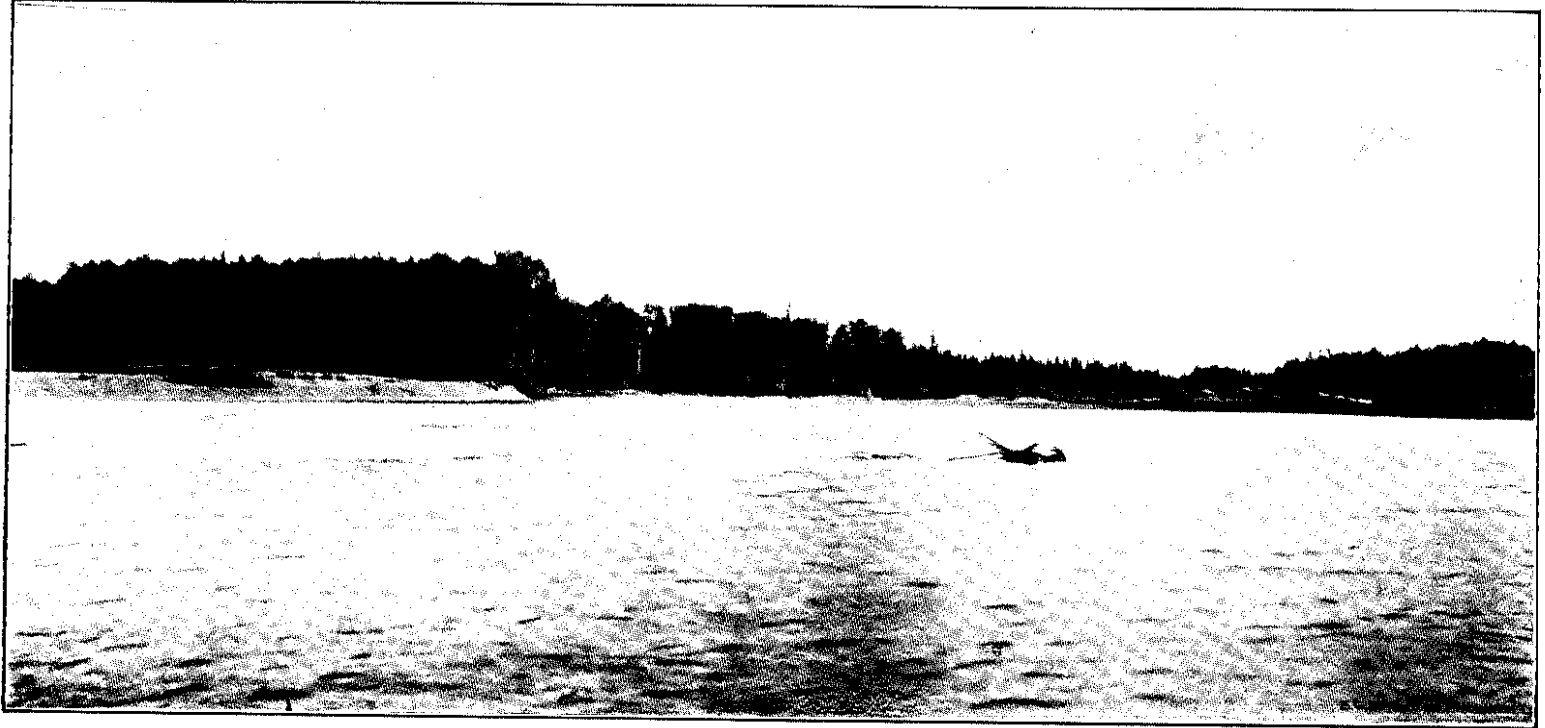
August 14th.—After about five hours' travel down stream, the party arrived at the "Portage of the Mountain of Rocks," which cuts over a shoulder of a rocky hill (4,000 feet altitude) formed at the bend of the river. The river here enters into canyon for some 30 miles, in which it is not navigable, flowing, in a series of rapids and falls, between perpendicular and often overhanging walls of sandstone, the vertical drop in the Canyon being about 275 feet. The distance across the portage, estimated by pacing, is about 14 miles from the upper end of the portage to Hudson Hope. Not wishing to "tackle" the portage this day, Camp XXI. was made at its upper end, and the canoes were lifted out and cached in the brush on top of the bank.

In the afternoon the mouth of the Canyon was examined, where the river, contracting to a width of not over 150 feet, rushed between cliffs of coarse-grained sandstone from 100 to 200 feet high, in which occur occasional bands of dark shale. On the south side of the Canyon some prospecting for coal was done in the summer of 1905 by an engineer from Eastern Canada, apparently with satisfactory results, as he staked out some 20 square miles as coal lands and applied for licence to prospect them, but such licence was refused, as the whole of that section of British Columbia, east of the Rocky mountains, was under reserve.

August 15th and 16th.—It was hoped that horses would be found to pack the supplies and dunnage over the portage, but such were not obtainable, and, consequently, the party had to do it. During the first two days packs were taken 10 miles, where a tent was set up by a small trickling stream, the only water found on the trail, a return being made to the upper end of the portage each night.

August 17th.—With the last of the packs the party went right through, 14 miles, to Hudson Hope, where Camp XXII. was made in a temporarily abandoned cabin belonging to Revillon Frères.

August 18th and 19th.—The supplies cached on the portage were packed down to Hudson Hope. The Hudson Bay Co.'s post, which had existed for many years on the south bank of the Peace river, was a few years ago moved directly across the river to the end of the Portage trail, where it now stands, two crude log houses, having for company two equally crude cabins belonging to the opposition firm of Revillon Frères. These stores are both "outposts" from the regular posts at Fort St. John, some 60 miles further down the river, and have been established for trading with the Indians during the late fall and winter months, which is the season when these Indians, of the Beaver tribe, are in the vicinity. The Beavers are a nomadic tribe, having no fixed place of residence nor permanent habitations, and owning neither horses nor cattle, as they live entirely by hunting. Their "village" was passed on the Portage trail; it was completely deserted, and consisted merely of a number of "tepee" frames situated on the high bench near a spring of water.



JUNCTION OF PACK AND PARSNIP RIVERS, B. C., LOOKING EAST.

Hudson Hope may be taken as marking the eastern boundary of the foothills, as to the east the country spreads out into high-level bench prairie land, having a general height above sea level of from 2,200 to 2,400 feet, into which the Peace river has cut to a depth of about 800 to 1,000 feet, while the smaller water-ways have cut to a correspondingly less degree.

Almost everywhere the surface, for a depth varying from one to four or five feet, is composed of a fine, dark, loamy soil, resting on a bluish clay, underneath which, as seen in the cutbanks along the rivers, lie clay shales with beds of semi-coherent sandstone, all belonging to the Cretaceous period. Interbedded with these measures there are, probably, occasional beds of lignite, and possibly of true coal. The "float" from these seams was found in various creeks, but the beds in place could not be found, a matter not to be wondered at, as every cutbank seems to have a fresh mudslide each spring.

The Peace river, below Hudson Hope, has a width of from a quarter to half a mile, and, although flowing at the average velocity of from five to six miles an hour, contains no rapids, as its bed is composed of gravel and small, round, water-worn stones, producing innumerable bars and shoals, with numerous islands, almost every one of which bears evidence of having been originally a gravel bar, on which, at the upper end, a log jam had formed, producing a breakwater behind which the sand and silt had collected, forming a foothold for the vegetation of forest trees which now grow so luxuriantly.

In the back channels and eddies sand and silt bars have collected, and these, particularly nearer the Canyon, show colours of fine gold. Attempts have been made to wash these bars with cradles and sluices, but, while some quantity of gold has been recovered, the bars are not rich enough to pay for this class of mining. The results obtained, however, indicate the possibility of their being successfully worked by dredging, the character of the river bed, its freedom from all boulders, etc., being particularly suited for such operations, although, at the present time, the difficulties of transporting heavy machinery into so remote a district seem almost insurmountable.

At highest water the river is too swift, and at low water too shallow, for steamboat navigation, but, for a period during midsummer, the Hudson Bay Company operates a large and well equipped stern-wheel steamer from Vermilion to Peace River Crossing, at the junction of the Smoky river, a distance of some 300 miles, with each year occasional trips to Fort St. John. In 1906 the steamer ran one trip to Hudson Hope, a distance of 250 miles above the Crossing, thus providing transportation over a distance of 550 miles of river; a length of river navigation which can best be appreciated by stating that it is approximately 50 % greater than that provided by the St. Lawrence river, from the "Great Lakes" to Quebec, on tide water. According to the Geological Survey, the fall in the river between Hudson Hope and Vermilion is 572 feet or about one foot to the mile.

On the plateau level, on the north side of the Peace river, there is a waggon road extending from Peace River Crossing to Fort St. John, built by the Dominion Government during the days of the Klondike rush, when that most iniquitous attempt was made to boom the "Edmonton Route" to the Yukon, the cause of many deaths and hardships innumerable. In extension of this road, which is not much more than a track over the prairie and requiring no construction, the Dominion Government has, during the past two seasons, been engaged, through the Royal North-West Mounted Police, in marking out a trail through to the Yukon, and has succeeded so far in getting a little further than Fort Grabame, in British Columbia, at which point a detachment has been obliged to winter this year. This trail leaves the Peace river at Fort St. John and bearing north-west, strikes the Half-way river about half-way up. This river, and a tributary, were followed up for some distance when, crossing the plateau, the trail strikes the headwaters of Otter Tail creek, which, in turn, is followed up to

the Laurier pass, through the Rocky mountains into the valley of the Finlay and to Fort Grahame. For the most part, the route taken has been along an old Indian trail between these two points, which has been re-cut and cleared out. It is understood that, during the coming summer, this trail is to be continued to Fort Connelly, on Bear lake, and eventually through to the Yukon Telegraph trail, at or about the "4th Cabin" above Hazelton.

August 20th.—Realising the improbability of obtaining pack-horses at Hudson Hope, it was the intention to build a raft and to float down the Peace river to Fort St. John—some 60 miles—at which latter point it was hoped that horses could be obtained with which to make a trip into the country south of the Peace, and between it and Pine River, which would have meant a retracing of steps to a certain extent. At this juncture, however, the difficulty was otherwise solved by an unexpected stroke of good luck, as a Cree Indian from Lesser Slave lake, who was hunting in the country to the south, came into Hudson Hope for supplies and readily agreed to provide transportation for the party through the district desired and to deliver the "outfit" at Fort St. John. This Indian was sent for horses, of which he had some 20 or more, at Moberly lake, with instructions to turn up next day. The two Indians who had come on with the party from Fort St. James were paid off, given supplies for the return trip, and sent back up the Peace to their home, where they arrived in due course.

August 21st.—The Cree Indian, Charlie Callahan, turned up with his horses about 4 p.m., and the heavier portions of the dunnage were moved across the river in the two small canoes of which the place boasted.

August 22nd.—An early start was made, the remainder of the camp outfit moved across, the packs made up, and by 9:30 the pack-train started for Moberly lake, some 20 miles distant in a southerly direction. The trail follows up a small creek for some distance, the waters of which, as well as the banks, were saturated with iron rust, apparently seeping out of the banks of clay. Following up this creek for three or four miles, the level of the general plateau was reached, from 800 to 1,000 feet above the Peace river. This plateau is generally rolling, covered with luxuriant grass, although in many places overgrown with willows and poplar bushes, while along the route of the trail there is a series of small lakes or ponds. The soil is excellent, the snowfall is reported to be light, but the winds strong in winter, although frequent "chinooks" blow through the Pine River pass. This section, and the mountains to the westward, are very favourite hunting places for the Indians and half-breeds of Alberta, and here they turn their horses loose to winter without shelter or any provision for feeding them, further than nature provides, and they say that in the spring they find them in good condition. Accompanying this Report is a photograph of one of the many open prairies passed on the way.

About 5 p.m. the western end of Moberly lake was reached, and after travelling about five miles down the north side of the lake, a temporary Indian camping place, formerly a trading post, was reached at about 7 p.m., where Camp XXIII. was pitched for the night.

August 23rd.—Moberly lake is about 15 miles long, in a general east and west direction, by about two miles wide; it receives from the west a stream which rises towards the headwaters of the Pine river, in the Rocky mountains, and empties to the north-east by Moberly river into the Peace river, some five miles above Fort St. John. The lake lies at the base of the foothills of the main range, and on the western edge of the plateau area, which, here begins to be hilly rather than rolling.

To the west of the lake, up the valley of the inflowing stream, there is a considerable area of fine farming land, protected from the northern winds but open to the warm "chinooks"

from the Pine River pass. An old Yukon miner named White, or Le Blanc, has already "squatted" on a rancho here and has made a start, with a fair band of horses; cattle will not do, as the wolves are too numerous.

To the north of the lake the country consists of rolling hills, grass-covered, with occasional bunches of scrub timber, and, while probably not suited for cultivation in this latitude, affords good grazing, and as it is wind-swept in winter, is said to be usually free from snow, enabling horses to get at the dried grass when they most need it. Towards the north end of the lake, at the outlet, there is, on the north side, an area of several thousand acres of fine level grass prairie, devoid of trees, and with excellent soil. This good land is reported to extend for some distance down the Moberly river, towards Fort St. John, although, as the Peace river is approached, the valley becomes very narrow. To the south of Moberly lake, as far as the eye could see, the country appears to be more hilly, and is covered with a thick forest of small spruce.

The trail followed passes along the north side of Moberly lake, crossing the river just below the outlet and continuing due east, up a draw, rapidly climbing a range of hills (elevation, 3,150) that runs north-easterly and separates the valley of Moberly river from that of the Pine. After crossing the range of hills, the trail drops rapidly into the general valley of the Pine river, in which it would appear the river has had various channels, the present channel being the most easterly, while the other channels are indicated by almost continuous lines of lakes, lying in clearly-marked valleys, all trending towards the headwaters of the present river. These old channels are some 300 feet lower than the general plateau level, which latter has a height above sea level of from 2,200 to 2,400 feet. The soil of the plateau is a fine rich loam, underlain by clay. The surface is undulating, but much cut by water-courses, which become gradually deeper as they approach the larger streams.

The whole district bears evidence of having been covered with a dense growth of spruce or similar timber, which has, at some comparatively recent period, been burned off and has been replaced by a scrub growth of poplar from 15 to 30 feet high, through which the trail is very indistinctly marked.

There are numerous game trails and Indian hunting trails running in all directions that are very confusing to a stranger in the country, while the almost continuous growth of poplars shuts out any view of hills, etc., precluding the use of such landmarks in travelling, so that it is not advisable for anyone to travel without a guide thoroughly familiar with the district.

After travelling some 25 miles, Camp XXIV. was pitched on one of the numerous open prairies along one of the older Pine river channels.

August 24th.—During the night there was a heavy rainstorm, but by morning everything was dry again. In this district it appears that most of the rain falls at night, followed by bright days.

The trail, in a few miles, came to the edge of the valley of the Pine river, but kept along the plateau some little distance back to avoid the numerous coulees, or gulches, making out from the main valley. It is not practicable to follow down in the river valley, since, while there is considerable bottom land, it is first on one side of the river and then on the other, the river wandering from a cutbank on one side to one on the other, effectively cutting off all travel along either bank. The season was reported to be exceptionally dry, but still the vegetation on the plateau did not appear to have suffered from drought, as sufficient moisture is obtained from heavy dews at night. The afternoon was spent following down the valley of the Pine river, along the plateau, where the characteristics already described continued, the valley becoming deeper as it neared the Peace river.

Great difficulty was experienced on the plateau in finding sufficient water to drink, such water as was obtained being surface water in shallow, half-dry streams; washing was out of the question. On the evening of the 24th Camp XXVI. was made about 12 miles from Peace river, beside a small water-hole that the Indians had found.

August 25th.—The Pine river here takes a bend to the east, entering the Peace river some five miles below Fort St. John, while the trail keeps to the north across the plateau direct for the fort. The plateau maintains its level until within about half a mile of the river, when the valley of erosion of the Peace is reached and the ground drops off at an angle of 30° to the river bottom, some 800 feet lower. From the edge of the plateau most magnificent views are had up and down the river, showing its sinuosities for miles, its various islands and back channels, and giving a comprehensive idea of its general character and of the surrounding country, such as never could be obtained from the river valley. Photographs of some of these views accompany this Report.

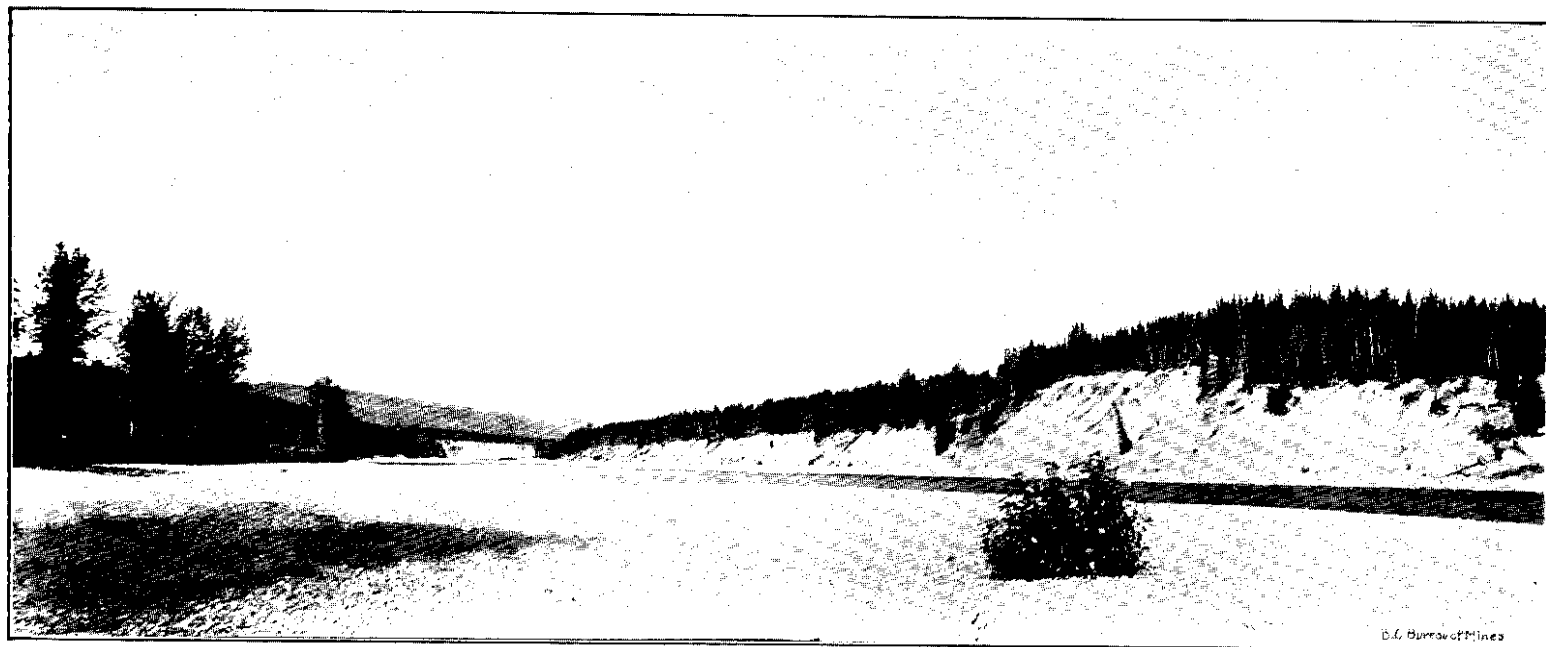
In the afternoon of the 25th Camp XXVII. was pitched on the south side of the river, directly opposite Fort St. John. Here the trails from the south converge on a large flat, some ten to fifteen feet higher than the water in the river, and three or four miles long by about half a mile wide, much of which is open prairie and the remainder covered with small poplar and aspen; the soil is good and the whole flat capable of being put under cultivation at once. On this flat, Mr. John A. Macdonnell, the commissioner appointed by the Dominion Government to make the selection of the 3,500,000 acres in the valley of Peace river that it is entitled to receive from the Provincial Government, has built two large log buildings and done some fencing; here he stayed for two seasons with a large party investigating the district, and it is supposed he has now made the selection, although the boundaries of such have not, as yet, been made public.

The altitude of the water in the river at this point is given by the Geological Survey as 1,462 feet above the sea level, while the writer's observations made it 1,450 feet.

Fort St. John is on the north bank of the river, on a small area of comparatively level land at the foot of the steep banks which rise some 800 feet higher to the general plateau level. There has been located here for over 50 years a Hudson Bay Company post, and of late years some free traders also established a trading post, which has, within the last two years, been taken over by Revillon Frères as one of their chain of posts. During the winter of 1905-6 the Royal North-West Mounted Police maintained here a detachment that had been employed in the cutting out of the trail to the Yukon, already mentioned.

August 26th.—Sunday was spent in camp, washing and repairing clothes. It was desired to take a trip to that section of the district to the south-east of the Pine river, but west of the Provincial Boundary, known as the Pouce Coupé prairie, for which horses would be required, and it was found that none could be obtained at Fort St. John. Here again there was an unexpected piece of good fortune, since Tremblay, a French-Canadian who had served as guide to the Macdonnell party, and bought all the horses, supplies, etc., of that party when it left about a month before, had settled in the Pouce Coupé and was at St. John on a trip, with all his horses, to take a load of supplies back to the Pouce Coupé, and was returning on the 28th. Arrangements were speedily made with him to transport and guide the party through the district, and the Indian, who had provided transport from Hudson Hope, was paid off and returned to his camp on Moberly lake. In the afternoon the writer crossed over to Fort St. John and arranged with the Hudson Bay Company for storage of all but necessary baggage, etc., the Company's agent, Mr. Beeton, kindly putting the "guest cabin" at his disposal.

August 27th.—Camp was not moved. The day was spent in the vicinity photographing and washing up, and in the afternoon all spare baggage was moved across the river to St. John.



LOOKING NORTH DOWN THE PARSNIP RIVER, B. C., FROM MOUTH OF NATION RIVER.

B. C. Bureau of Mines

August 28.—It had been planned to make an early start to-day, but a heavy rain, which fell during the night, rendered the steep clay cutbanks so slippery that horses could not climb them, so a delay of a day was necessary. During the afternoon the camp was left unguarded for a couple of hours, during which time the "sleigh dogs" from the neighboring cabin had "rustled" all the bacon, bread, etc., in fact, everything edible not in tins, although these supplies were hung up on a pole tripod some six feet above the ground. Fortunately, the base of supplies had not been left and the commissariat could, therefore, be replenished.

These sleigh dogs are the curse of the Northern country; they are mongrels of the worst description, usually Indian bred, and invariably thieves; in one instance they stole meat out of a pot boiling on the fire. More experienced travellers in the district go provided with a strongly bound wooden "kitchen-box," with a good padlock.

August 29th.—An early start was made for the Pouce Coupé prairie. Tremblay's pack-train was heavily laden and was new to the work, so that travelling was slow, only averaging about 15 miles a day.

The trail follows the river down for a couple of miles along the Macdonnell flat, when it mounts to an intermediate bench about 300 feet above the river, along which it continues for some three miles to a cutbank on the Pine river, at a point about five miles from its mouth. This intermediate bench affords excellent grazing, and is a beautiful prairie devoid of trees, but the soil, which lies on top of gravel, is so thin that it is not fit for cultivation, differing in this respect from both the upper and lower benches.

The Pine river, where the trail crosses it, is about 200 yards wide, swift flowing, and at this season of the year the water comes well up to the horse's belly when fording, but not high enough to wet a pack. The river, as far above and below the ford as could be seen from the hill on either side, is "in coulee," having steep cutbanks of clay and gravel and with no available bottom land.

After crossing the river, the trail mounts to the plateau level along a hog-back ridge and continues over the plateau to the Pouce Coupé prairie, but with numerous drops into the valleys of intersecting stream beds, for the most part dry at this season.

The country passed over during the day on the upper plateau was a repetition of the Pine river country on the Moberly lake trail, rolling prairie and small, rounded hills, covered chiefly with small poplar of a stunted growth. The soil is excellent, fine rich loam on a clay subsoil, supporting a most luxuriant growth of pea-vine and wild grass. There are a few muskegs, but their area is proportionately small and they are easily avoided.

After travelling some 15 miles, Camp XXVIII. was made on the plateau beside a dry creek bed. The only water obtainable was from a small hole dug in the gravel of the creek bed, out of which a couple of buckets of muddy water were bailed with a cup. There was no other water supply to be had on the trail for 15 miles, which fact alone regulated the length of the day's drive with the horses.

August 20th.—Travelled all day over similar plateau, mostly covered with poplar, but with occasional small patches of spruce forest—fair sized trees—which seemed to have escaped the general burning over to which the section had been subjected. After travelling 15 miles, during which two or three miles of the trail had to be cut out to let pack-horses through, Camp XXIX. was pitched at Chippewa camp, on the edge of a spruce forest and alongside a running stream.

August 31st.—Travelled 14 miles to-day and made Camp XXX. at 3 P. M., on the banks of Cutbank river, which at this season is a small brook, but in the spring a deep swift river, some 100 to 150 feet across, with banks which rise in terraces to a height of 500 feet above

the river; that is to say, the river has cut to this depth into the plateau. Cutbank river flows into the Peace river about 35 miles below Fort St. John.

During the day Coal creek, a small, dry creek, was crossed, in the bed of which were seen a number of pieces of lignite coal. The coal beds themselves could not be found, and were probably some distance up the creek. Sandstone was found in the various creek cuts, apparently lying nearly horizontally, and being very soft and partly cemented together.

September 1st.—Started at 9 A. M. After travelling 14 miles—part of the distance over a desolate plateau, much of which had been recently burned over, the rest of the way through a tangle of alder bushes, which so encumbered the trail that the horses had to fairly push their way through—the western edge of the Pouce Coupé prairie was reached, and as the grass had been largely burned off by forest fires, it was found necessary to camp on the edge of the prairie, where some feed for horses remained. Camp XXX. was pitched on the edge of Saskatoon creek in a clump of willows, in order to obtain shelter from the wind which sweeps so incessantly across the open prairies from the Pine river pass. The distance from Fort St. John to this edge of the prairie is about 58 miles, but, as nearly as could be reckoned, not over 15 or 20 from the Peace river, travelling due north over a country which is easy to travel until the steep banks of the Peace river are reached.

September 2nd.—Moved across the south-eastern edge of the prairie, where Camp XXXII. was pitched on the edge of Dawson creek, where it flows into a larger stream, known locally as Bear river, and called D'Echafaud creek by Dr. G. M. Dawson, but more recently named Pouce Coupé river by the Geographic Board.

September 3rd.—Leaving the camp and pack-train at Dawson creek, a trip was made with saddle-horses along the south-western edge of the prairie and some photographs were taken.

September 4th.—Sending the pack-train back to the camping place at Saskatoon creek, the writer, with Mr. Nation and Tremblay, made a tour of the prairie to the north-east, returning to Camp XXXIII., at Saskatoon creek, in the evening.

The Pouce Coupé prairie, on which the three preceding days were spent, is an extension into British Columbia of the prairie lands of Alberta, and is a great, open, rolling prairie, some 25 miles wide by 40 miles long. This prairie land lies immediately west of the Provincial boundary line, and its northern edge would be about 10 miles south of the Peace river. It is bounded on the east by the Pouce Coupé river (D'Echafaud) and on the west by Mud river. The general elevation of the land is about 2,400 feet above the sea level. The prairie is almost free from brush and is covered with a luxuriant growth of wild hay; it is well watered, being dotted with small lakes and by numerous small streams, which are so near their source that they have not cut very deep into the prairie. The soil is excellent, a dark loam varying in depth from 3 to 15 feet, underlain by clay. A sample of the soil was taken near Saskatoon creek, the analysis of which, by the Provincial Government Assayer, is as follows:—

Moisture.....	2.80 %
Loss by ignition.....	8.20 "
Insoluble.....	77.61 "
Oxide of iron.....	3.50 "
Alumina.....	5.70 "
Lime.....	0.60 "
Potash.....	0.81 "
Phosphoric acid.....	0.20 "
Nitrogen.....	0.44 "
Alkali.....	None.

Where the sample was taken, the bank, having been undermined by the creek, some 30 feet below, had broken away, leaving a fresh face, and the sample represents an average of the soil for a depth of some 30 inches over a considerable length.

This district takes its name from a celebrated Indian Chief, Pouce Coupé, "cut thumb," whose hunting ground it was, and has long been a favourite hunting place for the Indians from the plains, and here they wintered their horses, while they spent the winter hunting and trapping in the mountains to the west. The snow-fall is said to be light and the wind keeps the side-hills bare, giving winter grazing. The trees and bushes certainly present a scrubby appearance, indicating a severe winter, but plant life, such as grasses, etc., which have a summer's growth, bear strong evidence of the fertility of the soil and the warmth of summer.

September 5th, 6th and 7th were spent in retracing steps to Fort St. John, arriving there about 6 p. m. on the latter day.

September 8th.—It rained all day, so camp remained in the Dominion Government house, on the south bank of the river.

September 9th.—The party moved across the river to the Hudson Bay Co.'s post, where the agent put a log cabin, containing a cook stove, at its disposal.

So many bear and the signs of other game had been seen on the Pouce Coupé trip, that the half-breed cook's hunting fever was raised to such a pitch that he was rendered useless for his work, so, as he expressed the desire to spend some time in the district, he was here discharged and paid off. From this point on, the party consisted of the writer and Mr. Harold Nation.

September 10th.—It was hoped that it would be possible to get horses and a guide to visit the country north of the Peace river, but the only horses in the place belonged to Indians from the north, who have a great objection to their section being visited by a white man, and, under the chief's instructions, they refused to either hire their horses or to act as guides. Consequently, all that could be done was to go as far on foot as possible; so, in company with, and under the guidance of Father Hess, a R. C. missionary at the post, on September 11th the writer and Mr. Nation set out on foot and walked some 10 miles back on the upper bench, 800 feet higher than the river, and to the top of a small rocky hill, from which the country for miles around could be seen. From what little could be seen and from descriptions obtained from others who had travelled over it, it would appear that for some miles north of the Peace river the country is very similar to that described as seen south of the river. The soil is similar, the analysis of a sample taken from the plateau four miles north of Fort St. John, made by the Provincial Government Assayer, being as follows:—

Moisture	2.90 %
Loss by ignition	9.60 "
Insoluble	76.61 "
Oxide of iron	3.90 "
Alumina	4.00 "
Lime	0.80 "
Potash	0.73 "
Phosphoric acid	0.25 "
Nitrogen	0.30 "
Alkali	None.

About 20 miles north of the Peace river, muskegs are reported as beginning, becoming more and more frequent as one proceeds north, so that a distance of 30 miles from the river would probably cover all the land suited for agriculture. The climate north of the Peace is reported as being much colder than it is south of the river, and chinooks are not so numerous, owing to the fact that there is no low gap in the mountains by which the warmer winds might enter.

September 12th.—There was found at St. John a bateau built by the R. N. W. Mounted Police, and left by them in charge of the Hudson Bay Co. This the writer was allowed to use, on condition that he deliver it to the Police Officer at Peace River Crossing. All the seams of the bateau had to be caulked, which took a whole day, while Mr. Nation was engaged in hewing a pair of oars out of a couple of dry trees.

September 13th.—In the afternoon all the baggage was aboard the bateau and the trip down the Peace river began. The boat was so big and awkward and the oars so crude, that the current was trusted to almost entirely; but as this runs at an average speed of some five miles an hour, very good headway was made. Mr. Beeton, agent of the Hudson Bay Co. at Fort St. John, started at the same time in a small canoe, with his two boys and an Indian, but after accompanying the bateau for two days he went ahead, and was only overtaken at Dunvegan, where he had stopped.

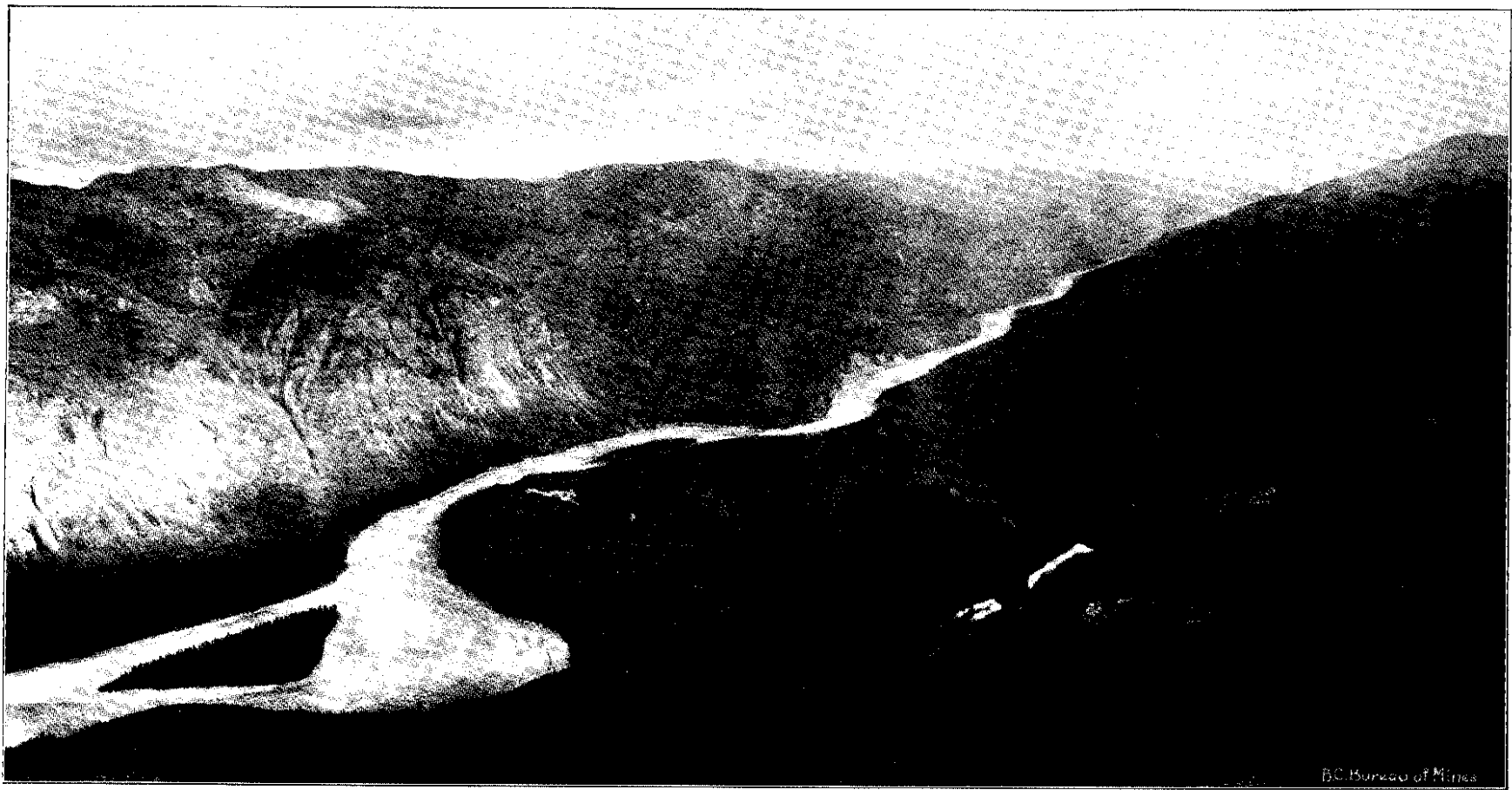
In the spring there had been some rather sensational accounts in the Coast newspapers, which were credited to Mr. Macdonnell, of the Dominion Government Exploration party, as to some wonderfully rich locations, made by him and his friends, on the banks of the Peace river, some 17 miles below Fort St. John, which were reported as being very rich in gold. Mr. Beeton, who acts as Deputy Mining Recorder for this part of the Province of British Columbia, went with the Provincial Mineralogist to those locations and showed where the prospecting had been done. The locations had been made on the north bank of the river, where the river had cut into the bank and exposed a face, in places, 50 feet high, showing the strata to consist of alternating beds of dark, earthy shales, of Cretaceous age, often containing nodular clay iron-stones and calcareous sand-stones, which latter were found to be frequently impregnated with iron sulphides. These beds are seen in the river banks for many miles, having a slight dip to the east and forming the underlying beds of the prairie district. In common with most of the similar formations of the region, these deposits will, when crushed, occasionally give colours of gold, which may or may not have been derived from the present stream. Samples were taken of, what appeared to be, the most highly mineralised portions of the beds carrying the iron pyrites, and the highest assay obtained was about \$2 in gold to the ton. No development work had been done on the properties since they were staked, and as the "Record Year" had just about expired, it is reasonable to suppose that the claims had been abandoned.

The first locations are reported to have been made by a prospector named Mulligan, who had been employed as cook for Mr. Macdonnell's party. Mulligan was met by the writer at Fort St. John, and said that he had disposed of his holdings to Mr. Macdonnell.

The circumstances serves to bring attention to the fact that much of the country contains gold, if only in relatively small quantities, and this may be the source of the gold already mentioned as having been found on bars, etc., in the Peace river.

The first afternoon the bateau travelled down stream some 15 miles, when Camp XXXVIII. was made, on an island nearly opposite the mouth of Mud river, which flows in from the south.

September 14.—In the morning, drifting down the river was again begun, and when the mouth of the North Pine river was passed it was seen that the river flowed in a coulee, with steep banks and with no bottom land. At 10:30 A. M. the mouth of Cutbank river was passed. At about 1 P. M. the boundary line between British Columbia and Alberta, some 45 miles below Fort St. John, was reached, and Mr. Beeton, of the Hudson Bay Co., shot a moose as it was swimming across the river. Camp XXXIX. was made here for the night, Mr. Beeton, after leaving half of the moose meat, continuing in his canoe to Dunvegan.



B.C. Bureau of Mines

VALLEY OF PEACE RIVER, FROM Mt. SELWYN 4,000 FEET ABOVE RIVER, LOOKING NORTH-EAST.

September 15th, 16th and 17th were spent drifting down the river, with some little assistance from the oars. At noon on the 17th Dunvegan, a Hudson Bay Co. post, situated on the north bank of the river, some 110 miles below Fort St. John, was reached. Dunvegan was formerly the headquarters of the Company for this district, but it is now relatively unimportant, serving merely as a trading post for the Indian settlement of Spirit River, which is a few miles south of the river at this point, and is connected with Dunvegan by a waggon road. This post also serves the Indians from the country to the north and a few half-breeds settled in the vicinity.

After a stop of two hours at Dunvegan, where the Company's agent, Mr. S. J. H. Betson, was seen, the trip downstream was resumed, but the day being wet and cold, Camp XLII. was made early in the afternoon, on the north bank of the river, about 15 miles below the fort.

September 18th and 19th.—After floating down the river for two days more, Peace River Crossing, at the mouth of the Smoky river, was reached early in the afternoon of the 19th. Here the boat was turned over to Sergeant Anderson, of the R. N. W. Mounted Police, and Camp XLIV. was made at the police barracks.

From Peace River Crossing there is a road,—so called by courtesy,—to Lesser Slave Lake, a Hudson Bay post and R. N. W. M. Police headquarters for the district, which lies about 100 miles to the south-east. Over this road all the supplies for the Peace River district are teamed, mostly in winter, but at this season of the year, owing to heavy rains and clayey soil, the freight teams had stopped and no horses were obtainable at the Crossing. Here again there was luck, for, although no teams had been through for ten days, on the evening of the 19th a special freight waggon, with four horses and a saddle-horse, arrived at the Crossing from Lesser Slave lake and was to go back again next day, so arrangements were made with the freighter to return with him.

September 20th.—Left Peace River Crossing for Lesser Slave lake post with Marshall Robinson, the half-breed packer. The journey of 100 miles occupied four days, and the Hudson Bay Company's post, at Lesser Slave lake, was reached on the evening of Sunday, September 23rd, and Camp XLVIII. was made on the Company's grounds.

September 24th.—The writer called upon Major Constantine, the Mounted Police Officer Commanding this district, and here again there was good fortune, for, through the courtesy of the Officer Commanding, he was loaned a large Peterboro canoe in which to make the journey of 200 miles by water to Athabaska Landing. Another fortunate circumstance was the meeting at the barracks with Mr. John Fielder, the Alberta Government Inspector of Roads, who wished to make the same trip. A land prospector from the United States, also wishing to go down the river, was found, which made up the requisite crew of four for the canoe.

September 25th was spent at Lesser Slave Lake, where the Indian dogs again cleaned the camp out of bacon, although it was in a box in a well-pegged-down tent.

September 26th.—Mr. Nation and the writer started from the post on Buffalo lake, an extension of Lesser Slave lake, at 10 A.M., but the water in the connecting channel was so low that the canoe, drawing only six inches of water, stuck fast in the mud, and, after wading ashore, Indians were obtained, with few clothes on to get wet or muddy, who had to practically carry the canoe over the shoals to deep water in the lake. The rest of the party was picked up, and by about 4 P.M. a start was again made, to succeed that night in only getting around the point into the main lake, where Camp XLIX. was made on the beach, at one of the few points on the lake where the water was deep enough near shore to permit even a canoe to land.

September 27th.—For a number of days a heavy wind from the east had been blowing, which would have seriously retarded, if not prevented, passage down Lesser Slave lake, but this morning, by further good fortune, the wind changed and blew down the lake, and with the aid of a sail, about 50 miles was made before night, having in the afternoon a rather exciting time running before a dangerous gale and managing by good luck to slip into the mouth of Asno creek, one of the few available shelters on the west shore. The lake being very shallow, a heavy sea rises quickly under a gale. Here Camp L. was made and the tents were set up in a clump of bushes just before a heavy rain-storm set in.

Lesser Slave lake is some 70 miles long by about 10 wide. Down the centre there is a channel perhaps a mile wide, with comparatively deep water, but the rest of the lake is so shoal, with bars of sand running out from shore for miles, that even a canoe does not find water enough to float, and, except at three or four small places on the entire lake, cannot be brought within half a mile from shore. At the mouth of Asno creek the current from the creek, instead of forming a delta, keeps a channel, some 20 feet wide by about a foot deep, washed clear through the bar. This channel was found more by good luck than anything else, as none of the party knew the lake, the only guide to it being the character of the waves breaking in it, and another half-hour on the lake would certainly have seen the canoe swamped.

September 28th.—With a light but favouring wind, and after grounding once or twice on shoals two or three miles from shore, the outlet of the lake was reached about 2 P. M., getting there just in time, as the winds blew up the lake in the afternoon.

After lunch a start was made down the Lesser Slave river, a quiet, meandering stream 100 feet wide, flowing at the rate of about one and a half miles an hour, between perpendicular banks, from six to eight feet high, through an area of level prairie country covered with beautiful grass and hay three feet high, with patches of willow bushes here and there. The course of the river is so tortuous that in one place an artificial channel, cut through the bank for 200 feet or so, cuts off a bend in the river channel for three miles. The steep grass-covered banks, with their willow trees, and the smooth, placidly-flowing water, gave the stream more the appearance of an Old Country canal rather than a northern river in its primitive state. At about 6 P. M. Camp LI. was made, some 15 miles down the river.

September 29th.—The river, from the lake to its junction with the Athabaska, was estimated at about 50 miles as it flows, although a straight line from its source to the mouth is not over two-thirds that distance. The first 30 miles is as already described, but for the next 20 miles the river is a succession of rapids, consisting of water flowing rapidly over shoals, composed of rounded stones and so shallow that it was with difficulty that a channel could be picked out deep enough to float the canoe. By night the river had been descended to a point some 10 miles below the beginning of the rapids, where a stern-wheel steamer was found tied up to the bank for the winter, it having been found impossible to get it any farther up stream, owing to the very low stage of the water. This steamer had been built at Athabaska Landing in 1906 by Capt. Barber, for use on Lesser Slave lake. This night Camp LII. was made aboard the boat, and all greatly appreciated the finding of a ready-made covering under which to unroll blankets and a table and chairs at which to eat meals.

September 30th.—The worst half of the succession of rapids was still to be run, and one of the men left in charge of the steambot, who knew the lower rapids, as he explained, "by dragging the steamer over them," volunteered to accompany the party to the junction of the Athabaska river. When within two rapids from the Athabaska the first mishap was met with, as, in attempting to round a curve in a rapid, the canoe was carried sideways against a boulder, which stove a hole in the frail craft, the boards of which were not more than a quarter of an inch thick and of basswood. Fortunately, however, the shore was reached before the canoe

sank, and, taking the cargo out, a board was rivetted on the inside, over the break, pitch put over the patch, and a piece of tin, obtained by unsoldering a condensed milk tin, tacked over all. Materials for such patching had been carried all the season, and only during the last two days of the long boat journey had they been found necessary.

The Athabaska river was entered about 4 P.M., and after proceeding down stream for some 15 miles, Camp LIII. was made at about 6 P. M., on the north shore of the river.

October 1st.—The Athabaska river is a stream varying in width from 300 yards to half a mile, deep enough for steamboat navigation, at least as far as the mouth of the Lesser Slave river, and flowing with an average current of about six miles an hour.

In the morning a steamer was met taking a last load of supplies up to the mouth of Lesser Slave river, from which point goods are taken up the Lesser Slave river and lake in "York boats," to be forwarded on to the Peace river district.

Late in the afternoon, while running through a particularly wide and swift stretch of river, the canoe bumped a submerged rock, breaking three holes through, fortunately right under a dunnage bag, which partly blocked up the holes. The shore was reached before the canoe swamped, but only just in time. An hour sufficed to put a board patch on the inside of the canoe and a piece of canvas laid on in pitch on the outside, when a start was again made and Athabaska Landing reached about two hours after dark.

October 2nd.—Mr. Fielder, Mr. Nation and the writer left by waggon for Edmonton, a distance of 100 miles, arriving there at 7 P. M. on the 4th.

October 5th was spent in Edmonton.

October 6th.—Left Edmonton in the morning, arriving at Calgary in the afternoon.

October 7th.—Left Calgary at 7 A. M., arriving in Victoria on evening of 8th.

SOUTH-EAST KOOTENAY DISTRICT.

FORT STEELE MINING DIVISION.

REPORT OF J. F. ARMSTRONG, GOLD COMMISSIONER.

SIR,—I have the honour to submit a report on the progress of mining in the Fort Steele Mining Division for the year 1906.

The following table shows approximately the number of mineral claims held during each year since 1899 :—

	Held under Crown Grant or Certificate of Improvement.	Certificate of Work.	New Locations.
1899.....	37	718	729
1900.....	71	704	470
1901.....	104	642	455
1902.....	117	451	253
1903.....	142	335	200
1904.....	167	260	169
1905.....	189	193	181
1906.....	241	235	160

The assessment work done on mineral claims shows a slight increase, but the number of new locations is smaller than in the previous year.

The shipping mines have been the *St. Eugene Group* at Moyie and the *Sullivan and North Star Groups* at Kimberley. The *North Star Group* has shipped only 2,900 tons of ore, but has been energetically pushing development work throughout the year. Work has been continued on the *Stemwinder*, a neighbouring claim to the *North Star*, with good results, and this claim will undoubtedly be added to the list of shipping mines in this Division within the next twelve months.

The syndicate which secured rights during the year 1905 to prospect under the waters of Moyie lake, between the *St. Eugene* and *Aurora Groups*, has been boring on the eastern shore and in the lake, and expects to reach the vein shortly.

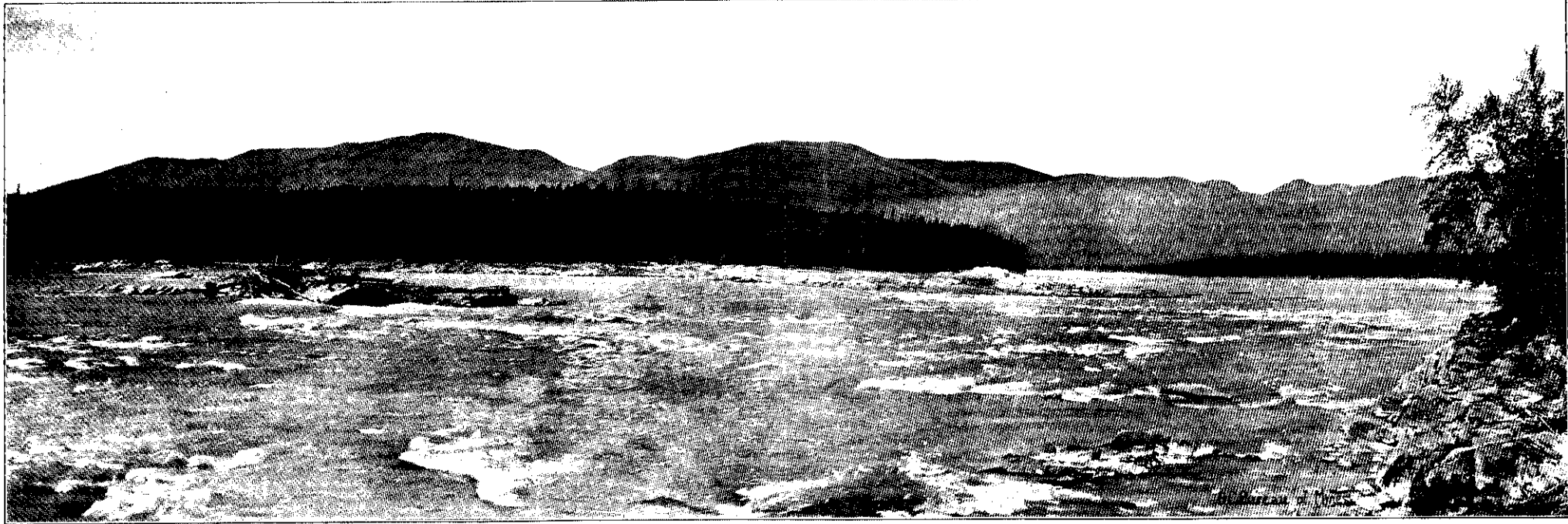
Development work on a large scale would be justified on many properties with the present means of transportation, but capital seems to be waiting for cheaper transport.

The silver-lead ore from this Mining Division has this year contributed largely to the total mineral production of the Province.

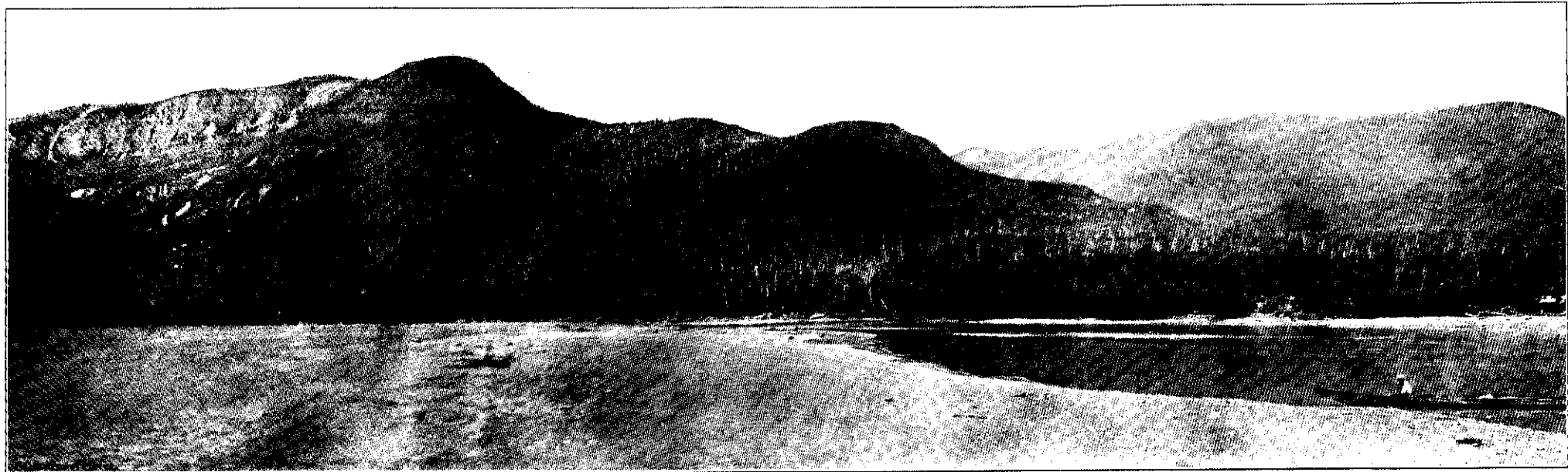
PLACER MINING.

The usual output from Wild Horse creek by Chinamen has been made. An hydraulic plant has been completed by a company of white men, who washed for six weeks during the early part of the fall.

One hydraulic company has been operating with a large staff of men on Perry creek during the whole summer. The steam shovel installed on this creek has not operated this year.



FINLAY RAPIDS ON THE PEACE RIVER, B. C.



PEACE RIVER, MOUNTAINS OPPOSITE Mt. SELWYN, B. C.

The company operating on Bull river resumed work late in the fall, but I have no details of the work done.

COAL AND COKE.

The Crow's Nest Pass Coal Company continues shipping coal and manufacturing coke in large quantities. In consequence of the mines being closed for some months by a strike, it has not been able to supply the constantly increasing demand. The Provincial Mineralogist will report more fully on their operations than I can. The installation of improved machinery during the year will result in increasing the daily output.

The Imperial Coal and Coke Company, having uncovered coal on the different groups of coal licences held by them on Fording river, have applied for and obtained leases over 89 lots, covering 53,851 acres of land. The preliminary survey of a railway route to these properties has been completed.

The Elk Valley Coal Company, holding 44 licences and leases on the upper Elk river, has discovered coal on several of its claims, and is continuing the exploration of the others.

Coal has also been discovered and leases have been granted on 41 lots lying immediately north of Lot 4,588, on the upper Elk river, and leases have been granted covering 26,240 acres.

Coal licences covering 13,440 acres on the north fork of Michel creek are in force.

A syndicate holds 16 coal leases, covering 10,240 acres, at the northern end of Lot 4,593.

I have not in my office any record of the number of coal licences and leases in force in the other parts of Lot 4,593.

OFFICE STATISTICS—FORT STEELE MINING DIVISION.

Mineral claims recorded	160
Placer claims recorded or re-recorded	4
Partnership placer claims recorded or re-recorded	2
Certificates of work	235
Payments in lieu of assessment work	0
Certificates of improvement recorded	30
Conveyances or other documents of title recorded	42
Partnership agreements	2
Gold Commissioner's permits recorded	8
Documents filed	18
Affidavits	289
Records of water grants and permits	2
Mining leases issued	3
Mining leases in force	29
Free miners' certificates issued, (ordinary)	361
" " " " (companies)	6
" " " " (special, individual)	3
Crown grants issued	22
Records of abandonment	2

Revenue.

Free miners' certificates	\$2,224 25
Mining receipts	2,990 75

NORTH-EAST KOOTENAY DISTRICT.

—:—

GOLDEN MINING DIVISION.

REPORT OF J. E. GRIFFITHS, GOLD COMMISSIONER.

I have the honour to submit my annual mining report for the District of North-East Kootenay for the year 1906. Mining is practically at a standstill as regards the shipment of ore, and will probably remain so until there are better transportation facilities in the valley. A large percentage of the ore must be treated on the ground.

This well-known property, which is situated close to the C. P. Railway track near Field, is likely to have another trial. Bunk-houses have been commenced and a wire cable to convey the ore down to the track is on the ground. A lease of the Golden Smelter has been secured, where the installation of new machinery is contemplated for the treatment of this particular ore, which has hitherto always been done at a loss. Whether this proposed new treatment is successful or not remains to be seen.

Work on a small scale has been prosecuted continuously on this group of claims, which is the property of the Labourers' Co-operative Co., and the only one at present worked by them. The development work consists of one tunnel 400 feet and one 200 feet.

Work was discontinued on the *Giant* during the summer, but will be resumed again shortly.

All other work in this Division consisted practically of assessment work only.

OFFICE STATISTICS—GOLDEN MINING DIVISION.

Free miners' certificates	101
Company certificates	4
Special certificates	1
Mineral claims recorded	44
Placer claims re-recorded	1
Certificates of work	26
Conveyances	7
Powers of attorney	5
Agreements	2
Crown-granted mineral claims	92

Revenue.

Free miners' certificates	\$ 898 50
Mining receipts general	710 10
Rent of water records	11 00
Royalty	200 29
Acreage tax	590 00
Tax sales	15 00

\$2,424 89

WINDERMERE MINING DIVISION.

REPORT OF E. J. SCOVIL, MINING RECORDER.

I have the honour to submit herewith my report on the Windermere Mining Division for 1906.

Railway communication, which is not far off, construction being actually under way, will change conditions tremendously, although, as a matter of fact, the different properties can ship at a profit under the present inadequate transportation conditions.

The following properties made shipments before the close of navigation on the Columbia :—*Tecumseh, Nettie M., Black Diamond, B. C. and Tilbury, Ptarmigan and Paradise*, which, with the exception of the two latter, were worked by local owners and one lessee. The *Tecumseh, Paradise and Ptarmigan* will continue work throughout the winter.

Lead Queen Group, on B. D. S. creek, a tributary of No. 3 creek, continues to improve with development work, which, as heretofore, is being done on the sole resources of the three original locators. It is expected that this property will become one of the large shippers in East Kootenay. The owners will continue work throughout the winter.

A new strike was made this season, on the 17th of September, on a tributary of the north fork of Toby creek, and is known as the *Comstock Group*. The paystreak averages about 3 feet in width, and is said to assay \$86.39 to the ton in silver and lead. The owners have installed a winter camp and are taking out several carloads of ore for shipment in the spring. This property is considered one of the most promising locations made in East Kootenay. It is understood that development work on an extensive scale will be commenced in the spring.

Nothing more than the usual assessment work has been done on the majority of the properties, in anticipation of the advent of new capital.

As most of the properties have been previously described by me, I deem it unnecessary to repeat this year.

OFFICE STATISTICS—WINDERMERE MINING DIVISION.

Free miners' certificates	95
Transfers, etc.	10
Assessments	86
Locations	36
Certificates of improvements	2
Water records	28

Revenue, \$2,212.75.

NORTH-WEST KOOTENAY DISTRICT.

REPORT BY FRED. FRASER, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report, on the progress of mining within the Revelstoke, Illecillewaet,* Lardeau and Trout Lake Mining Divisions, for the year ending December 31st, 1906.

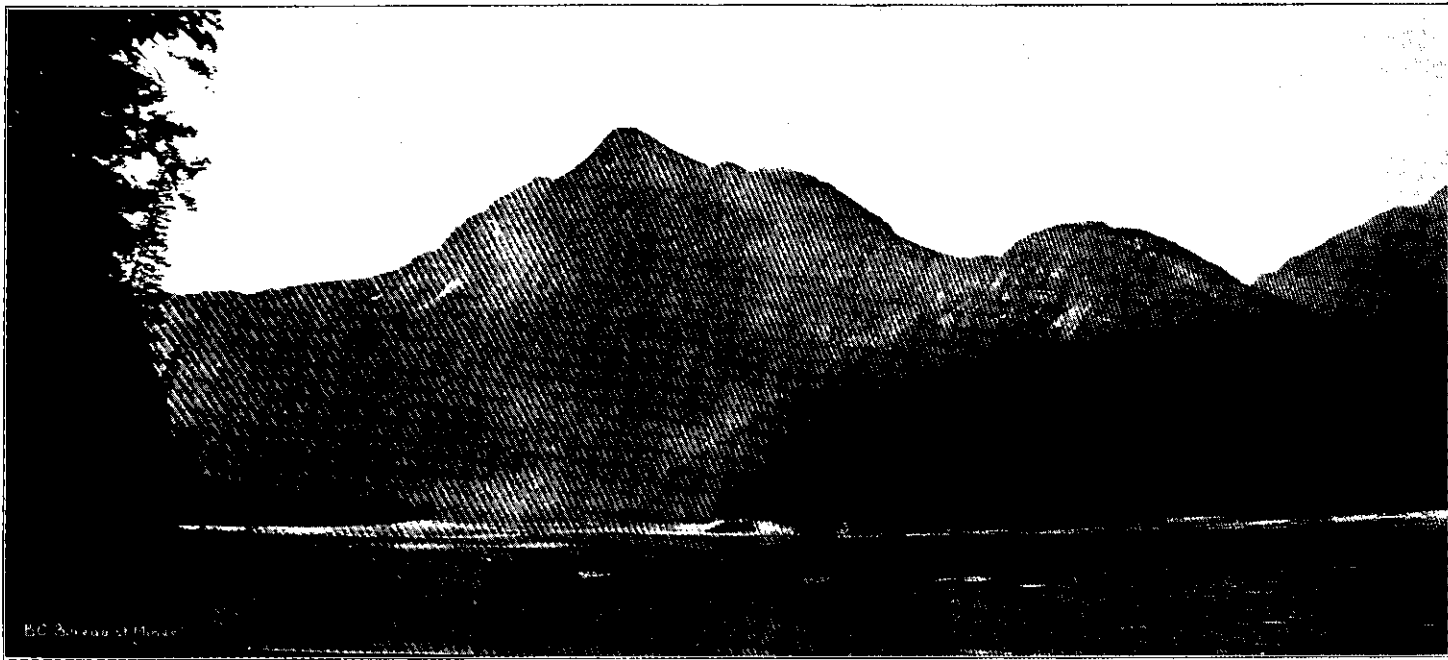
The year now closed has an exceptionally light record in mining. In the Revelstoke Division, the Prince Mining Co. worked a few men in the early part of the season, but in the remainder of the division nothing beyond assessment work was recorded.

In the Lardeau Division the *Eva* mine has kept its stamps going steadily, at the same time carrying on much development work in anticipation of increasing its stamps and mill-power at an early date. The Elwood Tinworkers Gold and Silver Mining Company has about completed its large outlay for machinery, which is nearing its final installation, and is expected to be put into operation by June 1st. The *Beatrice* mines have carried on much development work, with complete satisfaction to its shareholders, while the Mammoth Mining Syndicate, during the year, surmounted many serious obstacles and is now ready to ship ore. In this division some exceptionally fine discoveries have been made during the season, which must, sooner or later, attract attention and investment.

In the Trout Lake Mining Division, the *Silver Cup* still stands at the head of the shippers, the *Lucky Boy* closed down after a few weeks' shipping, but the company is making financial arrangements for work on a much larger scale than heretofore. The *Triune*, *Bad Shot*, *Broadview* and many other properties are giving promise of future prosperity, and while fewer properties have changed hands during the season, confidence is firmer and the outlook brighter than it has been for some years past.

The Revelstoke and McCulloch Creek Hydraulic Mining Co.'s ground, Placer Mining. under the management of Mr. J. D. Sibbald, promises to turn out well, and now that the old workings have been cleared away and virgin ground struck, a record can be looked for. French creek had a revival of interest during the close of the season. Smith creek is on the eve of a busy year. The new company, under the management of Mr. F. H. Guffey, has installed an up-to-date ferry, crossing the Columbia river at the mouth of Smith creek, erected a saw-mill, constructed some seven miles of trail, and has ordered the necessary machinery for a first-class hydraulic plant.

* ILLECILLEWAET MINING DIVISION.—By an Order in Council, approved on April 4th, 1907, taking effect on May 1st, 1907, the Illecillewaet Mining Division was abolished and the territory formerly included within its boundaries was divided between the Lardeau and Revelstoke Mining Divisions. That portion of it lying on the drainage area of the Incomappleux or Fish river has been added to the Lardeau Mining Division, and the remainder to the Revelstoke Mining Division.



MT. SELWYN ON PEACE RIVER, B. C., LOOKING SOUTH-EAST.



CAMP ON PEACE RIVER, AT FOOT OF Mt. SELWYN, LOOKING NORTH-EAST.

REVELSTOKE DIVISION.

REPORT OF W. E. McLAUGHLIN, 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, 1906.

During the past year but little development work has been done on the mines in this division, other than the necessary annual assessment work, except by the Prince Mining and Development Company, Limited, of Revelstoke, B.C., at the headwaters of Downie creek, who have kept a force of men on all season. A large amount of work has been done on these properties, there being upwards of 3,000 feet of tunnelling and shafts. The ore-bearing body is proved to a depth of 400 feet, and has been found to be from 2 to 10 feet in thickness. A tramway route to the river has been surveyed, which is less than six miles in length and is pronounced perfectly feasible. The company owns 20 mineral claims and fractions, 18 of which are Crown-granted. The properties are situated 30 miles up the Columbia river from Revelstoke, where the head office of the company is located.

On the *Revelstoke Group* of eight mineral claims, located by Neil McEachern and others in 1905, 10 miles south of Revelstoke, on the west side of the Columbia river, the surface showing consists of a ledge of free-milling quartz about 200 feet wide. Mr. McEachern has run 150 feet of tunnel, besides open cuts and cross-cutting on the ledge at different points. Some specimens show gold to the naked eye.

OFFICE STATISTICS, REVELSTOKE MINING DIVISION.

Free miners' certificates issued	169
Companies' " "	6
Mineral claims recorded	42
Certificates of work issued	89
Money paid in lieu of assessment work	3
Placer leases issued	3
Bills of sale recorded	40
Powers of attorney recorded	4

TROUT LAKE MINING DIVISION.

REPORT OF F. C. CAMPBELL, MINING RECORDER.

I have the honour to submit herewith my report of the progress of the mining industry in the Trout Lake Division for the year 1906:—

There has been no marked activity in mining in this Division during the year, and, with a few exceptions, owners of properties have contented themselves with the annual assessments. The most notable event, perhaps, has been the acquisition by the Ohio Mines Development Co., Ltd., of the *Broadview* and other properties situated on Great Northern mountain. These claims, which are within easy reach of transportation, are credited with large bodies of medium grade ore; and, should the expectations of the owners be realised, would be a great boon to the Division. The Poplar creek camp, which was said to contain many good gold properties and of which much was expected, remains still practically undeveloped.

On the *Silver Cup* only development work, under contract, was proceeded with from the 1st January to the 21st of March, at which latter date the mine was closed temporarily, owing to possible danger from snow-slides. Operations were resumed, by company work, the latter part of April, since which time the mine has been working steadily. The chief aim of the

management throughout the year has been development; this has been confined to the ground lying to each side of the raise connecting the lower level with the old workings above. Three levels have been run between these points, and the ore showings throughout are very satisfactory. Two thousand and sixty-five feet of drifts and cross-cuts, and 95 feet of raises, were run, making a total of 2,160 feet. No new machinery was installed, but a pipe-line has been laid, thus permitting of the driving of the compressor by water-power during the summer months. An average of about 35 men was employed during the year. Seven hundred tons of first grade ore, galena with grey copper carrying a high percentage of silver, were shipped. It is the policy of the management to maintain ore shipments averaging about 100 tons a month. This property is owned by the Ferguson Mines, Ltd., and is situated on the south fork of Lardeau creek, about 7 miles from Ferguson.

Ground-sluicing has been carried on to a considerable extent on the *Yuill Group*, which lies immediately below the *Silver Cup* property, exposing a lead from 4 to 5 feet wide and carrying about 4 inches of galena. This is on the strike of the *Silver Cup* vein and is believed to be a continuation of that vein.

The Reward Gold and Silver Mining Co., Ltd., is driving a long tunnel near Six-Mile, on the south fork of Lardeau creek, to cut at great depth the porphyry dike in which the *Silver Cup* and *Nettie L.* mines lie, and ran 500 feet during the year, thus making the tunnel 1,050 feet long.

On the *Winalow*, situated about one and a half miles west of the *Silver Cup*, a cross-cut tunnel has been driven 140 feet cutting a quartz vein about 8 feet wide, which carries good gold values.

Considerable work, of a prospecting nature, has been done on the *Star Group*, situated near the last-mentioned property.

The *Broadview*, situated on Great Northern mountain, was operated from January to April by a local syndicate, with a force of about 14 men. During this period 230 tons of ore was mined and shipped, and considerable development work done. On the 1st of September the property was acquired by the Ohio Mines Development Co., Ltd., which has since that date driven 470 feet of drifts, cross-cuts and raises. The work so far undertaken by this company has been purely development. The lead, where cut, is said to contain 26 feet of milling ore. Sixteen men have been employed during this period. The *Blue Bell*, *St. Elmo* and *True Fissure*, adjoining properties, are under bond to the same company.

Considerable development work was done on the *Lucky Boy*, which is situated on Trout creek and owned by the Chestnut Hill Mining Co., Ltd., 7 men being employed for about 3 months during the summer. Thirty tons of ore was shipped from this property.

On the *Calumet* and *Hecla*, situated on Rapid creek, a number of open cuts were made and the vein stripped for a considerable distance. This property possesses an excellent surface showing and carries good gold values.

OFFICE STATISTICS—TROUT LAKE MINING DIVISION.

Free miners' certificates issued to individuals	192
" " companies	7
" " individuals (special)	1
Mineral claims recorded	126
Certificates of work issued	449
Cash paid in lieu of assessment work	1
Certificates of improvements recorded	8
Bills of sale, agreements, etc., recorded	95
Gold Commissioner's permissions recorded	3

LARDEAU MINING DIVISION.

REPORT OF GEO. SUMNER, MINING RECORDER.

I have the honour to submit herewith a short report of the progress made by the Lardeau Mining Division during the year 1906:—

There has been little change in the mining situation here since the report of last year. The location of mineral claims has slightly increased, whilst the assessment work recorded has slightly declined. This, however, indicates that locations without merit are allowed to lapse. The same companies actively engaged in mining during last year are one and all showing their faith in the district by pushing development and by enlarging their mining plant and adding machinery which will increase their output.

The management of this valuable property has passed from the original
Beatrice. owners into the hands of heavy shareholders, whose intention it is to prove, and that as quickly as possible, that the *Beatrice* is a rich silver-lead property. Ore has been encountered in the intermediate tunnel, which was being driven for last year. Now attention is being directed to strike the ore-body in the lower tunnel.

This mine is Camborne's mainstay in free gold. The company has
Eva. slowly, but surely, demonstrated that it has free gold in paying quantities, and has raised the property to the self-supporting (and hopes during the coming year to the dividend-paying) stage. This company, in the past, has been supplying its 10-stamp mill with something like 1,000 tons a month, by hand-drilling, but before this reaches the press, the Rand compressor, which is now being installed, will be supplying air to seven or eight air drills. With the addition of 10 other stamps, it will not be difficult to treat practically double the above tonnage, with the same monthly expenditure.

This company resumed operations in the spring, and has by systematic
Gold Finch. development proved that free-milling ore still exists on its property. Reconstruction of the aerial tram, which was burnt out two years ago, is looked for this spring, and the stamp-mill will then be again started.

The Edward Baillie Syndicate, operating this property, is working
Mammoth. under great disadvantage, developing it during winter by using the proceeds of the very rich ore which is extracted from the surface in the summer. In the event of the lead being struck in the present workings ore can be taken out the year round.

This property is still lying idle. The confidence displayed by the share-
Oyster Criterion. holders at the outset has never been shaken by lack of merit in their holdings at Camborne.

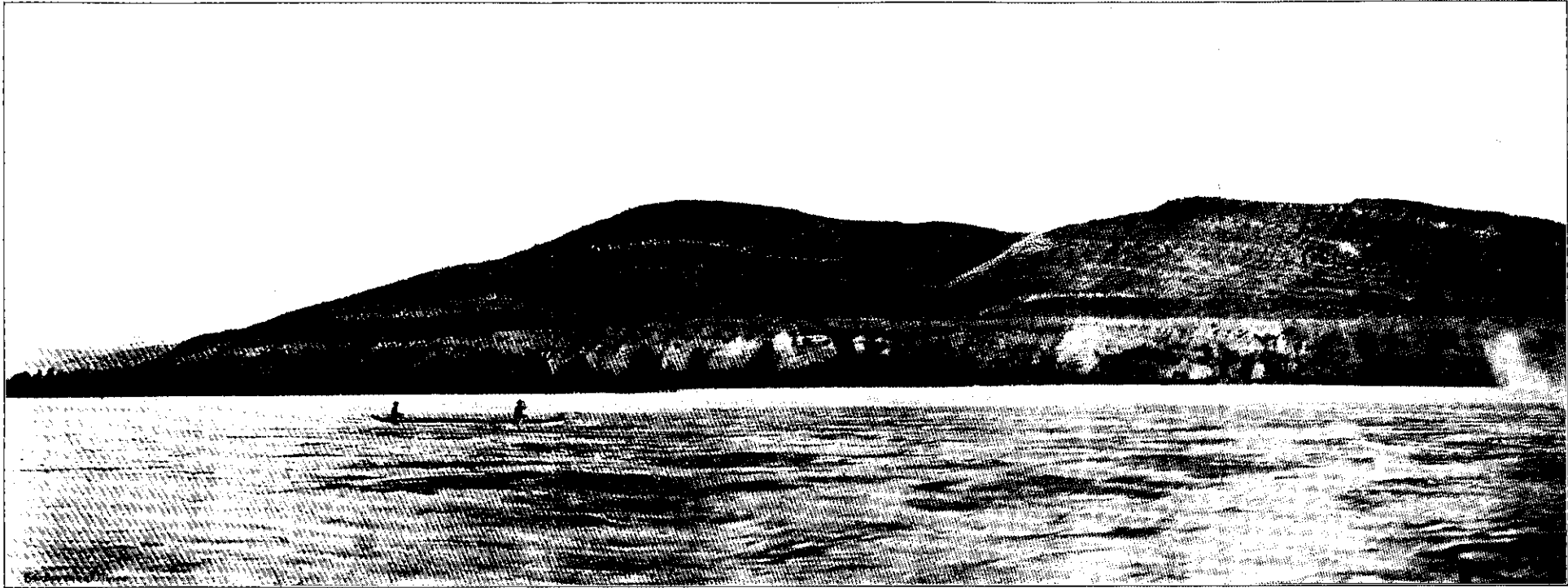
This company has installed a saw-mill, aerial tram and compressor, and
Silver Dollar. has a stamp-mill, with crusher and Chilian mill, *en route* to the property. Owing to the mountainous trail to the mill, some five miles above Camborne, and the nature of the machinery to be taken up for installation, there will, of necessity, be a period of heavy expenditure. The management by this time should know the value of their ore, also the available quantity, and should be in a position to inform the shareholders, should they require the information, the net proceeds from the ore—I say net advisedly. Milling can only extract a percentage of the ore, and at present any values remaining in concentrates could not be reckoned on to yield full values, on account of cost of transportation of same to the smelter.

This property adjoins the *Silver Dollar*. Considerable work has been done on this during the past year, but the owners being away, nothing authentic can be stated. The contractors, however, report good bodies of ore everywhere, and the values are supposed to be eminently satisfactory.

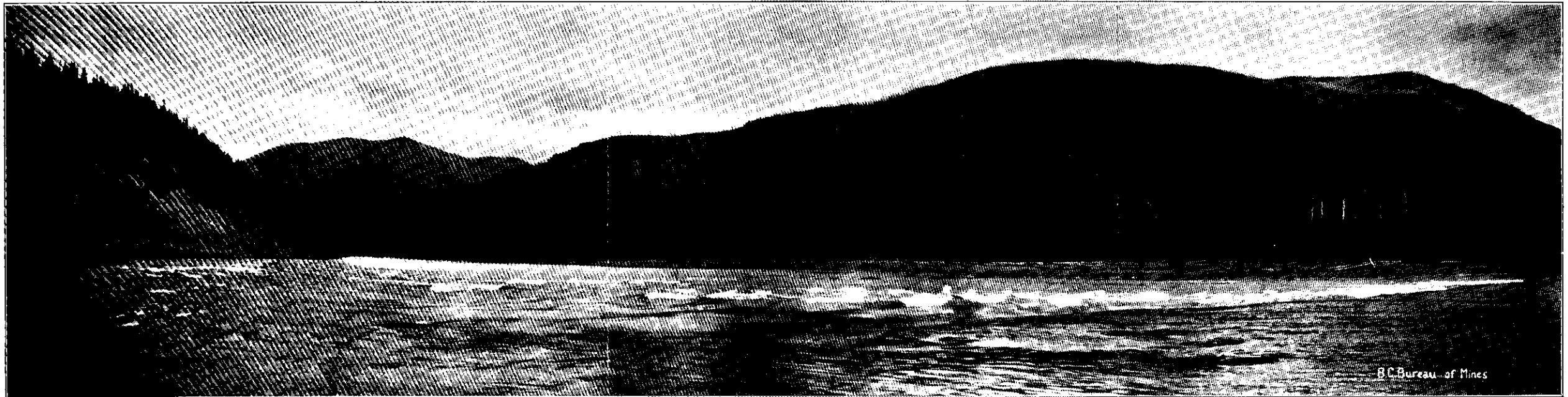
One location made during the past year is worthy of note, viz., the *Berneire*. A specimen from this property is on exhibition, apparently a piece of white quartz weighing about 100 lbs., and covered with visible gold. This location adjoins the *Nelson Group*, a free-milling gold proposition, and being directly in line with the *Eva* and *Gold Finch* properties, it would tend to show the continuity of the gold belt through this section.

OFFICE STATISTICS—LARDEAU MINING DIVISION.

Locations recorded.....	56
Certificates of work recorded.....	133
Bills of sale.....	20
Free miners' certificates.....	95
" " company.....	1
Certificates of improvement.....	8



COAL FORMATION ON PEACE RIVER, B. C.



PARLE-PAS RAPIDS ON PEACE RIVER, B. C.

SLOCAN DISTRICT.

AINSWORTH, SLOCAN AND SLOCAN CITY MINING DIVISIONS.

REPORT OF E. E. CHIPMAN, GOLD COMMISSIONER.

I have the honour to submit my report for the Slocan District for the year 1906.

During the year there has not been very much activity in mining, but, on the whole, an amount of progress has been made which justifies the confidence that prevails throughout the district. The number of mines working under lease has increased, and the results obtained have been, in nearly every case, reported as satisfactory to the operators. The imposition of a duty on zinc ores going into the United States caused a falling off in the shipments of ores of this character, but it is hoped that this duty will be removed in the near future and that the larger zinc producers will be able to resume operations.

NOTE BY PROVINCIAL MINERALOGIST.—Since this Report was written the duty on zinc ores imported into the United States has been removed and they now enter free. The following is the decision of the "U. S. General Appraisers," as published in the official "Treasury Decisions" issued to U. S. Customs and other officials, dated February 7th, 1907 :—

"(Treasury Decisions, 27,891—General Appraisers, 6,540.)

"Calamine and other ores of Zinc.

"The term 'calamine' in paragraph 514, Tariff Act of 1897, includes both the carbonate and the silicate of zinc; hence such ores of zinc are free of duty under the provision for calamine in said paragraph; 'blende,' or sulphide of zinc, not being a 'metallic substance,' as that term is employed in paragraph 183, is free of duty under paragraph 614 as a crude mineral, the circumstance that the large pieces of ore have been broken into smaller ones and the rock and dirt removed for economy and convenience in transportation not being sufficient to exclude the merchandise from classification under the provisions in paragraph 614 for 'minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture,' subject, however, to the qualification that when lead is found in these ores duty shall be taken on the amount of lead contained therein, as described in paragraph 181" (1½ cents per pound).

The most notable discovery in the district was that of a large body of stibnite in the *Alps* and *Alturas* claims, on the north fork of Carpenter creek. The ore shows in a well-defined ledge, four feet in width, running 65 % antimony. The owners of the property, The Golden Crown Gold and Silver Mining Company, Louis Hind, M.E., manager, owing to the lateness of the season and the elevation of the mines, viz., 7,700 feet, were unable to do more than development work during the fall, but sufficient progress was made to show that the ore-body is a very extensive one. A car load of ore is now sacked on the dump and a large quantity of ore is blocked out ready for mining. The management has arranged for the construction of an aerial tramway 4,000 feet in length, and for the building of substantial quarters for a large force of men, that operations may be carried on continuously. The ore is to be sent to Scotland for treatment, and shipments will be made as soon as the tramway is installed.

AINSWORTH MINING DIVISION.

In this Division the most marked progress has been made in the Ainsworth Camp. An important sale was made during the year of the *Krao* mine to Montana parties, for the consideration of \$100,000. The *Krao* was one of the oldest claims in the camp and had been practically idle for years. The discovery of native silver in this claim, and the above-mentioned sale, has renewed confidence in the permanency and value of the properties in the camp, and a number of abandoned or idle claims are being opened up. The following is a short statement of what has been accomplished at Ainsworth during the year:—

On the *Tariff* six men were employed and 350 feet of cross-cut tunnels were driven to tap the vein below the old workings. No ore was shipped.

On the *Albion* 200 feet of tunnel on the ledge was driven from the main tunnel of the Highland Mining Company. Four men were employed. No ore was shipped.

The *Black Diamond* and *Little Donald* were under lease to two men. The work consisted in stopping ore from the old workings. Fifty tons of ore were shipped.

The *Maestro* was under bond to Messrs. Giegerich and King. Six men were employed. A shaft was sunk 80 feet, 100 feet of tunnel was driven, and considerable surface stripping was done. No ore shipped.

Number One mine was under lease to two men. One hundred feet of drifting on the ledge was done and 90 tons of ore were shipped.

The *United* employed 12 men; put up gallows frame, hoisting plant, and built shaft-house, cook and bunk-houses; drifted several hundred feet on the ledge and made 150 feet of upraises; shipped about 200 tons of ore to the Pilot Bay concentrator.

In the early part of the year the *Krao* employed six men, mostly in surface-stripping and stopping out ore. The property was sold in October and the new management installed a hoisting and pumping plant and erected shaft-, cook- and bunk-houses for the accommodation of an increased force. About 1,200 tons of high-grade silver ore were shipped. W. E. Zwicky, of Kaslo, is manager.

The *Spokane Trinket* employed 14 men during the summer. Several hundred feet of raises and tunnels was driven and 60 feet of shaft sunk. About 400 tons of ore were shipped. G. H. Barnhart is manager.

The Highland (Kootenay, B. C.) Mining Company's properties have been under bond to Burns and Wilson, who employed eight men in development, upraising and drifting. No ore was shipped.

On the *Blue Bell*, on the east shore of Kootenay lake, about 50 men were employed in the early part of the year and 11,000 tons of ore were shipped to the Pilot Bay concentrator. In August the management changed and the shipments of ore ceased. The work of development was, however, continued at the mine and 12 men were steadily employed and a number of others were engaged in clearing the right-of-way for a flume from Tam O'Shanter creek. The present company intends erecting a 200-ton concentrator at the mine. Ten thousand tons of ore are now stored in the mine ready for treatment, and it is conservatively estimated that 1,000,000 tons are ready to be mined and taken down as soon as the proposed concentrator is ready for operation. S. S. Fowler, Nelson, is the manager.

WOODBURY CREEK.

On this creek the *Baltimore* worked an average of two men continuously during the year and did 500 feet of development. No ore was shipped.

The *Pontiac Group* worked four men since October, in development. No ore shipped.

The *Jessie Bluebird* worked an average of two men continuously during the year. At the present time six men are employed, three at the mine and three rawhiding ore. Twenty-four tons of ore were shipped, which netted the owner \$5,830. Several car-loads are now at the mine awaiting shipment. The owner, Eric Johnson, intends working the mine steadily with an increased force. Three hundred feet of tunnel was driven and 50 feet of shaft sunk during the year.

The King Solomon Mines Company has worked a small force of men steadily on its various properties during the year, but has shipped no ore.

A small amount of development work has been done on the *Scranton*, *Daniel*, *Ontario* and *Cable* claims, and all the claims on the creek have been represented.

HAMIL CREEK.

The Argenta Mines Company has put in a 10-drill Allis-Chalmers compressor plant, which is operated by water power, and built 2,600 feet of flume. It has employed an average of 15 men during the year and has accomplished 1,600 feet of development. The management intends to put in a plant for the treatment of the large bodies of ore near the mine.

On the *McLaughlan Group* of claims the owners have constructed a trail and built cabins, preparatory to continuous work.

On the south side of Hamil creek, J. C. Hanson has opened up a fine lead of copper ore carrying good values in free gold. The vein is supposed to be a continuation of the Argenta Mines property.

The *Lavina-Butte Group* still remains closed down.

On the Duncan river and its tributaries very little development besides the necessary annual work was performed, but all the important claims have been represented. To the lack of transportation facilities is attributed the delay in opening up this part of the district, although it is believed to be the richest part of the Ainsworth Division.

SOUTH FORK OF KASLO CREEK.

The *Flint* mine has employed three men continuously in development during the year, and has about 40 tons of ore ready for shipment, which will assay 100 ounces silver and 70 % lead.

The *Bismark* has worked three men steadily, has done 150 feet of development and shipped 120 tons of ore.

The *Index* worked three men steadily from February to the end of the year, and has done 450 feet of development work in driving tunnels. Drifted on the vein 95 feet, exposing for nearly the whole distance a fine body of ore, which will assay 100 ozs. silver to the ton and over 70 % lead. The management intends to prosecute development work with an increased force during the ensuing year.

The *Cork* mine worked an average of 35 men from the beginning of the year to the end of October, when the mill was shut down on account of shortage of water. About 700 tons of silver-lead concentrates were shipped. The management intends to resume operations early in the year.

The *Montezuma* mine consists of a group of five claims and is owned by H. Giegerich, of Kaslo. An average of 12 men has been employed on the property since early spring in developing the mine and repairing the aerial tramway. There are large bodies of concentrating ores exposed in the mine carrying lead, silver and zinc. A hundred tons of clean galena ore

were taken out in development, but have not been shipped. The tramway connects the mine with a concentrator which has a capacity of about 70 tons a day. The concentrator is owned jointly by Mr. Giegerich and the Province Mines, and is to be operated jointly by them.

The *Province Group*, owned by the Province Mines, employed about 40 men during the summer, fall and winter in reconstructing the *Montezuma* concentrator and adapting it to the saving of zinc concentrates, as well as lead and silver. A saw-mill has been built, flumes, bridges and roads constructed, tramway erected, and everything in connection with the mill has been put in first class shape, making it an up-to-date concentrator. Large bodies of lead, silver and zinc ores are blocked out in the *Province*, and these, in connection with the extensive bodies of the same class of ore exposed in the *Montezuma* mine, of which the Province Company is a half owner, are considered to be sufficient to keep the mill working at its full capacity for at least three years.

On the *B. N. A.* two men were employed nearly all summer in development. One hundred feet of tunnel was driven and considerable drifting on the vein. No ore was shipped.

One hundred feet of tunnel was driven on the *Nome Group* by the owners, Messrs. Norquist and Rugge, and all the other claims on the various branches of the south fork of Kaslo river were fully represented.

Development on the *Jackson* mines has been steadily progressing with a crew of five men, and the work has further opened up the already large bodies of zinc and lead ore. No shipments were made from the property during the past year.

KOOTENAY ORE COMPANY, LIMITED, SAMPLER AND SEPARATING PLANT AT KASLO, B. C.

This plant has done much to solve the problem of the proper treatment of low-grade ores and the bringing of such to a marketable value. The company has four Dings electro-magnetic separators installed in its works, and these machines and the entire plant were favourably reported on by the Zinc Commission appointed by the Dominion Government to inquire into the zinc resources of British Columbia. The principal separation work has been on *Ruth* and *Jackson* zinc ores, and material from which an average 37% zinc was extracted yields in the new process 51%. This plant will be in a position to treat the zinc ores coming from the entire south fork of Kaslo river, and arrangements to that end have been practically completed.

Messrs. Fowler, Retallack and Koch steadily worked at their lease on the *Whitewater* and *Whitewater Deep* claims, and employed altogether about 30 men in development and in taking out and marketing ore. Seven hundred tons of ore were shipped during the year, netting the lease-holders very substantial returns. The work will be steadily prosecuted the coming year.

Two men have been working continuously on the *Empress* at Bear lake, and the *Silver Glance* worked a small force the greater part of the year.

OFFICE STATISTICS—AINSWORTH MINING DIVISION.

Free Miners' Certificates, personal	241
" " companies	4
New claims recorded	141
Transfers recorded	66
Certificates of work issued	411
Payments in lieu of work	4
Water records issued	74
Pre-emptions issued	35
Certificates of improvements	90
Certificates of purchase	183



MOBERLY LAKE, B. C., FROM THE EAST.



PACKING OVER MOUNTAIN-OF-ROCKS PORTAGE, PEACE RIVER, B. C.

SLOCAN MINING DIVISION.

REPORT BY ANGUS McINNES, MINING RECORDER.

I have the honour to submit herewith my annual mining report and office statistics for the Slocan Mining Division for the year ending December 31st, 1906:—

The *Payne* mine has been worked under the leasing system for the last year, with very good results, Mr. Walker Smith being in charge.

The *Reco* is in charge of Mr. John Steel, and has been worked with a small force during the year and a considerable amount of high grade ore has been shipped.

The *Goodenough* adjoins the *Reco*, and has also been worked with a small force with good results.

The *Slocan Star* has done very little during the year, litigation with the Star Mining and Milling Co. over the apex rights being the cause. It is expected, however, that the case will be settled before spring, and then the mine will open up again with increased force. O. V. White is the manager.

The *Hope* has been working a few men doing development work. The property has hundreds of tons of ore blocked out, and will likely start shipping early in the spring.

Mr. Lewis Pratt has a number of men employed on the *Last Chance*, and I am informed that early in the spring the number will be doubled, as the mine has a good showing and a great tonnage of ore in sight.

The *Sunset*, owned and operated by G. H. Hughes, has been worked steadily during the year, with good results.

The *Idaho*, situated at Alamo siding, has been worked very successfully with a small force during the year. Mr. R. Roberts is manager.

The *Rambler*, situated in McGuigan basin, has had a great deal of development work done during the last year, and it is said that there is quite a large tonnage of ore blocked out. Mr. W. E. Zwicky is manager.

The *American Boy*, also managed by Mr. Zwicky, has shipped a considerable amount of lead and zinc ore during the past year.

The *Monitor* and *Bosun* mines are situated near New Denver, and have had a great deal of development work done and ore blocked out. It is the intention of the management to work these properties on a large scale the coming year. Mr. Maurice Gintzburger is manager.

The *Standard* is located near Silverton, and is owned and worked by Mr. George Aylard, of New Denver. Mr. Aylard has just completed two large buildings on the property, and proposes to work on a large scale in the coming year. He has ten cars of ore now ready to ship.

The *Batchelor* has within the last week changed hands. A strong company has taken it over and intends to mine it extensively next year.

The *Hewitt*, situated near Silverton, is owned and operated by Mr. M. Davys, of Nelson, and was one of the biggest shippers of the Slocan during the year. Mr. Davys has had about 30 men constantly employed during the year, and the more work that is done the better the mine shows up. Mr. Davys has also been working the *Vancouver* mine, which he has lately transferred to a strong company. This company is making arrangements to build a concentrating plant near the mine, and will work a large force of men the coming year.

There are, besides the properties mentioned here, several other properties which have been worked on a smaller scale, with good results.

OFFICE STATISTICS—SLOCAN MINING DIVISION.

Free miners' certificates issued.....	253
Companies' " ".....	9
Mining receipts " ".....	223
Claims recorded.....	63
Assessments recorded.....	237
Transfers and agreements recorded.....	41
Certificates of improvements issued.....	21

SLOCAN CITY MINING DIVISION.

REPORT OF H. R. JORAND, MINING RECORDER.

I have the honour to submit my report for the Slocan City Mining Division for the year ending December 31st, 1906.

The ore shipments from this Division during 1906 show a decrease from those of the previous year, due chiefly to lack of development work during the depression of the metal market. Some 1,700 tons only has been forwarded to the smelters. Nearly all this, however, was of an exceptionally high grade.

SPRINGER CREEK.

An 8-drill air compressor was installed at the *Ottawa* mine last summer, enabling deeper development of the mine, the motive power being supplied by Springer creek, 2,500 feet below the mine. At a point 1,000 feet in from the portal of No. 5 Tunnel a winze is now being sunk on the vein, where a station has been cut and a hoist installed. This winze has reached a depth of 90 feet, at which point a new level is being opened up with drifts both ways, the new level being known as No. 6. Five hundred tons of ore were shipped from this mine during 1906, the proceeds of which were sufficient to pay all expenses for that year. Some 30 men are now being employed. The present winze will be continued to a depth of 300 feet, that being the capacity of the present hoist.

The *Arlington* mine has been a steady shipper, with 700 tons to its credit for the year. The force has been increased under the management of Mr. W. F. DuBois and development work proceeded with.

The *Slocan Prince* shipped over 300 tons of ore at the beginning of the year, but is now temporarily closed down.

The owners of the *Myrtle Group* are now sacking ore, preparatory to shipping a car-load.

The *Kimberly* was sold during the year to New York people and some development work was done, resulting in a small shipment of ore.

The *Tamarac*, *Graphic*, *Hampton*, *Meteor*, and *Triuns* were all worked this year in a small way, and some ore was shipped from all these properties.

TWELVE-MILE CREEK.

The *Happy Medium* was also sold this year to New York parties, who did some development work and made a small shipment. The group, consisting of five claims, is now being Crown-granted.

A good strike was made on the *Midnight*, which is now under lease and is being developed.

About \$1,000 was spent in further developing the *May Group* during the year, and the properties comprising same are now being Crown-granted.

TEN-MILE CREEK.

A contract has been let on the *Neepawa* for further development, and a car-load of ore was shipped in September.

The most encouraging strike in this Division was made during the past year on the *Westmont* and *Black Cloud Group*, which has been worked by Mr. F. Griffith for the last eleven years. About 12 inches of clean ore is now showing in the face of the drift, with an assay value of about 300 ounces in silver to the ton.

LEMON CREEK.

No work was done on this creek during the last year, outside of the regular assessment work.

OFFICIAL STATISTICS—SLOCAN CITY MINING DIVISION.

Free miners' certificates issued, ordinary.....	146
" " special	1
" " company	6
Certificates of work recorded	269
New locations recorded	71
Conveyances recorded	79
Certificates of improvements recorded.....	18
Cash paid in lieu of work	\$1,600

NELSON DISTRICT.

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NELSON MINING DIVISION.

REPORT OF ROBERT A. RENWICK, GOLD COMMISSIONER.

The most noticeable feature of the mining development in the Nelson Mining Division during the year 1906 was the success met with in the opening up of the gold ledges in the Sheep Creek District. In every venture in the section success has crowned the efforts of the operators, and, although little beyond preliminary work was undertaken, the ensuing year will see a number of new shipping mines added to the list. The *Queen* mine was operated throughout the year with a crew varying in number from 25 to 40, and at the *Kootenay Belle*, *Mother Lode*, *Ore Hill*, *Emerald*, *Devlin Group* and the *Matthews* property development was carried on with most satisfactory results; with the exception of the *Emerald*, the values are chiefly in gold. The ledges, while not very large, carry high values in gold and are credited with having every indication of permanence. In the aggregate, considerable shipments have been made from the properties mentioned during the year. The *Queen* is the only property equipped with a mill, but from the other mines sorted crude ore gave good profit margins.

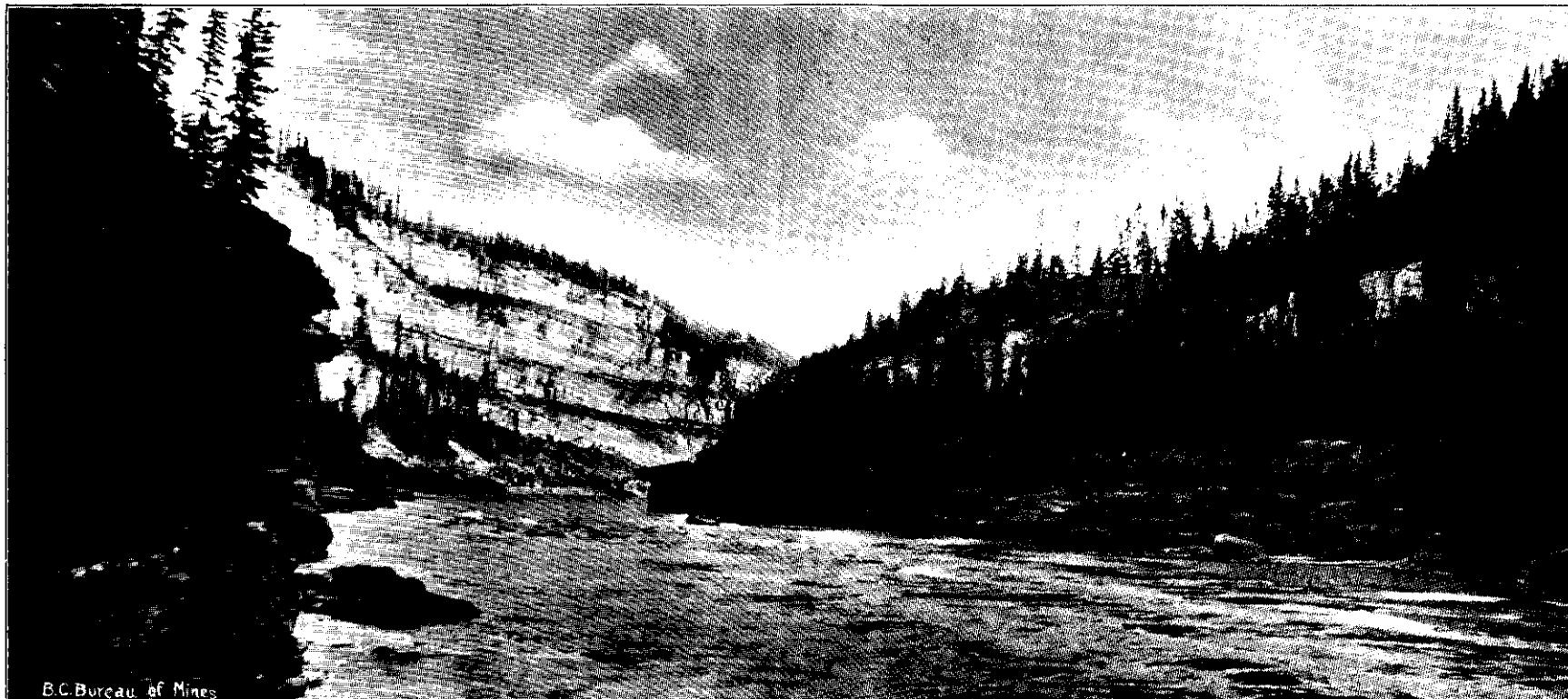
Another very gratifying feature was the discovery of what appears to be an immense deposit of copper on the north side of the Kootenay river, near Beasley siding, on the Canadian Pacific Railway, from which the owners expect a large copper output. There is every likelihood that the discoveries in these two sections will prove of sufficient importance to attract attention.

The Hall Mining and Smelting Company, which for years has been the most active company operating in the district, was forced to show a small loss as the result of the year's work. This was the more disappointing in view of the increase in the volume of the company's business, and the further circumstance that for the two preceding years, with lesser business, the company was enabled to show small profits.

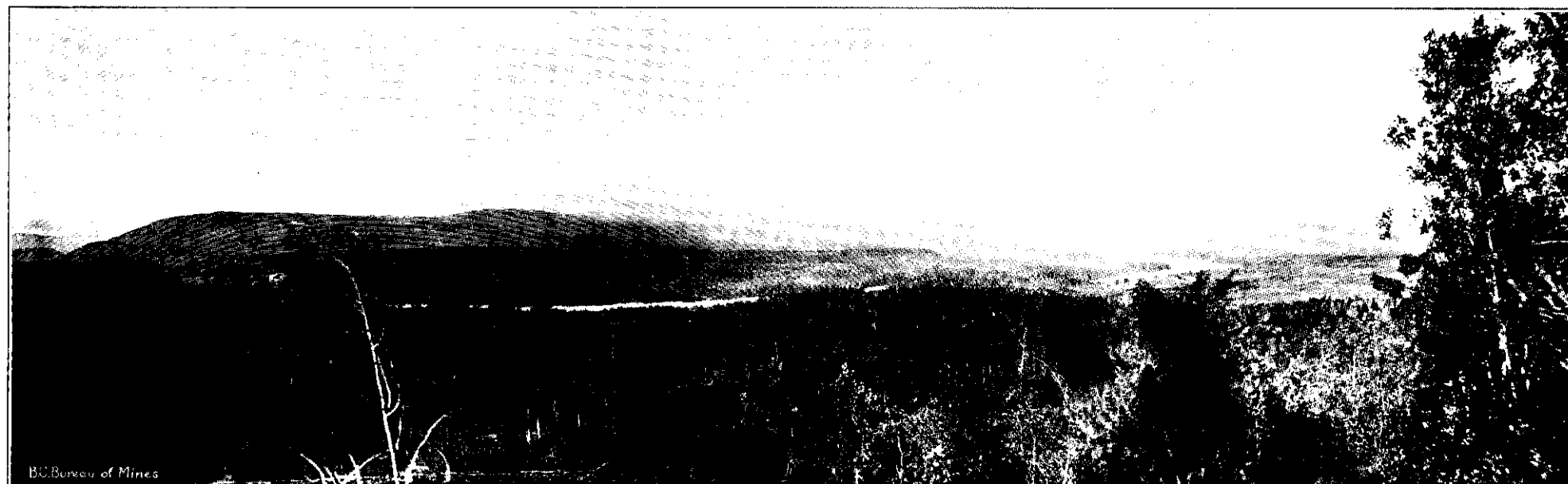
At the *May* and *Jennie* property, for which very high hopes were held out through the treatment of a large body of low-grade gold ore by the Hendryx process of cyaniding, there was practically nothing doing. The insufficient capacity of the cyaniding plant having been demonstrated, milling operations were discontinued and underground exploratory work was undertaken on a limited scale, the progress within the year being insufficient to determine results.

At the *Ymir* the year's operations were barren of financial results. The company's mill was in operation for a considerable portion of the last six months, but the mill feed was of low-grade and the year closed with another reconstruction on the cards.

The operations of this company for the fiscal year ending June 30th, Hall Mining and Smelting Co. 1906, while more extensive than those of the previous year, resulted in a small loss. Mining operations showed a profit of £1,162 15s 8d, but against this there was a smelting loss of £1,030 6s 10d, and when carried through the general account of the company the net result was a loss of £28 11s 5d. Work was carried on in the company's *Silver King* property under a partnership arrangement with M. S. Davys. The announced programme of unwatering the mine to work the lower levels was not carried out, and operations were restricted to the upper workings. During the financial year there was an extraction of 1,187 tons of ore, which averaged 25½ ounces silver and 4.3 % copper.



MOUNTAIN-OF-ROCKS CANYON (85 MILES LONG) ON PEACE RIVER, B. C.



LOOKING UP PEACE RIVER FROM MOUNTAIN-OF-ROCKS PORTAGE, B. C.

For the year ending November 30th, 1906, the shipments aggregated 1,920 tons, the smelter returns on which were \$40,000. This marked the termination of the partnership arrangement with Mr. Davys and direction of the work at the mine was assumed by the company. It is now contemplated to work the property through the *Dandy* mine levels, an arrangement having been arrived at with the owners of the *Dandy* mine to this end. This will have the effect of draining some of the *Silver King* workings at present under water, and will admit of working them without the necessity for pumping. A small crew is at work advancing the *Dandy* level into the *Silver King* ground.

In the smelting branch of the company's business the most notable achievement was the installation of the Huntington-Heberlein process for the desulphurisation of galena ores, but difficulty in getting orders filled for machinery and the prevailing scarcity of labour so delayed the completion of the work that the benefits from the improvements do not figure to any appreciable extent in the company's smelting operations for the fiscal year. The ore tonnage purchased by the smelter was drawn from 127 mines, and was made up as follows:—*Emma*, 8,060; *B. C. Standard*, 5,422; *Silver King*, 1,544; lead and dry ores, 24,872; making in all 39,898 tons. The No. 1 blast furnace was in operation 29 days, and No. 2 furnace 345 days, equivalent on their capacity to 85%. The tonnage smelted was 37,767 tons, made up as follows: roasted and converted, 8,279 tons; raw galena, 8,794; dry ore, 7,702; *B. C. Standard*, 4,582; and *Emma*, 8,410. From this was produced 7,630 tons of lead bullion, carrying 116,500 ounces silver and 8,163 ounces gold, the total value being \$1,215,943.

The *La Plata Mines*, Limited, operating the group of this name on *La Plata Mines*. Kokanee creek, completed the erection of a 100-ton concentrator during the year and commenced milling operations in July. The shipments from the mine amounted to some 2,000 tons, half of which was crude ore and the balance concentrates. The sorted crude ore averaged 50 to 70 ounces silver and 10 to 20% lead. The product of the mill is a concentrate milled from seven to ten into one, and ranges in values from 30 to 60 ounces silver and from 10 to 20% lead. Much difficulty was met with in providing for the concentration of the *La Plata* ore to effect good recoveries, but even as it is, there is a considerable loss carried off in the slimes. A crew of 60 men was engaged throughout the year, of whom 45 were underground and the others on the surface. The principal development was in advancing the No. 5 and No. 4 levels and putting a connection in between them. The bulk of the ore shipped came from the No. 5 workings. The company contemplates installing a 10-drill compressor during the coming year, and also to put in a section of a tramway to cut out part of the haul from the mill to the Kootenay lake landing.

The most sensational event of the year was the discovery of a large *Queen Victoria* body of copper ore on the *Queen Victoria* property, situate about half a *Queen Victoria* Group. mile from Beasley siding. Development was carried on throughout the year by J. P. Swedberg, and by December the showing was sufficiently good to warrant the bonding of the property by James Cronin, Bruce White, N. J. Cavanaugh and B. B. Mighton. The consideration named in the bond is \$100,000, and a substantial payment under the same was made in cash. There is a large outcrop of mineral on the property, the ore carrying copper, a little silver, gold and nickel. The present owners of the property estimate they have 200,000 tons of ore in sight. It is said the ore was passed over for the reason that where exposed on the surface, the ore-body, while copper-stained, carried no values, but when broken into the values were disclosed. A crew of 20 men are at work on the property; a tramway is being erected and a railway spur constructed. By February the owners contemplate having an output of from 30 to 40 tons a day, and within six months to run this up to 200 tons. An analysis of the ore showed 50% silica, 5 to 7% copper, 15%

iron and 12 % lime. Assays give an indicated value of 4 to 5 % copper, with one ounce of silver and 20 cents in gold to each per cent. of copper. For the present the property will be worked by the "glory hole" system. The owners expect to place the ore on the railway cars for \$1.50 per ton, and to have a freight and treatment rate of \$4. With favourable development, it is contemplated the output of the mine will be smelted on the ground, a company being formed to erect and operate a smelter.

The company operating this property has had a very successful financial year. The mill was kept in operation throughout the year, with an average monthly feed of 600 tons. The shipments from the mine were 531 tons, including three cars of crude ore. The smelter returns from this were \$14,980, the concentrates having a value in gold ranging from \$25 to \$40 in gold and small silver values. In addition to the values in the concentrates, there were saved on the plates 2,343.8 ounces of gold, having a value of \$43,100. An addition made to the mine plant consists of a small steam compressor capable of driving three drills, for use as an auxiliary during the low stages of water. A crew of 30 men was employed throughout the year. The ore reserves at the close of the year were said to be satisfactory.

This property was operated throughout the year by the Hall Mining Hunter V. and Double Standard. and Smelting Co., under lease from the B. C. Standard Mining Co. from December 21st 1905, to January 31st, 1907, the shipments aggregated 5,099 tons, the smelter returns on which were \$16,845. A new tunnel is being driven in, with the expectation of striking the ore within 400 feet. Considerable change has been met with in the character of the ore. The year's operations were not profitable to the owning company.

Work on this property was carried on throughout the year by the Eureka Mine. Eureka Copper Mines, Limited. The shaft was carried down for 50 feet from the 150-foot level, and 270 feet of drifting carried on along the 150 and 200-foot levels, and a connection made between the two levels to provide a second exit. During the year 940 tons of copper ore were shipped, the values being in copper and gold. The smelter returns on this ore were \$14 to the ton. A force of 18 men was employed throughout the year.

This property was worked continuously throughout the year. Shipments aggregating 1,312 tons were made to the Hall Mines smelter; the smelter returns (net) upon which were \$53,315.80. The average assay value per ton was \$40.64. During the year 1,305 feet of development was performed, disclosing a new chute of ore, but no continuous body. In the opinion of the management a very considerable expenditure will be necessary in order to develop the mine at a lower level, and unless further ore chutes are exposed the mine will soon be worked out. The Hastings (British Columbia) Exploration Syndicate, Ltd., operating the *Arlington*, secured a lease upon the *Canadian King* and commenced development, but no ore was shipped.

OFFICE STATISTICS, NELSON MINING DIVISION.

Free miners' certificates, ordinary	597
" " company	14
" " special	3
Certificates of work	526
Money in lieu of work	2
Locations, mineral	287
" placer	15
Placer leases	3
Transfers	148
Crown-granted mineral claims	847

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, 1906 :—

The Provincial Government expended \$2,000 upon 6½ miles of waggon-road from the Arrow lake towards the *Big Ledge*, the work done consisting of bridging and blasting out rock ; there are still 1½ miles to be finished. The property is reported to contain a large deposit of zinc ore.

This group is situated on Big Ledge, Pingston creek, and comprises Monarch Group. the *Monarch*, *Empress*, *Delenger*, *Anna S.*, *Maple Leaf*, *Ontario*, *Forest Chief* and *White Heather* mineral claims. The width of the vein is 316 feet. On the *Monarch* there is an open cross-cut, all in zinc ore, assaying 30 % zinc, and there is another band of zinc ore 24 feet wide. In *Anna S.* gulch and *Delenger* gulch there are exposures of 40 feet each of zinc ore. On the *Empress*, on the west side of *Empress* gulch, the vein is exposed for 550 feet, showing 40 feet in width of zinc ore, and four feet of concentrating galena. The zinc ore assays 47 % zinc. The owners of the *Monarch Group* have constructed this season six miles of waggon road from Arrow lake towards the mine, and have expended some \$4,000 on the works.

The *Adventurer Group* is also on the Big Ledge, and consists of the *Adventurer*, *Sunshine*, *Outlook*, *Watchman* and *Iron Duke*. The ore-showing as to quantity and quality is the same as upon the *Monarch Group*. The owners are trying to negotiate a sale or bond.

On the *Millie Mack*, situated on Cariboo creek, 16 miles east of Burton, a force of men has been working all season to tap the vein at depth.

OFFICE STATISTICS—ARROW LAKE MINING DIVISION.

Free miners' certificates	41
Mining claims recorded	7
Certificates of work	45
Conveyances, etc., recorded	8
Certificates of improvements	6

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 1906 :—

Mining in this Division during the past year was confined to a large extent to the old properties on Red mountain, a few other properties having been operated for short periods only during the year.

The shipments of ore are somewhat less than those of the previous year, this being accounted for by the shutting down of the coal mines in East Kootenay, which caused the closing of the smelters, and, consequently, the curtailing of the ore shipments, the output being approximately 280,000 tons, of an approximate gross value of \$3,278,269.

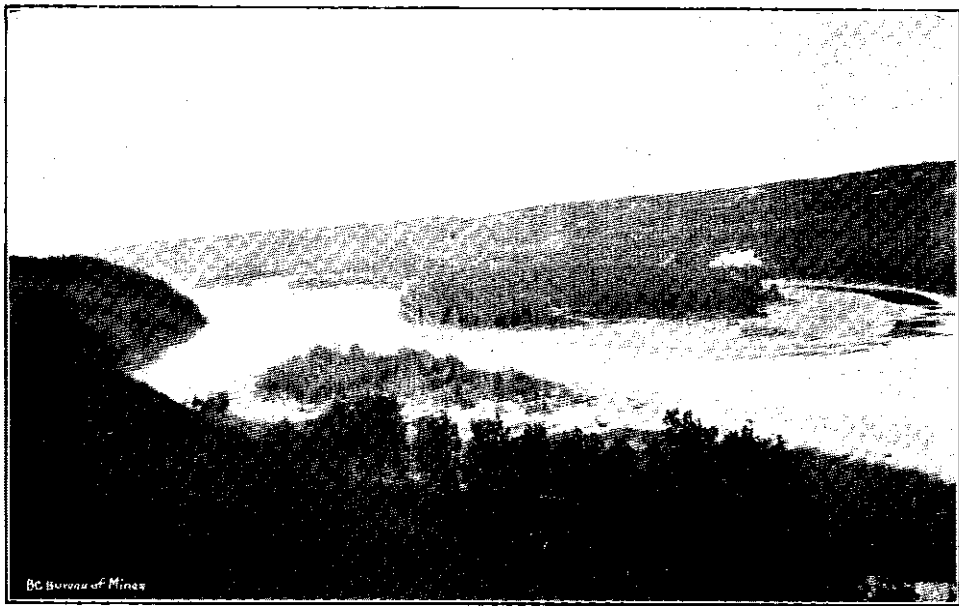
Included in the above-mentioned output was some 12,000 tons of low grade ore which was treated by the concentrators of the Le Roi No. 2, Limited, and the White Bear Consolidated Gold Mines, Limited, producing 745 tons of concentrates of a fairly good value.

The average number of men employed during the year was 730, which number should be largely increased during the coming year, as conditions point to a much larger output of ore, provided the supply of fuel is forthcoming to enable the smelters to treat such increase of tonnage.

These properties are owned and have been operated during the whole Le Roi and Black Bear year by the Le Roi Mining Co., Ltd., during which time 127,161 tons of ore were shipped, such ore having been stoped from the different levels of the *Le Roi* to a depth of 1,350 feet, and from the different levels in the *Black Bear*, an adjoining property.

Development work is being carried on as rapidly as possible, the Company being aided very materially by the work done by diamond drilling. Such development during the year consisted of sinking the main shaft 90 feet; tunnelling, 7,635 feet; raising, 111 feet; winzing, 193 feet, together with 3,076 feet of diamond drilling; the average number of men employed during the year was 247.

These properties having been amalgamated, are now being operated Centre Star and War Eagle by the Consolidated Mining and Smelting Company of Canada, Limited, which also operates the large smelting and refining works at Trail, together with different other properties throughout the East and West Kootenay Districts. During the year 114,853 tons of ore were shipped, this tonnage being taken from the different levels of the mines as far down as the 12th. Development work during the year consisted of sinking the main shaft 228 feet; raising, 1,842 feet; cross-cutting and drifting, 12,384 feet, and diamond drilling, 9,954 feet. The faces of the tunnels on the 4th, 7th and 8th levels are now in the *Idaho* claim, a property recently purchased by this company, and lying immediately east of and adjoining the *Centre Star* claim. Another property, the *Enterprise*, lying immediately east of the *Idaho*, has also been purchased by this company, giving it a property fully one mile in length. The company made large additions to its plant during the year, at a cost of \$95,348. The average number of men employed was 350.



LOOKING EAST DOWN PEACE RIVER, FROM HUDSON HOPE, B. C.



HUDSON HOPE, H. B. POST, ON PEACE RIVER, B. C. FROM THE EAST

The *Josie* and *Annie* claims, together with a number of others lying to the north and west of and adjoining the *Le Roi* mine, are owned and operated by the *Le Roi No. 2, Limited*, work being carried on principally in the *Josie* and *Annie*, from which properties, during the year, 21,924 tons of ore were shipped, in addition to which 10,436 tons of low-grade ore were treated at the concentrator of the company on the premises, producing 655 tons of concentrates. The development work during the year consisted of driving, 1,888 feet; raising, 145 feet, and 4,732 feet of diamond drilling, the average number of men employed being 97. Additions to the plant during the year cost \$3,200.

The *Jumbo*, situated about one mile north of the *Le Roi* mine, is owned by the *Jumbo Gold Mining Company*, of Spokane, and, during the year, was operated until the 10th day of March, at which time it was closed and remained so for two months, when it was again operated until the first day of August; then it was closed and remained so during the rest of the year. The shipments during the time the property was in operation consisted of 3,393 tons, and 18 men were employed.

The *White Bear*, owned and operated by the *White Bear Consolidated Gold Mines, Limited*, is situated west of and adjoining the *Black Bear* mine, the property of the *Le Roi Mining Co., Limited*, and resumed operations on or about the first day of March, 1906, after being closed during the previous eight months. During the remainder of the year the property was steadily operated, the shipments of ore consisting of 545 tons, in addition to which some 1,200 tons of low-grade ore were treated at the company's concentrator on the premises, producing 89 tons of concentrates. The development during the period in which the property was in operation consisted of sinking 277 feet; driving, 949 feet; raising, 77 feet, and diamond drilling, 905 feet; 26 men being employed. The depth of the main shaft at the end of the year was 1,058 feet, and the total underground workings consisting of 5,000 feet of driving and 500 feet of upraising. Development work at the present time is being carried on, on the 7th, 8th and 10th levels, with very encouraging results.

The *Crown Point* is owned by the *Consolidated Mining and Smelting Company*, of Canada, Limited, and was operated for a few weeks during the months of May and June, during which time nine men were employed, taking out 367 tons of ore, which was shipped to the company's smelter at Trail for fluxing purposes.

The *O. K.* is situated about two miles south of Rossland and was worked under a lease for some time during the early spring, during which time 65 tons of ore were milled on the premises, but as the ore was not of sufficiently high grade to justify the expense of operating, the parties having the lease were obliged to throw it up. This mine has been worked under lease by several parties in the last three or four years, and although it is considered to be a valuable property, none of the lessees have been able to make a success of it, the general opinion being that none of them have been able, financially, to carry on the much needed development work.

The *Velvet*, situated on Sophie mountain, some six and one-half miles south-west from Rossland, was operated during a few weeks in the months of May and June, during which time 249 feet of drifting was done by the 25 men employed.

The *Mabel*, situated to the north of and partially within the limits of the City of Rossland, is controlled by parties in Lima, Ohio, and was operated on a small scale during a portion of the year, three or four men being employed, and a car-load, consisting of 25 tons, shipped.

The *Inland Empire* mine, situated on Grenville mountain, a distance of 25 miles north-west from Rossland, and reached by the Norway mountain waggon road, which passes within a few hundred yards of the workings, was recently purchased by the Inland Empire Mining and Milling Company, Limited, Foreign, of Walla Walla, Washington. Development work during the past year consisted of sinking a shaft 6 by 8 feet, 180 feet deep; four or five men were employed under the management of Mr. S. F. Griswold, and, as the shaft has attained a depth at which it is a disadvantage to hoist by hand power, it is the intention of the new company to instal machinery of sufficient power to carry on the development work more advantageously, and the result of the work already done would seem to justify the necessary expenditure of installing such a plant.

The *Berlin* lying to the west of and adjoining the *Inland Empire*, is owned by S. F. Griswold, who, during the year had a shaft, 6 by 8 feet, sunk to a depth of 45 feet, giving a promising showing.

In addition to the foregoing, very little work was done, other than the necessary assessment work, which keeps falling off from year to year, as shown by the accompanying office statistics.

OFFICE STATISTICS, TRAIL CREEK MINING DIVISION.

Mineral claims recorded	28
Certificates of work	54
Certificates of improvement	2
Bills of sale, etc., recorded	11
Free miners' certificates, companies	9
" " personal	206
" " special	7

BOUNDARY DISTRICT.

GREENWOOD MINING DIVISION.

REPORT OF W. G. McMYNN, GOLD COMMISSIONER.

I have the honour to submit my annual report on mining operations in the Greenwood Mining Division during the year 1906.

The mines of the Boundary District made an output in 1906 of 1,158,991 tons of ore. The story of their operations during the year, as told by the Phoenix "Pioneer," is one of steady progress in every direction. Not only have the large producers been doing a gradually increasing business in mining and smelting, but the smaller and higher grade mines have been showing up well and have been a source of satisfaction and profit to their owners. More men are employed to-day in the Boundary mines and smelters, and more by the railways in handling the mineral products, than ever before in the history of this growing and progressive section.

One feature of importance in assuring capitalists that Boundary mines can be made profitable, is the fact that the Granby Consolidated M. S. & P. Co., Ltd., has this year paid a 12 % dividend, the fourth 3 % dividend for 1906 being payable to the shareholders on 31st December, 1906. As the Granby Company is the largest concern of its kind in the Province its record has been more closely watched, perhaps, than that of any other mining company in British Columbia. Its undoubted success, evidenced by the fact that, with the above stated payment of \$405,000, the company will have paid a total of \$1,753,000 thus far in dividends, places the question of profitable mining in the Boundary beyond a doubt.

One result is that the two other large companies operating in the Boundary—the British Columbia Copper Co. and the Dominion Copper Co.—are increasing their operations to a considerable extent, thus being but a step or two behind the Granby Consolidated in proving that the Boundary's low-grade ores can be mined and smelted at a profit—especially with the present high price obtainable for copper.

In six and a half years the mines of the Boundary have sent to district smelters approximately 4,609,042 tons of ore. This is from 1900, in the middle of which year ore shipments were commenced, to the end of 1906. In 1900 but 97,000 tons were shipped, while 1,158,991 tons of ore were dug out of Boundary mines in 1906 and sent to the three reduction works, or eleven times as much as in 1900. To show the yearly progress and increase of output, the following table is given:—

1900	96,600 tons.
1901	390,800 "
1902	508,876 "
1903	690,419 "
1904	829,808 "
1905	933,548 "
1906	1,158,991 "
Grand total	4,609,042 "

Of the above total, the Granby mines have sent out nearly three-quarters, or more than 3,000,000 tons, this ore all coming from Phoenix camp. The British Columbia Copper Co.'s

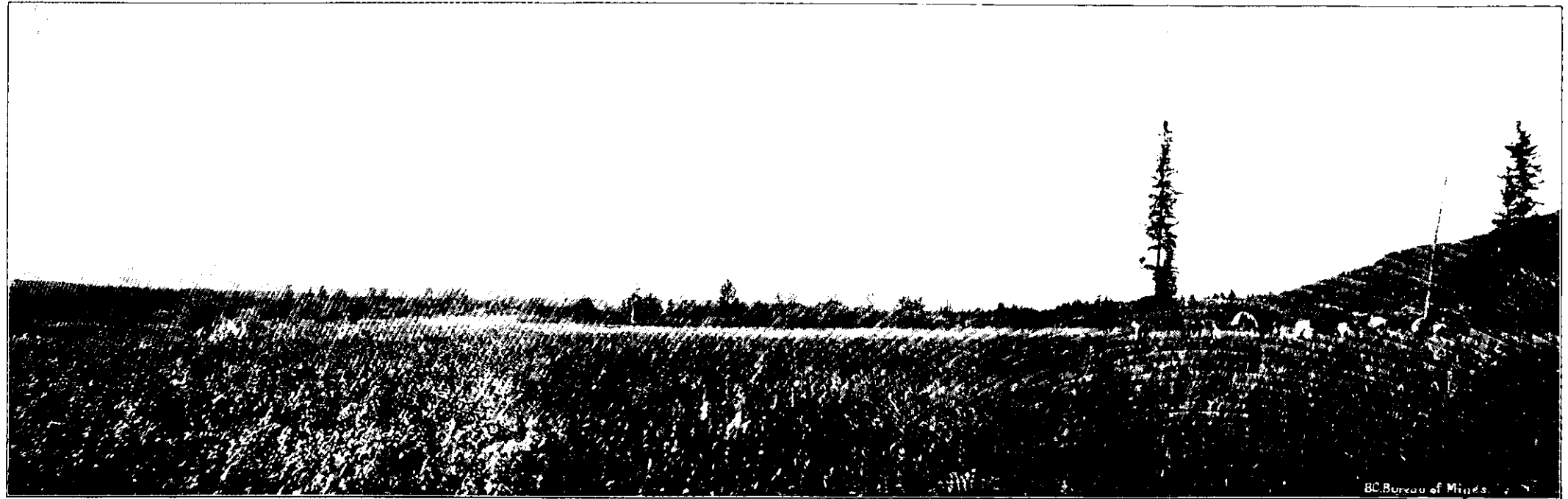
Mother Lode mines have produced about 830,000 tons; some 380,000 tons by mines now controlled by the Dominion Copper Co., and the remaining 450,000 tons by the *B. C., Snowshoe*, and numerous small shippers.

The recovery of copper per ton from ore of the Boundary mines is known to be low; an estimate of 25 to 30 lbs. per ton is considered conservative. The fine copper production of the Boundary mines for the first year of ore shipping was but 5,700,000 lbs. The recovery for 1906 will amount to about 32,000,000 lbs. Altogether, the mines of the Boundary in seven years have contributed, approximately, 136,000,000 lbs. of copper. In addition to this, there are gold and silver values to be taken into account as well. The values of the ores thus treated would amount to more than \$30,000,000. Nearly all the large producing mines have been making additions to their machinery plants this last year, in preparation for still larger outputs in the near future.

At this company's mines work has been progressing steadily on what Granby Con. M. is known as the *Victoria* shaft and headworks. This will be the permanent S. & P. Co., Ltd. working shaft of these great mines, and the company is spending something like \$100,000 in fitting-up the shaft and the accompanying headworks with the requisite machinery. The shaft is now down 400 feet and has been timbered. The hoisting engine is of 250 h. p.; it will be driven by an electric motor of the same power. There will also be a third Mammoth crusher at this shaft, a duplicate of the two others now in operation at the Granby mines, maximum capacity, 150 tons an hour. Both the Canadian Pacific Railway Co. and Great Northern Railway Co. are arranging to reach this shaft, and both will be fed from the extensive ore-bins erected at this point. The Granby mines are in a fortunate position. If one of the openings should, for any reason, be placed out of use, the regular output of ore could be easily maintained from either of two or three others, with the choice of two railways to haul the ore to the smelter.

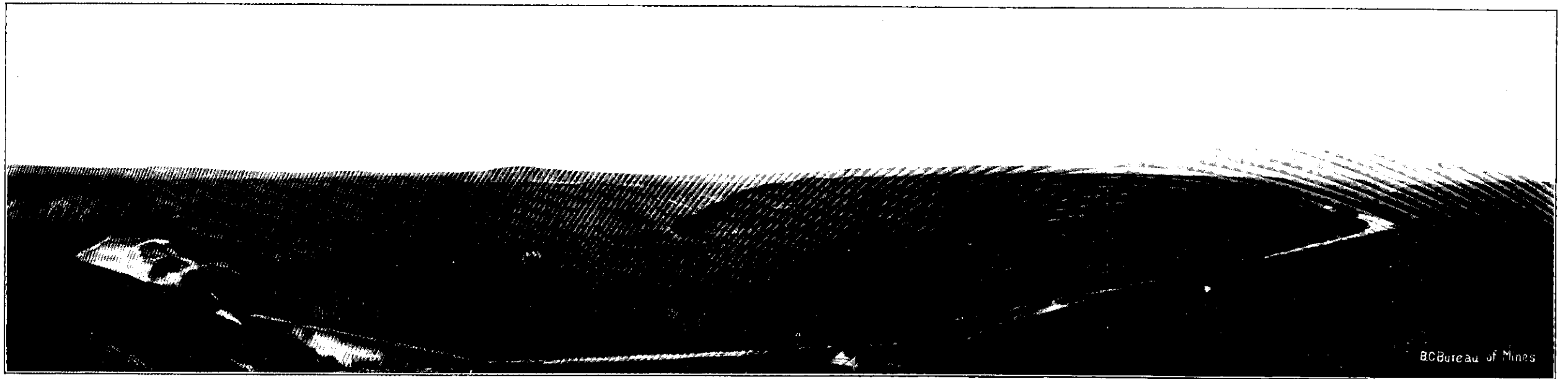
For the past year the British Columbia Copper Co.'s mines have been British Columbia working towards a large increase in output when the smelter should be enlarged. The *Mother Lode* mine has been extensively developed at depth, and with the force of 200 men there now, it can, if required, maintain shipments up to 1,000 tons daily. This company's *Emma* mine, in Summit camp, is one of its best properties, aside from the *Mother Lode*, and it has been developed satisfactorily this last year, more and better copper ore having been found there. At both the *Mother Lode* and the *Emma* mines the company is substituting electricity for steam power, at a great saving in cost of operation. During the year, the B. C. Copper Co. bought outright the *Oro Denoro* and the *B. C.* mines, both situated in Summit camp, and these acquisitions are known to be advantageous to the company. The *B. C.* mine has shipped more than 100,000 tons of ore in past years, some of the best ever sent out of Boundary mines, while the *Oro Denoro*, adjoining the *Emma*, has large deposits of ore that can be cheaply mined and shipped. The main four-compartment shaft at the *Mother Lode* mine is down 475 feet, with long drifts at the 60, 200, 300 and 400-foot levels. Diamond drilling has proved the existence of ore at lower levels, and preparations are being made for taking it out.

During 1906 the smelting works of the B. C. Copper Co., at Greenwood, have been entirely remodelled and rebuilt along modern lines. The two old furnaces, which had been in use for about five years, were torn out and replaced by one of the finest and most complete up-to-date smelting plants in the Dominion of Canada. This work is completed, the new plant, with three large furnaces, now having a daily capacity of more than three times that of the two old furnaces. Custom ore is weighed on self-registering scales, and bins, to the capacity of 2,000 tons, are provided to receive it. From these the ore passes through a sampling mill of 600 tons



Bullhead Mt.

COUNTRY BETWEEN HUDSON HOPE AND MOBERLY LAKE.



SOUTH PINE RIVER, B. C., 13 MILES FROM MOUTH, LOOKING SOUTH-WEST.

daily capacity, whence a conveyor belt delivers it again into railroad ore dump cars, these delivering the ore into the smelter bins. The latter have a capacity of 12,000 tons of ore and 2,000 tons of coke. The new blast furnaces were manufactured by the Power & Mining Machinery Co. They have a hearth area of 46 inches by 240 inches each, and a daily capacity for treating from 600 to 700 tons each, the furnace charging being done with side-dumping cars, hauled in trains from the ore and coke bins by trolley locomotives. The molten slag is hauled away from the furnaces in cars of 25 tons capacity, each being provided with an electric motor for tilting the car, the system being operated by trolley locomotives. In the power-house are three Root rotary blowers, each delivering 300 cubic feet of air a revolution, driven by 300 h. p. motors, and furnishing air for the blast furnaces; a Nordberg blowing engine, having a capacity of 5,000 cubic feet a minute, operated by a 300 h. p. variable speed motor, to furnish air for the converting plant; a high pressure air compressor, to furnish air for pneumatic tools, raising furnace charging doors, etc.; a hydraulic accumulator, for tilting the converters, and two motor generators of 100 and 75 kw. capacity, to furnish direct current for travelling crane and trolley locomotives. The entire machinery is being operated by electrical energy, which is furnished by the British Columbia Construction and Distributing Co., from the power station at Bonnington falls, on the Kootenay river, 75 miles distant.

In the converter building, adjoining the blast furnace building, is a modern two-stand converter plant, to which the copper matte is taken molten from the furnaces by a 40-ton travelling crane and blown into blister copper, 98 % fine. In addition, the company converts the copper matte from the smelter of the Dominion Copper Co., at Boundary Falls, by contract.

The water supply comes from Copper creek, across which a dam has been thrown about a mile above the smelting works, giving a reservoir at such elevation that ample pressure for fire and other purposes is obtained. A complete fire system has been installed, with self-draining hydrants at intervals throughout the works, giving adequate protection. The water from the blast furnace jackets delivers into a cooling pond, whence a centrifugal pump delivers it to storage tanks of 160,000 gallons capacity, to be re-fed to the furnace jackets as required. The blast furnace and converter buildings are constructed entirely of steel. The plant is provided with fully equipped machine and blacksmith-shops and storage warehouses.

The tonnage of ore treated at the British Columbia Copper Co.'s smelter, including custom ores, by years, is as follows, the figures for 1906, of course, being reduced on account of the works being out of commission for several months during the enlarging operations:—

1901	117,611 tons.
1902	148,600 "
1903	162,913 "
1904	210,484 "
1905	210,830 "
1906	121,031 "
Total	971,469 "

This company has prosecuted active and systematic development during the past year, and has, in that time, mined and smelted more than 200,000 tons of ore from its mines, most of this supply being drawn from Phoenix camp. The *Brooklyn* mine has a shaft some 425 feet in depth. On the 150-foot level there is 250 feet of drifting; on the 250-foot level, 3,000 feet of drifting, and on the 350-foot level some 500 feet of work. Besides this, there is over 500 feet in raises, making about one and one-half miles of workings on this one property. Connection at the 250-foot level was made with the shaft on the *Idaho*, an adjoining property. Adjoining the *Brooklyn* on the east is the *Stemwinder* mine, which has a shaft about 400 feet in depth, with

drifts at different levels, and a total of 1,300 lineal feet of work done. Shipments have been made which were considered satisfactory. On the *Idaho*, mentioned above, a main shaft has been sunk and a long tunnel, driven as far as the Granby Co.'s property, revealed a large body of ore, which will be easily available for shipment when the present proposed enlargement of this company's smelter at Boundary Falls is completed. New ore-bins have been erected, and the Great Northern Railway has connection with these by a spur.

In Deadwood camp shipments have been regularly made from this company's properties, the *Sunset Group*, about 50,000 tons being mined. These properties adjoin the British Columbia Copper Co.'s group, and their ore is of similar fluxing quality. An electric installation will facilitate operations here. About 25 men find steady employment.

The Dominion Copper Co. owns and operates other properties not in this Division, the *Rawhide*, *Athelstan*, and *Mountain Rose*.

The smelting works of this company, located at Boundary Falls, were re-opened, under the present management, in December, 1905. The two furnaces now in use have a rated capacity of smelting about 300 tons of ore a day, but in actual practice they do better than this.

The amount of ore treated at this smelter, under the various managements, for the last four years, is as follows:—

1903	132,570 tons.
1904	30,930 "
1905	84,059 "
1906	218,811 "
Total	466,370 "

While the copper mines of the Boundary have been exceeding all previous records for output, etc., the high-grade silver and gold mines near Greenwood have also been making substantial progress. Chief among these is the *Providence*, near Greenwood. It paid a dividend of about \$16,000 last September. Six other dividends, amounting in all to \$22,000, were paid previous to October, 1904, making a total of \$38,000 so far distributed. It shipped a total of 1,140 tons of first and second grade ore during the year.

Second on the shipping list is the *Skylark* mine, with 529 tons. A new shaft has been sunk to a depth of 200 feet, and is now being used as the main entrance to the mine, the connection with the old shaft furnishing good ventilation. On the 150-foot level there are drifts totalling 500 feet in length, some 55 feet being cut to the south this year. This drift is in ore, the ledge averaging about six inches. Most of the ore shipped this year came from this level, the stopes running direct to the surface. About 45 feet of cross-cuts have also been made on this level for prospecting purposes. On the 200-foot level the vein was reached about 30 feet from the shaft. From this point drifts have been run 90 feet to the north and 30 feet to the south. This level has opened up a very nice body of ore, which looks most promising. Considerable surface improvements have also been made this season, including a new shaft-house, ore-bin, blacksmith shop and boarding-house.

At the *Strathmore* mine operations are at present confined to sinking the main shaft, which has attained a depth of about 130 feet. On the 50-foot level much drifting has been done to the north in very fine ore, and stopes opened up. A considerable quantity of ore has been broken down in the stopes. The shaft is in good ore, the ledge averaging from six to eight inches. A 7½ h. p. electric hoist has now been installed. A total of 140 tons of ore has been shipped this year.

Elkhorn. Fourth on the list, from a shipping standpoint, is the *Elkhorn* mine, from which 45 tons of first-class ore has been shipped. On this property the cross-cut at the 300-foot level is in 125 feet.

Crescent. On the *Crescent* the shaft is now 210 feet in depth. It is practically vertical, is timbered to the bottom, and is one of the best equipped among the high-grade mines in the District. Values have greatly increased with depth, the latest assays being \$148.22 for first-class, \$111.70 for the general average, and \$22 for the second grade.

Prince Henry. A great deal of work has been done at the *Prince Henry* during the year. Early in 1906 a 20 h. p. electric hoist was installed, and since then development has been rushed. The shaft is at present down 185 feet, the lead at the bottom being about nine inches wide and becoming stronger. A trial shipment of one car of ore made early in the year gave satisfactory results.

Crescent Fraction. This property, adjoining the *Crescent* on the south, is being operated by the Chicago-B. C. Mining Co. A shaft has been sunk to a depth of 105 feet, and about 90 feet of drifts run N. E. and S. W. Both shaft and drifts are in ore, the ore in the drift to the north being 24 inches in width. A stope has been started in the south drift and over a carload of ore broken down.

Bay. At the *Bay* mine operations were resumed a few months ago. A raise has been made from the 100-foot level to the surface. It is well timbered, and is used as the main entrance to the mine. A 20 h.p. electric hoist has now been installed and a substantial gallowa-frame built over the new shaft.

Mavis. A few months ago work was resumed on the *Mavis*, the extension to the south of the *Bay*, by Linklater & Eckert, who have a lease of the property. A drift has been run 15 feet to the north from a point 35 feet down in the shaft. The ledge averages about 24 inches in width, though at one point a width of 5 feet was encountered. Some 20 tons of ore have been taken from this drift, and has been shipped. Average assays run up to \$100, values being principally in gold.

In the *E. P. U.* mine a tunnel is being driven from a point on Twin creek, and a total length of about 200 feet dug to tap the ore which showed so well on the surface.

Starveout. Early in the summer of 1906 work was started on the *Starveout* claim which lies to the east of the *Helen* mine. A 50-foot shaft has been sunk on the main quartz vein, which is about 10 inches in width, and several open cuts made on a parallel vein 50 feet to the east. The shaft has been equipped with a gallowa frame and horse whim.

Considerable work was done on the *Preston* mine early in the year, when a 5 h.p. electric hoist was installed. The ledge in the shaft is about 5 inches wide and values are good. A car of ore was shipped.

At the *Dynamo* mine work is in progress on a long tunnel which is being driven to tap the lead at depth.

Other properties on which work has been done during 1906 are: the *Capital-Prize*, *Gold Bug*, *Gold Finch*, *Eureka*, *Fremont*, *Meadow Lark*, *Anaconda*, *Jewel*, etc. A total of 2,110 tons of ore has been shipped from the high-grade mines this year, representing a value of about \$175,000.

WEST FORK OF KETTLE RIVER.

Some 15 cars of ore have been shipped from the *Sally Group* of claims, near Beavertell, on the west fork of Kettle river, netting the owners, the Vancouver and Boundary Creek M. & D. Co., about \$45,000. The veins are small but very rich, and the values are chiefly in gold

and silver. Development work was kept up during the greater part of the year on these claims, and the company has now about 800 tons of second-class ore in its bins, averaging about \$25 a ton, which it hopes to ship at an early date, when the Midway and Vernon Railway shall have been built up the river valley. On the *Duncan* and *Bounty Fractional* mineral claims, south-east of the *Sally*, a large amount of work has also been done, and one carload of ore was shipped, with satisfactory results. On the *Rambler*, *Carmi*, and other claims in this district, more work has been done again this year than last, but the progress of this locality is being retarded through lack of transportation facilities.

OFFICE STATISTICS—GREENWOOD MINING DIVISION.

Free miners' certificates issued	562
Location records	227
Certificates of work recorded	492
Bills of sale recorded	157
Certificates of improvements recorded	65
Placer claims recorded	4
Water grants issued	1

GRAND FORKS MINING DIVISION.

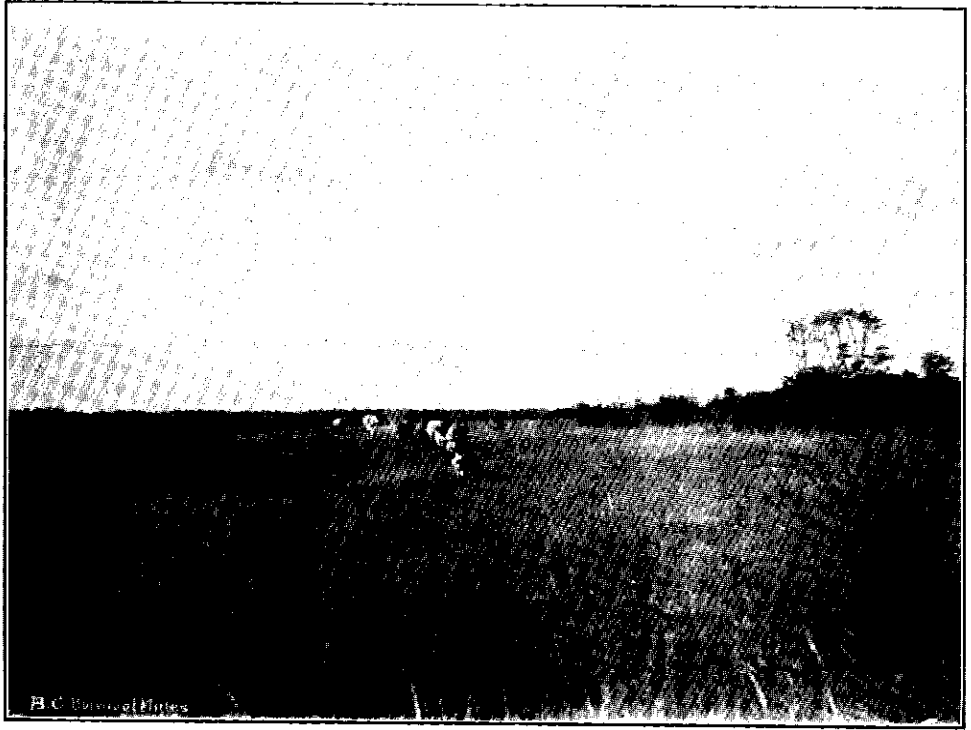
REPORT OF R. S. ALMOND, GOLD COMMISSIONER.

The Granby Consolidated Mining, Smelting and Power Co., with its Granby C. M. S. smelter located at Grand Forks and its mines at Phoenix, about 15 miles & P. Co. from Grand Forks, is the largest mining and smelting corporation in British Columbia, and from the fact that it is handling the low-grade copper ores of the Boundary District, its progress has been followed with interest and care. That this company paid over one million and a half dollars in dividends during the past year tends to show that mining and smelting with it is on a sound basis, and proves, conclusively, the low grade ores of this District can be mined and treated at considerable profit. At the mines the company is continually developing and keeping ahead of the demand, and at the smelter there is an unceasing extension of plant, and an ever-growing demand for the raw materials. Over 300 men have had continual employment at these works during the year, and a larger number at the mines at Phoenix.

WELLINGTON CAMP.

Properties in this camp have been changing hands in considerable numbers during the past season, and have mostly adverted into the hands of the large corporations working in the Boundary District. The Granby Consolidated Mining, Smelting and Power Co., Ltd., has absorbed the *Gold Drop*, *Curlew*, *Black Bear Fraction*, *Monarch Fraction*, *Bank of England*, *Bank of England Fraction*, *Toboggan*, *Ironclad Fraction*, and several more, and is pushing development work on most of them. The advances made on the *Gold Drop* have been most successful in every direction, and an average number of 35 men have been employed on the mine, and 2,197 feet of development work, besides 1,613 feet of diamond drilling, have been done on the property; an average daily output of 200 tons of ore is being obtained, and the mine has shipped 43,933 tons to the end of the year.

On the *Curlew*, a property near the *Gold Drop*, but lying lower on the mountain, a large tonnage has been exposed. Possibly, in the future, the *Gold Drop* will be worked by a tunnel through the *Curlew*. Two railroads tap this camp, the C. P. R. and the V. V. & E.



COUNTRY NEAR POUCE COUPE PRAIRIE, B. C.



CROSSING SOUTH PINE RIVER, FOUR MILES FROM MOUTH.

The Consolidated M. & S. Co. of Canada has started to operate in this camp, having taken a lease of the *Snowshoe* from the Snowshoe Gold and Copper Mines, Ltd. Professor Brock, of the Canadian Geological Survey, reports that about 100,000 tons of ore can be profitably mined. In consideration of the lease, an overdraft of the Snowshoe Company for \$78,000 has been guaranteed by the Consolidated M. & S. Co. of Canada. The proceeds from ore shipments will be applied on this overdraft until it is paid. When the Company shut down last October, on account of the strike in the East Kootenay coal mines, it had 90 men on its pay-roll and had shipped 8,426 tons of ore. It is now shipping about 260 tons a week.

The Dominion Copper Co., whose smelter is located at Boundary Falls, on Boundary creek, is interested in this camp, but more so in the adjoining camp of Greenwood, in the Greenwood Mining Division. The *Rawhide* is its principal mine in Wellington Camp, and it is largely to this property that the company looks for the increased tonnage to supply its lately enlarged smelting works. Three shafts are being worked on this mine; there are also two tunnels of about 600 feet in length, the lower of which is said to be 400 feet below the surface and right in the ore body. The largest stope is 170 by 70 feet, and shows ore on all sides, without any indications of limit. The *Rawhide* is shipping over 700 tons a week, and has shipped 26,032 tons during the year 1906. This company has lately started on the *Athelstan* mine, in the same camp. This claim has not been worked since 1904, but, previous to that, had been worked for several years, and over 12,000 tons of ore had been shipped from it. The *Athelstan* ore is said to be fairly high grade.

Surrounding the different properties owned by the above-mentioned companies are many more mineral claims, with just as good showings on them as on those already acquired by these large corporations, that in time will, in all probability, also be absorbed by them.

On July creek the *St. Lawrence Group* of claims, consisting of the *St. Lawrence*, *Silverton*, and *V. A.* and adjoining the *Wolfard Group*, have shown up well with the last assessment work done. The values are copper, gold and silver in chalcopyrite, ranging from \$3 to \$32.

The *Wolfard Group*, consisting of the *Kate No. 1*, *Wolfard* and *Kate No. 2*, is the next group of claims, of which the *Kate No. 1* and the *Wolfard* are Crown-granted, and on which exploitation has been carried on both by diamond drill and the regular process of tunnel-and-shaft, and, as the result seems to have been of a satisfactory nature, it is to be hoped that this group will soon join the list of shippers.

On Hardy or Eagle mountain, the *Homestake Group* of three claims, the *Homestake*, *Connection* and *Crescent*, has responded well to this year's regular work, and the values in copper, gold and silver vary from \$4 to \$18.

The *Golden Axe*, owned by J. Holm and J. Davis, has a tunnel 25 feet long and a considerable quantity of surface work done on it; the values range from \$1 to \$15.

The *Centre Eagle*, *Copper Butte*, *Hobson* and *Mabel H.* are all owned by John Holm. He has a 60-foot tunnel on the *Centre Eagle*, and a 20-foot shaft on the *Copper Butte*, as well as surface and other work done on the four claims. The ore averages about \$48, taking all values.

The *American Eagle*, *Monte Carlo* and *Little Babe* are all Crown-granted claims; the former of these is owned by Mr. Holm, and the latter two by Mr. H. McGuire. These claims have very fine showings for the work done on them, and the values run fairly high in copper. Each claim has a shaft on it, of 35, 80 and 85 feet, respectively.

The Betts and Hesperus Mining Co. has not pushed its work on the *Betts* and *Hesperus* claims since the middle of last summer, but up to that time had put in some 800 feet of tunneling and had drilled over 3,000 feet with the diamond drill, besides putting in some machinery, building houses and doing considerable surface work. The company is evidently waiting for transportation facilities.

The *Queen* has two shafts down some 40 feet each, a tunnel of over 100 feet in length, and surface work of importance done. The showing on this claim is excellent. It is owned by P. Byrne.

The *Eagle* mineral claim, from which Eagle mountain has taken its name, is an old Crown-granted claim owned by Frank Richter. It is the oldest claim in this vicinity, but has not had much exploration work put on it yet.

The *Rabbit Paw* and *Last Chance* are owned by R. W. Yuill; the latter has a 70-foot tunnel, a shaft 30 feet deep and much surface work done on it.

The *Humphry*, owned by Alex. Omon, has only surface work at present, but this work has exposed a grand showing of copper ore.

The *Homestake* is owned by Mr. A. L. Rogers. It has a 55-foot shaft and an amount of surface work.

The *Majuba* is being developed by a tunnel, which is now in 150 feet from the entrance. This is the only galena proposition on Eagle mountain. It is owned by Pete Santure.

The *Gladstone*, a proposition containing mostly iron, is also being developed by a tunnel, the same being now in 100 feet.

SUMMIT CAMP.

The British Columbia Copper Co., whose smelter plant is situated at Greenwood, together with the Hall Mining and Smelting Co., Ltd., with its smelter at Nelson, B. C., has much interest in this camp. The B. C. Copper Co.'s properties consist of a three-fourths interest in the *Emma*, *Jumbo*, *Minnie Moore*, and a full interest in the *Oro Denoro* and *B. C.* mineral claims. At the present time the *Emma* mine appears to be the one on which they are depending mostly for ore from this camp, although they are preparing the *Oro Denoro*, by installing an electrical plant for shipping ore, and have started to ship from the *B. C.*

The *Emma* has been equipped with a new electrical plant, consisting of a 200 horse-power, 2,200 volt Westinghouse motor, an 8 x 10 Lidgerwood hoist, and a compound, belt-driven Rand air compressor with Corliss valve gear; capacity, 1,400 feet of air a minute. No. 1 tunnel, which tapped the ore-body a short distance from the shaft, has been driven 387 feet in ore from that point. The ore was extracted from this tunnel from the full width of the lead, except for a distance of about 50 feet; the width of the vein averages from 20 to 35 feet and consists of magnetite carrying gold, silver and copper, and valued at about \$5 per ton. About 8,000 tons of ore have been broken in the stopes, ready to be taken through the tunnel and shipped. The shaft has been sunk lower and is now about 272 feet deep. It is intended to start No. 2 tunnel from a point about 250 feet down. The ground under No. 1 tunnel has been prospected with a diamond drill, with good results.

The ore shipments during the year were 2,079 tons to the B. C. Copper Co., Ltd., 1,025 tons to the Granby Consolidated Mining, Smelting and Power Co., and 8,060 tons to the Hall Mining and Smelting Co., Ltd. The value of the ore was \$53,229, or \$4.77 per ton.

This mine was formerly owned and worked by the Denoro Mines, Limited, but was sold by them a few months ago to the B. C. Copper Co., the consideration being 15,000 shares of the B. C. Copper Co.'s stock, which works out to the shareholders of the former company at about one B. C. Copper Co.'s share for 100 Denoro Mines shares. When working under the former order of things the mine shipped its ores to both the Trail and Boundary Falls smelters, and altogether shipped some 42,000 tons. The mine is not shipping at the present time, as an electrical plant is being installed, but as soon as this work is finished and the power forthcoming, the mine will be in full swing again.

This mine was formerly owned and worked by the B. C. Chartered Co. **B. C. Mine.** Some of the best copper ore ever taken out of any mine in the Boundary district was taken out of the *B. C.* in Summit Camp. Over 102,000 tons were taken out and shipped by the B. C. Chartered Company, some of which went to the Trail smelter, but mostly to the Granby at Grand Forks. This property was acquired by the British Columbia Copper Company during the past summer.

The Dominion Copper Company owns a three-fourths and the Hall **Mountain Rose.** Mining and Smelting Company a one-fourth interest in this property; the former company has finished driving a tunnel, cutting the vein 50 feet below a tunnel driven by the latter company at a previous date. The ore in the lower tunnel was found to be identical with that in the upper one, and the vein about 15 feet wide. The *Mountain Rose* shipped 3,555 tons of ore during 1906, and at the present time is shipping 35 tons a week, about a third of the ore was shipped to the Dominion Copper Co.'s smelter at Boundary Falls.

Assessment work was done on the *Josie Group*, in Summit Camp, and on the *Banner Group*, which consists of the *Royal Banner*, *Monitor*, *Florence Fraction* and *Willis* mineral claims. The values are in gold, silver and copper, and on the former group range from \$6 to \$7, and on the latter from \$4 to \$32.

Assessment work was done on the *Alpha and Omega* and many others in Pass Creek Camp. Nothing more than the ordinary assessment work has been done on any claims. The *Strawberry*, *Humming Bird* and *Humming Bird Fraction* have been idle all the year.

NORTH FORK OF KETTLE RIVER.

In Brown's Camp, on the north fork of Kettle river, considerable work was done on the *Pathfinder* by the Granby Consolidated Co., and some ore was shipped by waggon to the Granby smelter, but the work was closed down on account of the values not proving high enough to stand this mode of handling.

The *Volcanic Group*, consisting of *Volcano*, *Shickshock* and *Fantantine*, has been at a standstill during the year, but much work one way and another has been done on many of the claims in this camp. The Kettle Valley Railway, now under construction, passes right through the camp, and it is expected that when this road is in running order quite a few of these properties will become shippers.

The *Golden Eagle* and the *Earthquake Group* have remained inactive during the past season. At the present time there is some talk of the *Little Bertha* being again financed and placed on a working basis.

FRANKLIN CAMP.

Franklin camp, including McKinley and Gloucester camps, is situated on the east fork of the north fork of Kettle river, about 45 or 50 miles from Grand Forks. This camp has attracted the attention, during the summer months, of mining men coming into this part of the country, and from the reports will prove productive in the near future.

The *McKinley* is the premier mine, as far as exploitation goes, in the **McKinley.** camp; it has some hundreds of feet of tunnelling, extensive surface work in the shape of clearing the top dirt off the claim and leaving the ore exposed, besides many open cuts and test quarries. A great part of the summer the McKinley Mines, Limited, the present owners of the claim, had two diamond drills testing and sampling the ore deposits in every direction. The exploitation on the *McKinley* has gone so far that the company has been forced into an inactive state, until such time as it is able to get machinery over the roads to equip the mine.

The *Banner* is another developed mineral claim lying across a deep ravine or gorge from the McKinley claim, and on the opposite range or spur of mountains. The claim is under bond at the present time. It has been developed principally by tunnel and the ordinary system of surface work, up to last fall, when it was thoroughly prospected with a diamond drill. This claim will be among the first shippers in this camp. It was formerly owned by Mr. Frank McFarlane, who still has an interest.

The *Gloucester Group*, consisting of the *Gloucester*, *Ophir*, *G. H.* and *Gloucester Group. G. H. Fraction*, is situate on Gloucester creek, a feeder of the east fork of the north fork of Kettle river, and at the present time is being developed by the Dominion Copper Co., Ltd., which holds a bond on it, on which the first payment has been made. Work has been done on all the claims in the group, but more especially on the *Gloucester*, which has several hundred feet of tunnelling, a considerable amount of surface prospecting work, and several hundred feet of shaft work.

The *Maple Leaf* mineral claim, situate on the same spur of the mountain as the *Banner*, on the northern slope, is owned by the Fee Bros. and Mr. Young, of Vancouver. The ore is chalcopryite and the surface showings are rich. The claim is under bond to the Dominion Copper Co. Much stripping and open cut work was done on the claim during the summer, uncovering some fine bodies of ore; the work contemplated for next spring will, it is hoped, prove the ore to depth.

This claim has a showing ranging from 700 to 1,400 feet wide, and running in values from 49 cents to \$14.25 in gold, silver and copper. The work done on this claim is not very extensive at present; it consists of 150 feet of open cuts and a shaft 10 feet deep.

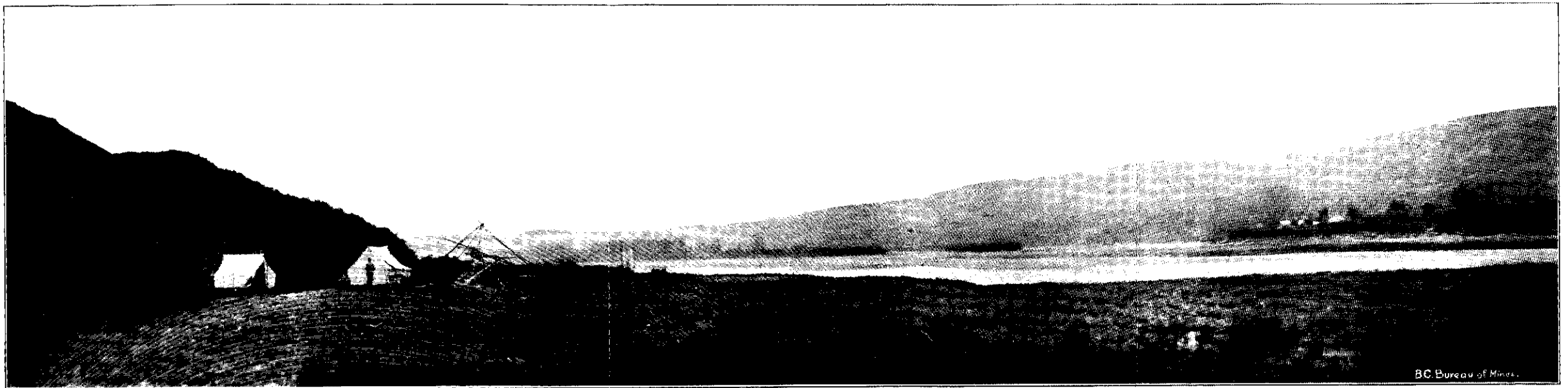
This group of claims comprises the *White Bear*, *Lucky Jack*, *Big Cub*, *White Bear Group. Black Bear* and *Little Cub Fraction*. The work for the group has all been done on the *White Bear* and *Lucky Jack*. This work has uncovered a large body of white iron carrying gold and copper and running from one to ten dollars. There are several chutes of high grade chalcopryite running through the lead.

The *Copper Group* is comprised of the *Copper*, *Riverside*, *White Tail* and *White Tail Fraction*, and is situate across the east fork of the north fork of Kettle river from the Franklin Townsite. Joe Gelinas, Dan Morrison and Alex. Omon are the owners. The work on the *Copper* is a shaft, 12 feet deep by 7 feet square, on the lead. There is an open cut 100 feet long, all in ore, averaging 5 feet wide and from 2 to 5 feet deep; a second shaft, 12 x 7 x 7 feet, all in ore, and other prospecting work, besides a cabin and blacksmith's shop. On the *Riverside*, *White Tail* and *White Tail Fraction* considerable prospecting work has been done, demonstrating the existence of extensive ore-bodies on each.

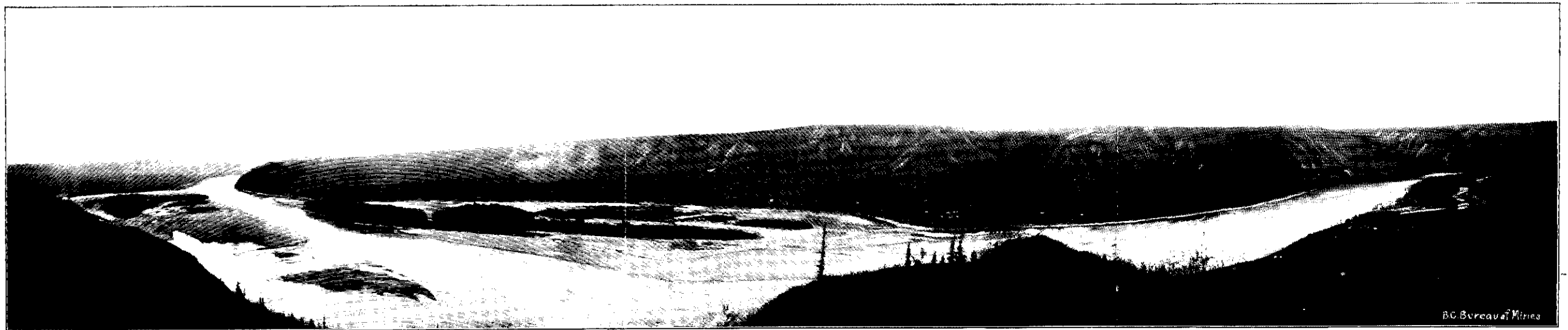
The *Edna*, in the same locality, and owned by G. Carraher, has been prospected by open cuts and surface work, and shows the same ore-bodies as the *Copper* mineral claim.

The following table may be of interest, as showing the ore smelted by the Granby Consolidated Co.'s Smelter, at Grand Forks, since it first blew in its furnaces:—

1900	62,387 tons.
1901	250,828 "
1902	312,340 "
1903	401,921 "
1904	596,252 "
1905	687,988 "
1906	840,000 "



GOVERNMENT RESERVE, OPPOSITE FORT ST. JOHN, B. C., WITH CAMP.



PEACE RIVER, OPPOSITE FORT ST. JOHN, B. C., FROM SOUTH SIDE.

The production for the fiscal year ending June 30th, 1906:—

Copper	19,939,004 pounds ; average price,	\$ 0 17.78
Silver	316,947 ounces ; " "	0 64.68
Gold	50,020 " " "	20 00

Total value \$4,751,058 69

The net cost a pound of the copper was 8.35 cents.

OFFICE STATISTICS—GRAND FORKS MINING DIVISION.

Locations recorded	305
Certificates of work issued	396
Transfers, etc., recorded	121
Permission to re-locate given	1
Filing notices of work, etc	43
Certificates of improvement recorded	23
Free miners' certificates issued	348
" " " special	3

OSOYOOS MINING DIVISION.

REPORT OF JAS. R. BROWN, ACTING GOLD COMMISSIONER, FAIRVIEW, B. C.

I have the honour to submit herewith my annual report of the mining operations in the Osoyoos Mining Division for the year 1906.

CAMP FAIRVIEW.

Very little mining work has been done this year outside of assessments, *Stemwinder*. excepting on the *Stemwinder*. The company operating this mine has, during the past year, undergone re-construction, and is now known as the *Stemwinder Gold and Coal Mining Company, Ltd.* A new flume, over a mile long, has been constructed from Reed creek to the head of the pipe-line, which doubles the water supply available for power and treatment purposes, and will, for a portion of the year, enable steam costs to be entirely dispensed with. A large belt-driven, cross-compound, Rand air-compressor has been installed in the mill adjoining the Corliss engine, by which it can be driven; the compressor may also be driven by the water wheel. A supply of the new Murphy drills has been obtained, from which great things are expected. The shaft is being sunk to the 600 ft. level from the bottom of the present 300 ft. incline shaft, all new work being perpendicular, and a raise is to be made from the present 300 ft. level, which will come out at the back of the mill and give an admirable site for new headworks, dump and crusher, and facilitate the delivery of ore to the mill. The ore has been found under the break which caused temporary suspension some time ago, and unless unlooked for difficulties arise, by cross-cutting this ore-body each 100 feet during the sinking operation, there will become available a large amount of pay ore that will demonstrate the value of this property.

On Kruger mountain but little work has been done either on the *Dividend* or *Gold Dust* Group of claims.

CAMP HEDLEY.

On the *Nickel Plate* and other properties of the Yale Mining Co. less development has been done than in any other year since the property was first bonded in 1898; but it was a record year for extraction, and this was done with a view to obtaining the maximum value of which the existing plant and ore in sight was capable. Fortunately, the amount of develop-

ment done before the present manager took charge was sufficiently extensive to permit of this course of "picking the eyes out," without any serious impairment of the value of the property. The development was confined to exploration work with the diamond drill, of which 3,600 feet was done on various claims of the *Nickel Plate Group*.

The tonnage of ore mined and milled during the year was 35,000 tons, principally from the *Nickel Plate* and *Sunnyside* claims. No addition of any importance was made to the plant during the year, but a few necessary changes were effected. The postponement of extension of the works or improvement of the plant may be credited to the failure of the Railway Company to complete construction within the time set. The Company has already paid large sums of money for haulage of plant from Penticton, and when it was promised railway connection in the early autumn of 1906, it was perhaps justified in waiting for it before bringing in additional plant. The concentrates have been hauled by waggon to Penticton, a cheaper rate of haulage being obtained by giving the freighter a load of concentrates for back loading.

On the *Humming Bird Group* of claims, owned by J. J. Marks and others, there was done, in addition to considerable prospecting, 2,000 feet of diamond drilling, from which satisfactory results were obtained.

The *Golden Zone Group*, owned also by J. J. Marks *et al.*, and consisting of the *Golden Zone*, *Silver Bell*, *B. C.* and *Irish Boy*, was improved to the extent of about \$1,000 worth of work. Former shafts and tunnels were extended and a new find made which gives excellent assay values. The total development done to date is much more extensive than that done on the average claims held by private parties.

The *Florence Group*, in 20-Mile canyon, is owned by Thos. Bradshaw, who spent about \$1,500 in development work during the year. The amount already expended on these claims, the *Florence*, *Florence Fractional* and *Zeerust Fractional*, amounts to over \$8,000, principally in tunnelling. The ore is arsenical pyrites carrying satisfactory gold values.

On the *Greenwood Group*, owned by Mr. Duncan Woods, three men worked the greater part of the summer on development work.

The *Kingston Group*, consisting of the *Kingston*, *Metropolitan*, *War Horse* and *Grand View*, is owned by the Kingston Gold and Copper Mining Co. Development work has been carried on steadily most of the year, the force employed being from four to seven men. Much more good copper was exposed during the year, and additional buildings for the mine crew were provided.

The *Jumbo Group*, situated on Sixteen-Mile creek, had a great deal of development work done. A shaft was sunk, under the direction of G. M. Gilbert, to a depth of 100 feet, and also a considerable amount of cross-cutting done.

The *Oregon Group*, consisting of the *Oregon*, *Winchester*, *St. Barnard*, and *Savage*, is situated on the north bank of 16-Mile creek. About 30 feet of tunnelling was done during the year, resulting in an excellent copper showing.

The following is a report sent in by R. W. Northey, who has been in the Keremeos valley for the last seven or eight years, and has had every chance of visiting the various mines and claims:—

"The *Billy Goat* and *Shamrock* are owned by James Riordan and the Riordan Mountain Olalla Copper Mining and Smelting Company. The work done includes a Camp. 47-foot open cut 15 feet deep, a 15-foot shaft, a 10-foot shaft, a 50-foot tunnel and a deep cut into the side of the ore-body, leaving a vertical face of 25 feet.

"*Afterthought*, *Resort* and *Resort No. 1*, claims on the western and north-western slopes of the mountain are owned by Jas. Riordan. Same class of ore as on *Billy Goat*. Discovery was made last year of a ledge of chalcopyrite in contact with a granular lime dike, being covered by only three feet of red oxidized soil. Work done—two large open cuts on the *Afterthought*, a 40-foot cut on the *Resort* (the discovery) and a 10-foot shaft on *Resort No. 1*.

"The *Homestake* and *Andover* claims on the southern half of the mountain, and joining the *Billy Goat*, *Shamrock* and *Grand View*, are owned by R. W. Northey and J. H. Hayes, of Olalla. Riordan mountain is a small double mountain, the *Billy Goat*, *Shamrock* and *Afterthought* occupying the northern promontory and the *Homestake* and *Andover* the southern. The ore is precisely the same as on the *Billy Goat*, with pretty much the same values. Work on the *Homestake* includes a 10-foot tunnel all in ore, with 20 feet of rock cutting at the entrance. There is a good-sized ore dump on a crib-work flat built at the tunnel entrance, 50 feet above the proposed waggon road to the *Billy Goat*.

"*Grandview* and *Portland*, situated on the western and south-western slopes of the mountain, and adjoining the *Billy Goat* and *Homestake*, are owned by John and Colin McKinnon, of Hedley. Work is done in open cuts, some of them exposing the ore-body at a depth of 15 or 20 feet. The ore is similar to that on the *Billy Goat* and *Homestake*.

"Three full-sized claims, *Rio Grande*, *Lorna Doone* and *Sharpshooter*, Northey Mountain are on the northern slope of Green mountain, and within half a mile of Camp. Keremeos creek and the Pentiction-Nickel Plate waggon road. A huge ledge of pyrrhotite and mispickel outcrops through all three claims, and this outcrop of brilliant red (the effects of oxidisation) can be seen miles away. This ore-body runs N. E. and S. W., and on the centre claim, the *Rio Grande*, two 20-foot tunnels, about 200 feet apart, have been run into the capping about 50 feet below the apex. Previous to starting No. 2 tunnel, all the red oxidised stuff was stripped off clean down to bedrock for a length of 50 feet, from the apex to the tunnel level, and for a width of 8 feet, while the depth varied from a few inches at the apex to 8 feet at the tunnel entrance; thus the tunnel was started in solid ore and no timbering was required. Work was stopped at the first heavy fall of snow, late in October. There are about 200 tons of ore on the dumps. From the outcrop the ledge appears to be not less than 50 feet in width. The owners are R. W. Northey and J. H. Hayes, of Olalla.

"Two claims, *Cinnabar* and *Cinnabar No. 2*, situated on the southern slope of Northey mountain and on the opposite side of a narrow valley from the *Rio Grande* group, cover about 100 acres of mineral ground. On the *Cinnabar* an immense bluff of almost solid pyrrhotite and arsenical iron is a distinguishing feature from the waggon road, which passes about half a mile south. The owners, Louis Goodchop, of the Khyber Pass ranch, and R. B. Venner, of Camp McKinney, did considerable development work during the summer, chiefly a long cross-out tunnel low down the slope. Both groups in this camp can obtain water-power from Keremeos creek.

"*Beaconsfield* is a large group comprising 600 acres on Red mountain. Red Mountain. The work includes no less than five long tunnels, half a dozen shafts, and a great number of open cuts. The tunnel on the *Beaconsfield*, in 175 feet, showed up some small veins of copper ore; from a 45-foot tunnel on the *Guinevieve* the rock went \$5 in gold; in a 65-foot tunnel on the *Keremeos* a lode was intersected, but the grade was low; and from a glory hole on the *Pontiac* about 200 tons of low-grade ore was taken out. There are thousands of tons of this low-grade pyrrhotite all over the property that can be mined cheaply, on the glory hole plan. The *Gibraltar* shaft is down 55 feet. The work done in 1906 included a 60-foot tunnel on the *Standard*, where another 40 feet should intersect a

good-looking ledge which outcrops on the ridge, a 24-foot shaft on the *Kenilworth*, a 20-foot shaft on the *Lady Bertha*, and a glory hole on the *Standard*, where about a ton of high-grade arsenical iron was taken out. Seven men were worked during the season of 1906, from June till the end of October. The company (Keremeos-Pontiac Mines) has erected a combined boarding and bunk-house, a storehouse, powder house, stable and three blacksmith shops.

"*McNulty's Group* consists of eight claims, situated on the north-eastern slope of Red mountain. Nearly all the work has been done on the *Gem*, where there is an immense outcrop of pyrrhotite, or magnetic iron pyrites, averaging nearly 200 feet in width. Last year's work opened up some garnetite carrying yellow copper. The workings include a 100-foot tunnel with a cross-cut of 80 feet and several large open cuts into the ledge, the strike of which is N. E. and S. W., with a trifling dip to the S. E. The owners, James McNulty and Thomas Roderick, of Phoenix, erected a substantial cabin, and put in nearly all the summer of 1906 developing their property.

"The *Black, Alfred* and *Green Mountain* are three Crown-granted claims owned by Black Bros. and others. Work done includes three long tunnels and a number of open cuts.

"The *Tiger* mineral claim is owned by James Black, of Olalla. Quartz veins, five feet wide, carrying free gold and native copper. Work done, three large open cuts and several smaller ones.

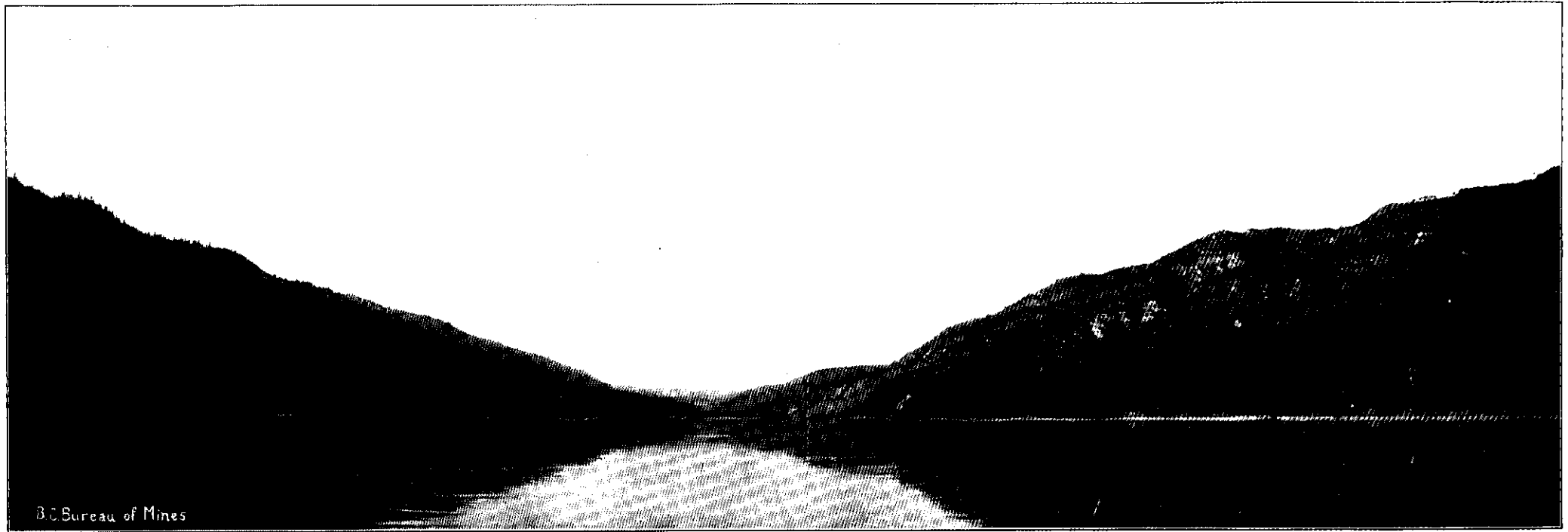
"The *Dividend Group* consists of seven claims, owned by the Olalla Copper M. and S. Co. Large bodies of magnetic iron and pyrites. Values are chiefly in gold, but garnetite with yellow copper occurs in some of the workings. Work done includes several long tunnels, shafts and open cuts. Cabins and blacksmith shops have been erected. This group has been Crown-granted.

"The *Scotia Group* of five claims, on the northern slope, are owned by J. A. McDonald and Ed. Wheadon, of Olalla. There is a 35-foot tunnel on the *Scotia* and a big open cut 100 feet higher up the hill, both workings showing up some very fine ore, which, as usual, is in contact with a granular lime dike. The strike is N. E. and S. W., with a slight dip to S. E. The ore is chiefly garnetite, impregnated with yellow copper and interspersed with pyrrhotite and some mispickel. About 500 feet east of this ledge there is a parallel one of about the same width, 15 feet, same class of ore and same strike and dip. This has been opened by three large cuts across and into the ore-body.

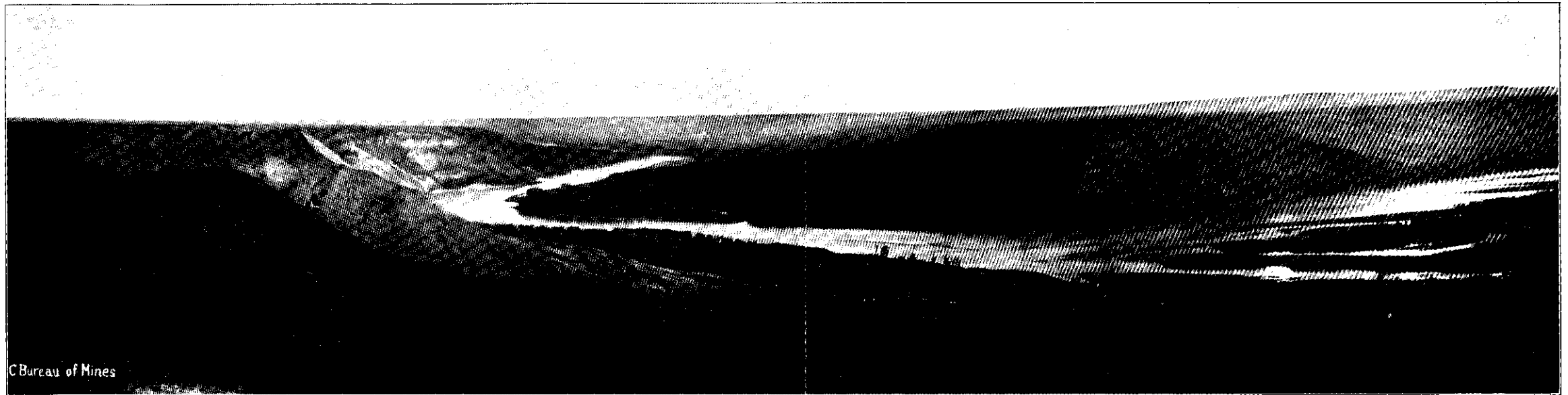
"The *Maple Leaf* and *Last Chance* are situated on the western slope and owned by W. J. Garbutt and partners. A body of ore, chiefly pyrrhotite, is noticeable for a long distance by its bright red oxidisation. Work done, cross-cut tunnels and open cuts.

"The *Nellie* is owned by James Black, of Olalla. Ore-body, pyrrhotite. Work done, three open cuts, 45 feet, 28 feet and 25 feet long.

"The *Apex Group* of eight claims, situated on a spur running north-east from Independence mountain, owned by W. D. McMillan, of Olalla, and in which W. J. Forbes, of Hedley, has an interest. In the late summer of 1905 the B. C. Copper Co., of Greenwood, started work under a bond, but a great deal of development work had been done by McMillan before the company made the deal. The company built large dining and bunk-houses, stables, powder house, two blacksmith shops, shaft-house, and erected a horse whim capable of hoisting from a depth of over 200 feet. Work was first started on the *Nighthawk*, where McMillan had opened a ledge of pyrrhotite and arsenical iron. A cross-cut tunnel was run in through this mass of ore, which by actual measurement was found to be 32 feet wide, with a strike N. E. and



PEACE RIVER AT 120th MERIDIAN, B. C.



VIEW FROM PLATEAU LEVEL ABOVE FORT ST. JOHN, PEACE RIVER, LOOKING SOUTH.

S. W. and a dip S. E. The values were not deemed sufficient by the company to warrant continuance of the work, and operations were accordingly concentrated on the *Apex*, farther west. On this claim a shaft was sunk close to the point where the spur or ridge runs out from the main mountain. Here, under a granular lime capping, McMillan had obtained values in both gold and copper, the gold being carried in white arsenical iron and the copper in the lime or calcite. The values continued all the way down the shaft, and at the 100-foot level a drift was run south-west on the ledge for over 60 feet, still in ore, but very variable in values. At this juncture the B. C. Copper Co., who had paid the first installment of the purchase money, asked for an extension of time, and, being refused, the company stopped work in May, 1906, since when the *Apex* has been closed down.

"The *King Arthur* adjoins the *Apex* on the south-west, and has the *Apex* lead running through its entire length. The work done in 1906 consisted of a cross-cut tunnel to intersect the lead at a depth of 150 feet. The first 20 feet of this tunnel is in loose rocks and water-worn gravel, necessitating timbering for that distance. Some arsenical iron was taken out from an open cut about 50 feet above the tunnel entrance. About 300 feet south of the tunnel, and lower down the hill, a big open cut discloses a body of pyrrhotite and iron pyrites. The owners of the *King Arthur* are R. W. Northey and J. H. Hayes, of Olalla.

"The *Monarch's Daughter* adjoins the *King Arthur* on the south-west. The work done during 1906 consisted of stripping and surface cross-cutting, exposing a great deal of mineralised ledge matter. This claim is owned in Fairview.

"The *Conkling Group* comprises six claims. Work done includes several long open cuts, chiefly on the *Monarch*, where the lead, which is about 10 feet wide, is opened up by half a dozen deep cuts for a distance of 500 feet. The ore is pyrrhotite and of the usual grade. On another claim in this group free gold has been found. Conkling & Cornell are the owners.

"The *White Grouse* adjoins the *Monarch* on the south. Considerable work done and ore of pay grade. Claim was surveyed in 1906 and Crown grant applied for. Owned by J. Dalrymple, Fairview.

"The *Dominion* and *Pine Apple* adjoin *Conkling's Group* on the south-west, and are owned by Alex. Ford, of Fish lake. Work done consists of a 30-foot open cut across the lead and a 12-foot shaft. The ore is pyrrhotite, with garnetite carrying yellow copper.

"On the *Teviot*, owned by Kenneth Matthison, of Phoenix, several veins of arsenical iron have been opened on, giving values in gold. On the *Amases*, the same owner, the ore is chiefly pyrrhotite, but of a rather better grade than usual. Work done in 1906 included six large openings into the ore-body from the summit of the ridge to the bottom, over 500 feet.

"The *Star of Hope Group*, situated at the junction of 16-Mile and Cedar creeks, consists of four claims, owned by Frank Richter, of Keremeos, and L. M. Lyon and J. A. McDougall, of Olalla. The ore is galena and arsenical iron. The work consists of a 40-foot shaft, tunnels and surface cuts.

"The *Mount Zion Group* consists of three claims, situated on Mount Zion, on the east side of lower Keremeos valley and about three miles north-east of Olalla. There are two parallel leads on this property, both running N. E. and S. W. and about 1,000 feet apart, the lower one being only about 300 feet above Keremeos creek and the Penticton-Princeton wagon road. The work on the lower lead includes eight open cuts on the outcrop for 500 feet, a cross-cut tunnel in 105 feet, a drift 65 feet and a winze down 12 feet. In 1906 the work was concentrated on the upper lead, where considerable stripping was done and a shaft started in the ore-body, which is about 10 feet wide. Both leads are similar in size and class of ore, which is chiefly garnetite carrying yellow copper and magnetic iron. Owned by the Mount Zion Mines.

"The *Mount Severn Group* of four claims is situated on the east side of the valley about two miles north-east of Olalla. On the *Mount Severn* the ore is pyrrhotite and garnetite, but no high values have yet been met with. Owners—Hayes, Northey and Peterkin, of Olalla.

"Six claims form the *Golden Rule Group* on the same mountain as *Mount Severn Group*. Work done chiefly on the *Golden Rule*. Owned by W. C. McDougall, of Princeton.

"The *Olalla Giant* is on the west slope of Bullion mountain, and is owned by W. C. McDougall. Work done in 1906 consisted of a tunnel run in on ore-body, which is nearly at the foot of the slope. Size of ledge not yet known.

"The *Bullion* is the most developed property in lower Keremeos valley, the workings including the longest tunnel in the Similkameen, in over 700 feet; No. 2 tunnel, in 200 feet; No. 3 tunnel, in 176 feet, and some smaller ones, besides open workings on various parts of the mountain. The *Bullion* and 18 or 20 other claims in the group have been surveyed and Crown-granted. The property, which is owned by the Olalla Copper M. & S. Co., has been closed down during the present winter. The ore carries values in gold, copper and silver.

"The *Searchlight Group* consists of four claims, owned by Jas. Riordan and the Olalla Copper M. & S. Co.; recently surveyed and Crown-granted. Bornite is the chief ore of this group.

"The *Elkhorn Group* of four claims, owned by J. M. Sharp and the Olalla Copper M. & S. Co. is also surveyed and Crown-granted.

"Situated on the top of the range, on the east side of the valley, south of Olalla, the *Opulence* has considerable development work done on it and is owned by the Olalla M. & S. Co. There is a 50-foot shaft, with two drift tunnels of 35 feet and 15 feet, respectively.

"The *Black Diamond*, situated at the foot of Opulence mountain, is owned by Messrs. Buchan, Lyon & Eisler, of Olalla. The shaft is down 60 feet. Work done in 1906 was a 20-foot tunnel, which is being run in to the bottom of the shaft. On the adjoining claim, *St. Keverne*, three small veins of quartz, carrying silver, gold and some copper sulphide, were opened by cuts and shafts.

"The *Eldorado Group* carries ore very similar to that on the *Dolphin*. Work done in 1906 includes a 30-foot shaft and a 25-foot cut across the lead. The same class of ore is found on the *Shamrock*, but with better values in gold and copper. Work done includes two tunnels, one 35 feet and the other 30 feet.

"The *Dolphin Group* is situated half a mile south of Olalla; owner, Mr. Pitman. Seven men have been at work since November 12th, 1906. The work done includes four tunnels of 160 feet, 60 feet, 39 feet and 26 feet, with seven open cuts and pits aggregating 120 feet.

"The *Magdala Group* of two claims lies just east of Keremeos. The work done includes two shafts and a number of open cuts. In 1906 a new cut disclosed some fine-looking ore, although not particularly valuable.

"The *Copper King Group* is situated on the crest of the foothills on the west side of the valley, at Olalla, and about 1,000 feet above the waggon road. Work done includes two tunnels, one 30-foot shaft and several large open cuts. Copper is in evidence everywhere, as well as black magnetic iron. Size of ore-body not known. Owned by John Buchan, of Olalla. Adjoining the *Copper King* on the east is the *Prince of Wales* owned by John Kearns, of Fairview. Work done, all in open cuts. Ore, copper sulphides.

"Adjoining the *Copper King* on the south are the *Homecrest* and *Strand*, owned by C. A. Eisler, of Olalla. Ore similar to that on *Copper King*. Work done, all open cuts of various depths.

"Two claims, *Roadside* and *Cream of the Camp*, are close to the waggon road and Olalla creek. Recently surveyed and Crown-granted. Ore chiefly pyrrhotite, carrying values in copper, gold and silver. Owned by L. W. Shatford, M.P.P., and others.

"The *Comstock* and *Olalla*, situated on the west fork of Olalla creek and owned by Bromley & Lyon, of Olalla, have a large body of ore. Work done, 10-foot shaft and long open cut.

"Situated on the west side of the valley, about 700 feet above the waggon road, is the *Smoky*. The ore on this claim is red hematite, carrying values in gold. The vein is 75 feet wide, strikes N.E. and S.W., and has no dip. This claim is owned by John Knowles, of Olalla."

OFFICE STATISTICS—OSOYOOS MINING DIVISION.

Individual free miners' certificates	287
Company " "	4
Records of locations	140
Certificates of work issued	316
Records of transfers, etc	60
Certificates of improvements issued	36

VERNON DISTRICT.

—:O:—

VERNON MINING DIVISION.

REPORT OF L. NORRIS, GOLD COMMISSIONER.

I beg to submit the following report on the mining industry in this Division during the past year :—

There has not been much activity in mining matters in this Division during the past year. The most important work was done on the *British Empire* and *Royal Standard* claims, near Okanagan Landing. On these claims a 5-stamp mill ran for 120 days, and gold was recovered on the plates. Manager, D. R. Young. The mill shut down in November last, and has not since resumed operations. Want of capital is still seriously interfering with the proper development of these claims.

Some work was done last June by Thomas Kelly on the *Last Chance* mineral claim, a rather promising silver-lead proposition situated on the north bank of Trout creek, about 8 miles up from its mouth. It has two pay streaks 10 and 12 inches wide, respectively, and some picked specimens ran as high as 100 oz. of silver to the ton and 50 % lead. This claim is owned by Thos. Kelly, F. L. Asler and R. H. Aguf. There is one tunnel driven in about 120 feet, at a dip of about 45°.

Take it all round, last year was decidedly an off year.

The following mining statistics were furnished me by H. F. Wilmot, Mining Recorder :—

Records	33
Free miners' certificates	124
Company's "	1
Transfers	7
Certificates of work	25
" improvements	1
Claims Crown-granted	1

YALE DISTRICT.

REPORT OF G. C. TUNSTALL, GOLD COMMISSIONER.

I have the honour to enclose the mining reports for the Kamloops, Ashcroft, Yale, Similkameen and Nicola Mining Divisions, embracing mining operations in those Divisions during the year 1906 :—

PLACER MINING.

It will be observed that the yield of placer gold in the first four Divisions, which formerly showed good returns, has been of so little value as to be unworthy of mention. This is a matter of deep regret, as it apparently marks the termination of an industry which, in past years, contributed a remunerative occupation to a hardy class of men, whose history is closely associated with the early days of the Province.

Mr. Dodd, the Mining Recorder at Yale, in his report for the year 1905, stated the yield in the Yale Division to be only \$2,000. That of the Ashcroft Division also showed a remarkable decrease in the usual output, whilst a similar amount to that of the Yale Division was credited to the Similkameen District.

Since the abandonment of the Fraser river by the whites, placer mining has been steadily prosecuted by Indians and Chinese, principally the latter. The same bars, and other localities favourable for the deposit of float gold, are mined with results varying every year, caused by the spring floods carrying away bars situated at a considerable distance higher up the river, and depositing the gold they contained at points lower down, where it remained until the following spring.

The new dredge, constructed at Yale last fall by a New Zealand company, was operated several weeks, in charge of a crew of experienced men, but I have not been able to obtain the particulars of the results. It is the intention to remove it to Hill's Bar next season, where the amount of success obtained will determine the future of the lower Fraser river in regard to dredging operations.

MINERAL CLAIMS.

To offset the exhaustion of the placer mines, the mineral claims of the districts are attracting attention. The approaching construction of the V. V. and E. Railway through the Similkameen country will open up a promising mineral section, which, in consequence of lack of railway communication, has remained comparatively undeveloped.

The development of the Nicola coal mines will not fail to stimulate mining interests by a supply of cheap coke necessary for smelting.

In the Highland valley, in the Ashcroft Mining Division, on the *Transvaal Group* and other locations, work has been diligently performed on the mineral deposits they contain, with results that prove their valuable character.

KAMLOOPS MINING DIVISION.

My remarks concerning the mineral locations in this Division will be short, as they only refer to those on which the most development work has been accomplished. There are many others on which mere assessment work has been performed, this being insufficient to give any idea of their permanence.

Iron Mask. The *Iron Mask*, Capt. J. Argall, manager, has been worked during the past year with a force of from 60 to 80 men, until the beginning of last October, when the number was reduced pending arrangements being made to increase the returns, by utilising the large bodies of low-grade ore, which will yield profitable results with the introduction of a more economical mode of transportation and treatment. To effect this object, negotiations are in course of progress for the erection of a large smelter near the Canadian Pacific Railway line, where a suitable site has been obtained for the purpose. The ore will be transported by an aerial or gravity tramway. These improvements will admit of operations being prosecuted on a larger scale.

The quantity of ore shipped to the smelters in Kootenay, since my last reports, I understand, is 3,720 tons.

Wheal Tamar. The *Wheal Tamar* is situated in the Jocko lake section. It was steadily worked last summer with a small number of men, in charge of O. S. Batchelor. A "common sense" whim was installed and housed in with a substantial frame building. Cross-cutting was performed at the bottom of the 50-foot shaft. Forty feet of the vein was intersected and produced ore of the same class and value as the outcropping on the surface, which contains ore 60 feet wide, that can be worked to advantage, and 200 feet of low-grade ore that may be found profitable under more favourable conditions in regard to treatment. The vein has been cross-cut in different places for a considerable distance.

Evening Star Group. This group consists of three claims, viz., *Evening Star*, *Golden Star* and *Bill Nye*. It is situated about six miles south-west of Kamloops, immediately south of the *Iron Mask* mine. The vein runs north-east and south-west, and has been proved by open cross-cuts to extend the whole length of the three claims. The ledge is from 40 to 100 feet in width on the surface. The principal work has been done on the *Evening Star*. A tunnel was run from a small lake to intersect the vein; at about 35 feet from the entrance a lode of high-grade ore was encountered, 6 feet wide. A shaft, 4 x 9 feet in the clear, with two compartments, well timbered all the way down, has been sunk a depth of 90 feet. At a depth of 40 feet a body of clean ore 4 feet wide was cut through, dipping to the north-east, and at 56 feet had dipped out of the shaft. A drift was started at this point 20 feet long, in ore of the same grade, which yields \$35 a ton, in all values. About 1½ car-loads are now on the dump, which will pay to send to the smelter. Another chute of similar grade, 6 feet wide, exists at the bottom of the shaft. Between the two high-grade veins is a large body of low-grade ore which, with a smelter in the vicinity, would yield profitable returns in combination with the richer ore.

Truth Group. Considerable work was performed on the *Dacotah* last summer, which is one of the principal properties of the *Truth Group*. The work consisted principally of wide open cuts running with the trend of the vein matter in magnetic ore and carrying small values in gold, copper and silver. In one of the cuts a good showing of copper was exposed, which will be further developed next season. All of the ore mined was sold to the *Iron Mask Co.* for fluxing purposes. The *Truth Group* is one of the mineral properties on Coal Hill and contains some of the best ore deposits.

Mr. Ashby, the former manager of the *Pot Hook*, informs me that instructions have been received from England to resume work on that mine, which has lain idle for several years.

Cotton Belt Mines. The *Cotton Belt* mines are situated on Grace mountain, about ten miles in a straight line north-east of Seymour Landing, at the head of Seymour arm. The following work has been performed on the claims mentioned:—*Cottonwood*, an open cut and shaft 20 feet deep; *Joe*, shaft 10 feet; *Boyne*, shaft 12 feet;

Harrison, shaft 10 feet; *Victoria*, open cut, shaft 20 feet, and lode stripped for a considerable distance; *Jessie*, vein stripped; *Wellington*, cross-cuts; *Shory*, cross-cuts; *Leemitford*, cross-cutting on vein; *Black Prince*, two large open cuts; *Tartar*, open cut 30 feet long; *McLeod*, shaft 12 feet; *Horseshoe*, shaft 10 feet. The ore-bodies show an increase in value as depth is obtained. I am informed that two new veins were discovered last summer. They exist in different formations, and are dissimilar in the character of the vein matter. One of them, 70 feet wide, contains chalcopryite. The other vein, 10 feet wide, is composed of galena, grey copper and chalcopryite. Mr. F. Daniels, the manager of the *Cotton Belt Group*, reports having found a vein of molybdenum of a very promising character, which has returned some high assays in that metal and 10 ozs. in silver. The gravel in Cotton creek contains both gold and platinum, but not in sufficient quantity to pay to work.

The amount granted by the Government for the construction of a trail has been a great assistance to prospectors.

COAL.

A local company of Kamloops business men, which acquired 2,500 acres of coal lands bordering the railway track and extending up the mountain side, commenced drilling operations last fall at a point about six miles west of Kamloops, designated by the late Dr. Dawson as being in line with the strike of the coal belt, and offering advantages for the prosecution of the necessary work. A Calyx drill, which cuts a core two inches in diameter, was purchased from the Canadian Rand Drill Co., of Sherbrooke, Quebec, and installed last fall, and has performed efficient work with a much smaller expenditure than if done by means of a Diamond drill. The depth attained is 375 feet, represented by 200 feet of rock, geologically termed as belonging to the Tranquille bed, 100 feet of conglomerate, and 25 feet of shale. The cold weather suspended operations during the winter, but preparations are now in course of progress to resume drilling. It is not expected that the coal seam will be encountered before reaching a depth of 500 feet.

OFFICE STATISTICS—KAMLOOPS MINING DIVISION.

Claims recorded	135
Certificates of work	143
Bills of sale	48
Mining leases issued	11
Certificates of improvement	20

Revenue.

Free miners' certificates	\$1,907 75
Mining receipts, general	1,885 55
Tax, Crown-granted mineral claims ..	253 50
	\$4,046 80

I take pleasure in forwarding a communication from C. B. Drummond, giving information relative to the mineral claims on Coal hill, in some of which he is interested:—

“These being a prospector's ideas, can be so considered.

“The *Cyclone Group* has been surveyed this year. This property lies south and east of Peterson creek, and is, as far as the ore-bodies have been traced, on their south-east strike.

“The *Laura Group* has had some \$600 to \$700 spent on it this year. The shaft has been carried down to the 50-foot level, and replacement of iron by copper is now rapidly taking place in the bottom of the shaft. Some very nice ore from the same shaft is on the dump, whilst some 600 feet farther west on the strike there is a cut 70 feet in length, in which a

spot has been squared out for a shaft and has good yellow copper for a surface showing. The heavy drift on the north end of the 70-foot cut has made it inadvisable to strip farther. At present there is no sign of a north boundary. The south boundary is probably a wall, and, if so, the only one at present disclosed in the camp. There are many other surface cuts.

"The *Gold from the Grass Roots* claim has been surveyed and application for a Crown grant therefor was made this past year, and in being surveyed has practically displaced some fractional claims.

"The *Monte Carlo* has a good showing of ore, sufficient to warrant further expenditure if capital was forthcoming.

"The *Wheal Tamar* has had considerable work done on it this season, and there is now exposed a very large body of $1\frac{1}{2}$ to 2 % ore; higher grade ore is also in evidence. This is one of the more developed prospects, and will well repay investigation.

"The *Blizzard Fraction* has also had some work done this year. It adjoins the *Wheal Tamar*, and it would appear to be the more reasonable way to open the latter through the *Blizzard Fraction* ground by quarrying and glory-holing than by shaft.

"The *Ajax* and adjacent claims have had assessment work performed. There are some good showings and large bodies of ore here, but work has not yet defined any boundaries of mineral-bearing rock, though exposures over a large scattered area all show ore, some fairly high-grade copper.

"The *Number Seven* needs work in the shape of a shaft. This claim probably contains a large body of magnetite and copper, which is not likely to be exposed as long as only the assessment work is done from year to year. Being overlaid by drift, and not much bed-rock in sight, the owners have not gained any great depth, though there are several cuts and holes of, say, 10 to 15 feet in depth; these latter are more or less filled in with dirt.

"Not much work has been done in the neighbourhood of the *Sugar Loaf* this season.

"The *Chieftain Group* has produced some good copper, and, as the ore is not pockety anywhere else in the camp, there would be reason to suppose that work will disclose ore-bodies.

"It is hoped that the coming year will see work resumed on the *Pot Hook Group*. There is a considerable body of higher grade copper thereon.

"On the *Roadview* there is some nice bornite ore to be obtained. This is also a hard claim to prospect, owing to the amount of glacial drift overlying the formation, making the preliminary surface stripping very discouraging, but lying as it does between the *Truth Group* and *Mountain*, is worth looking into for a large body.

"The *Mountain* claim is a large mass of low-grade ore, probably between 1 % and $1\frac{1}{2}$ % copper.

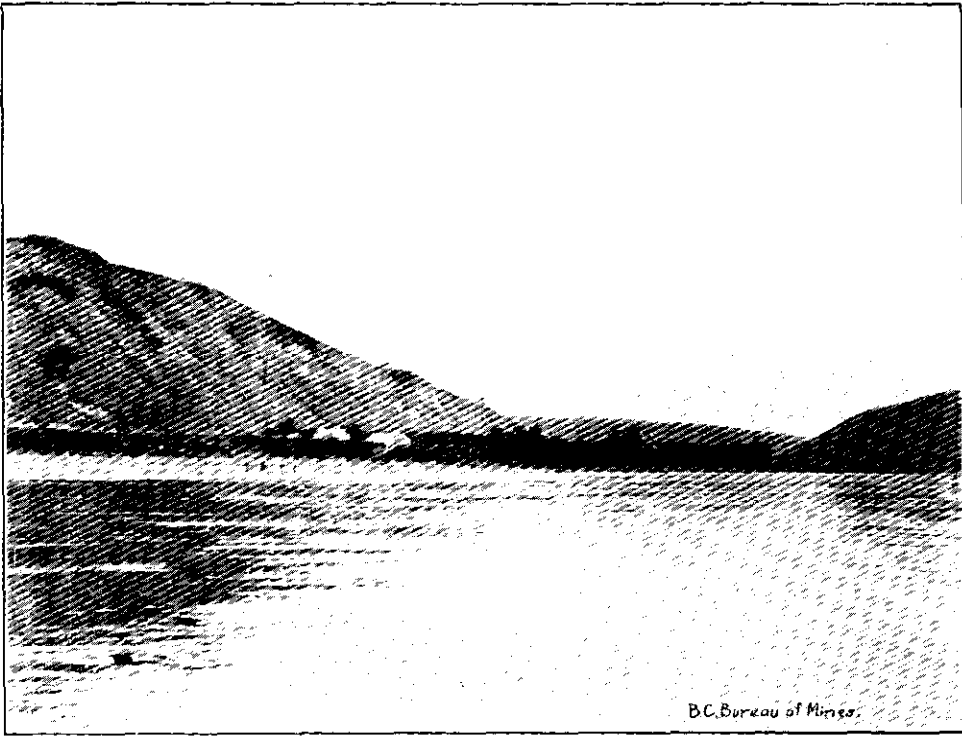
"Application for a Crown grant has also been made on the *Iron Cap*.

"A group of claims has been incorporated as the *Norma Group*. These form a good property and ought to be more extensively developed, though the present cause of this not being done may be lack of capital.

"The old Dominion Copper Co. now owns a group formerly known as the *O. K.*

"The *Orphan Boy* has some good gold values and yellow copper on the dump.

"The *Hecla Group* needs more money for deeper development. A tunnel run on this property would drain the lead, but is too large an undertaking for the present owners. The shaft is full of water and water has always been a disagreeable factor in working in this shaft, but, at the same time is probably responsible for the ore-body here, which is a continuation of the *Python* zone.



B.C. Bureau of Mines.

DUNVEGAN H. B. POST, PEACE RIVER, ALBERTA.
LOOKING DOWN STREAM.



B.C. Bureau of Mines.

EPISCOPAL CHURCH MISSION AT LESSER SLAVE LAKE, ALBERTA.

"The *Esperanza* has had some yellow copper found on it this year. This is the first so far discovered. As this is a sinking proposition, development will be necessarily slow.

"The *Nulli Secundus* is a new location in part covering old ground. Some yellow copper has also been shown up here. Development will be proceeded with in the spring.

"The Kimberley Co. has applied for a Crown grant of its properties here, and a claim or two, the *Copper King*, etc., at Cherry creek. The company has done some work at Cherry creek.

"The *Rising Sun Group* has had a small glory-hole, with a face 50 feet in depth by 40 feet in width, put into it. A cross-cut will now be run across the lead at this depth. Some nice ore has been taken out of it, but squeezing, through movement, has compressed all the mineral out of it for some distance through the cut by which the glory-hole is reached. The rock appeared to be in place, however, just when work was knocked off for the season and the ore was coming in. Water level has been reached.

"The *Hawthorne* has been Crown-granted. A large iron cap exists here, but through insufficient depth work has not yet reached the ore.

"Assessment work has been done annually on the *Dispatcher* for some years, all by surface cross-cuts, but if sunk on this property ought to make another of the large low-grade bodies."

ASHCROFT MINING DIVISION.

REPORT OF H. P. CHRISTIE, MINING RECORDER.

I have the honour to submit my annual mining report for the Ashcroft Mining Division for the year 1906.

There has been practically no change for the last couple of years. The office statistics show a small decrease all round, although the reports continue favourable, and the owners of mineral claims are in nearly all cases keeping up their assessments. There has, however, been very little legitimate mining done. No placer mining has been engaged in to speak of, the Fraser River Gold Dredging Co. having ceased all operations for the present.

OFFICE STATISTICS—ASHCROFT MINING DIVISION.

Free miners' certificates	80
Certificates of work	42
Locations recorded	41
Placers "	3
Conveyances, etc	7

YALE MINING DIVISION.

REPORT OF WILLIAM DODD, MINING RECORDER.

I have the honour to submit herewith my annual report and office statistics for the year ending December 31st, 1906.

There is practically nothing new of importance to report regarding the Mining District.

PLACER MINING.

The Pacific North-West Co., on Siwash creek, continues the extension of its open cut and laying sluice-boxes, with the view of striking bedrock.

DREDGING.

The Yale Syndicate, composed of New Zealand capitalists, has completed its dredging plant, and is ready to make a practical test of the Fraser river bed at Hill's bar, as soon as weather permits.

MINERAL CLAIMS.

The Mount Baker and Yale Mining Co., on Siwash creek, has done the usual assessment work.

The Marvel Gold Mining Co. has five mineral locations, and has extended its tunnel into the mountain, meeting with encouraging prospects. These properties give assay values in gold from four different ledges. A six-stamp Merrill mill has been installed on this property.

The *Bonanza* location, near Hope, is owned by Wardle & Co., who extended the tunnel during the past season.

In the vicinity of Hope considerable activity has been evidenced by a number of locations recorded in Coquihalla and Skagit valleys; also on Ladner creek. In the event of construction of the V., V. and E. Railway, a large amount of prospecting may be expected in the country bordering on the line of construction.

OFFICE STATISTICS—YALE MINING DIVISION.

Mineral and placer records	23
Free miners' certificates	63
" " companies	4
Certificates of work	39
Affidavits (25), notices (6), and permits (3)	34
Conveyances, agreements	23
Powers of attorney	3
Leases in force	29

Revenue.

Free miners' certificates	\$ 442 50
Mining receipts	1,987 30
Miscellaneous receipts	536 75
	\$2,966 55

NICOLA MINING DIVISION.

REPORT OF GEORGE MURRAY, MINING RECORDER.

I have the honour to submit the following report upon mining operations in the Nicola Division during the year 1906:—

ASPEN GROVE CAMP.

The largest number of mineral locations is in the Aspen Grove Camp, of which several groups have been Crown-granted. About nine years have elapsed since prospecting work began in this section, and up to date, but few claims have changed hands. Efforts are now confined chiefly to keeping up assessment work and Crown-granting.

The *Golden Sovereign Group*, which makes a strong showing of native copper, was bonded last March. Development work was engaged in and a shaft was sunk to the depth of 100 feet.

The *Copper Standard* group of claims, owned by Price Ellison, M. L. A., *et al.*, contains copper ore with appreciable values in gold and silver. Work was done on the *Bighorn* and adjoining claims, enhancing the value of the property.

On the group of claims owned by Dad Allen, assessment work has resulted in exposing copper glance, chalcopyrite and bornite. Locations held by Roberts and Budd, on which prospecting has been done, afford excellent showings. Some good exposures are to be found on the *Tom Cat Group*, where several strong showings of native copper are in sight.

Bates Bros. and Armstrong, who were among the first prospectors in the camp, have several groups of properties, on some of which considerable development work has been done.

Disclosures on the *Wayside Group*, owned by Larsen and Murray, indicate a wide ledge with copper showings.

TEN-MILE CAMP.

The camp at 10-Mile creek has attracted attention on account of the ore exposed by assessment work on some of the properties. Work done in this camp during the last two years has resulted in very favourable disclosures, both as to permanence of veins and values of ore-bodies. An open cut on the property of the Broomhead Syndicate exposed the lead, which is 15 feet wide with two well-defined pay chutes of high-grade copper ore, with small gold and silver values. In a former tunnel a station was cut and winze sunk 15 feet on the larger pay chute, which is several feet wide.

Work on the *Cowboy* claim, owned by the same company, has disclosed a vein of ore of excellent indications.

On the *Coronado* mineral claim a lead about 12 feet wide, which seems well mineralised, has been discovered.

A large body of medium grade copper ore is in evidence on the group of claims owned by Mr. Sissett and others.

Locations held by J. W. Collis and associates were favourably mentioned in previous reports, and subsequent work strengthens the conviction. H. Stumbles & Co. have a large ore-body in sight, containing copper pyrites, which give excellent assay values.

The extension of the railway into Nicola brings the 10-Mile Camp within 12 miles of shipping facilities, with a down-grade to the station.

MILL CREEK.

On Mill creek, about three miles north of Nicola, Thomas Hunter has a group of several claims, gold and copper bearing. The ledge matter is white quartz and the formation granite. Frank Lambert has five claims, on which several years' assessment work has been done. Assay values from both properties are good.

COAL PROSPECTING.

During the last three years a considerable amount of prospecting with Diamond drills has been done. The Diamond Vale Coal & Iron Co. has been operating extensively with the drill on its coal areas in the Quilchena basin, and recently on its Coldwater property. The disclosures on Quilchena were satisfactory, but too remote from a railway for a present shipment. This company secured a large area of the best coal lands in the Nicola and Coldwater basin, through which the C. P. R. branch line passes. After several drill tests, which resulted favourably, the company selected a colliery site, and things are now in preparation for the opening up of these properties. All the work is done substantially and with a view to permanency. Everything is now ready for shaft-sinking, and, as the depth of the first seam is comparatively small, the company hopes to have an output of coal at an early date.

The Nicola Valley Coal & Coke Co. (locally known as the Garesché-Green), also located on the Coldwater, has a large coal seam to start on, an outcrop on the hillside of a good quality of coal, which can be worked by tunnelling. Under the efficient management of A.

Faulds, M.E., this property is being prepared for coal shipment. The local demand has been fully supplied; also the Canadian Pacific Railway engines on the Nicola branch get their coal from the tunnel output. A car is now being loaded for shipment to Vancouver. Counting the different seams known to exist on this property, there is fully 18 feet thickness of coal accessible by tunnel. The work so far has been chiefly exploratory and preparatory; but as soon as proper shipping facilities are afforded the company expects to have an output equal to the demand.

OFFICE STATISTICS—NICOLA MINING DIVISION.

Claims recorded	96
Certificates of work	119
Free miners' certificates	101

SIMILKAMEEN MINING DIVISION.

REPORT OF HUGH HUNTER, MINING RECORDER.

I have the honour to forward the annual mining report for the Similkameen Mining Division for the year 1906:—

A few Chinese were engaged in placer mining above the mouth of Bear creek.

On Copper mountain the majority of the claims are Crown-granted, and on the remainder assessment work has been done.

The owners of the *St. George*, *St. Helen* and *St. Lawrence* mineral claims, on Bear creek, who, with the assistance of the Government, built a waggon road some 12 miles long, have started to develop their property by means of a shaft. At the 120-foot level a body of high-grade ore was struck, which continues with depth.

At the head of this creek a group of claims, known as the *Independence*, has been bonded to a New York Syndicate, which has a force of men running a tunnel to prospect the ground.

I have nothing of importance to report concerning other portions of the district, owners satisfying themselves with doing merely sufficient work to hold their claims.

OFFICE STATISTICS—SIMILKAMEEN MINING DIVISION.

Free miners' certificates	223
" " special	3
Location records	307
Certificates of work	443
Conveyances	109
Certificates of improvements	38

Revenue.

Free miners' certificates	\$1,464 90
Mining receipts general	2,934 15
Acreage tax, mineral claims	771 00
	\$5,170 05

LILLOOET DISTRICT.

LILLOOET MINING DIVISION.

REPORT OF C. PHAIR, GOLD COMMISSIONER.

I have the honour to submit my annual report on the progress of mining in Lillooet Mining Division during the year 1906 :—

No changes of importance have taken place since last year.

The *Lorne* mineral claim, at Cadwallader creek, was worked as usual with an arrastra, which crushed 215 tons of ore, yielding \$5,441.82, which was a good result from such a primitive mode of treating the ore.

The purchase of the *Wayside* mineral claim at Bridge river by Mr. Osmond Fergusson, is worthy of note. The surface indications are good, but it has not yet been proved on depth.

The Anderson Lake Mining and Milling Company's mineral claims at Anderson lake are bonded to Mr. J. Burley Smith, of Montreal, who informed me that he had undertaken to form a company in London, England, with a large capital to operate the same.

Messrs. Babb, Ferguson, Walker and Swanson have done considerable development work on their placer leases at Alexander creek. They employed an average of 15 men and took in a large hydraulic plant over a trail for the greater part of the way. They intend working two monitors, having a good water supply, and the ditch, which is $1\frac{1}{2}$ miles in length, is nearly completed. They dammed the outlet of No-fish lake, for the purpose of storing water. The lake is about two miles long by one-half mile wide.

The Jespersen leases at Cayoosh creek were not worked to the same extent as last year. High water, at various times, prevented the re-building of the dam, so only four men were employed in prospecting and development work.

The yield of placer gold ascertained amounts to only \$14,000, which is \$10,000 less than last year, owing chiefly to the cessation of the dredge by liquidation, and the departure of nearly all itinerant Chinese miners to Bullion, where they obtained employment at high wages.

OFFICE STATISTICS—LILLOOET MINING DIVISION.

Mineral claims recorded	41
Placer claims re-recorded	5
Certificates of work recorded	89
Conveyances recorded	49
Mining leases in force	25
Dredging leases in force	6
Free miners' certificates issued	82

Revenue.

Free miners' certificates	\$ 888 00
Mining receipts general	2,361 15
Mineral tax	108 83
Tax on Crown-granted mineral claims	398 50

\$3,756 48

CLINTON MINING DIVISION.

REPORT OF F. SOUES, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on mining in the Clinton Mining Division of Lillooet District for the year ending December 31st, 1906 :—

Mining in all its branches, I regret, has been practically at a standstill, and no improvement in value over that of 1905. The total yield of gold, so far as I have ascertained, is under \$1,000.

A certain amount of prospecting has been done on the mineral claims (copper) on the Bonaparte river.

On a few of the recorded claims sufficient work has been done to hold them for another year.

The holders of the dredging leases on the Fraser river, in this division, have seen their way clear to install a Keystone drill to test the value of the gravels in the bed of the river, a method which I have advocated for years. It is an expensive way of prospecting, but in the end far better than building an expensive dredge and launching it on what may be a worthless part of the river. The work done by an imperfect dredge on Horsebeef bar, below Lillooet, has convinced me of the far-seeing ideas of the late Dr. Dawson. In a conversation with him several years ago, he said: "that the mineral values in the Fraser river were enormous, but they were at depth, and science and mechanical skill would, some time in the future, find ways and means to reach them." The Keystone drill was installed late in the season, and only some three or four bore-holes put down a distance of 50 to 60 feet each, when extreme cold weather set in and all work stopped until next April, at the earliest, when prospecting will be renewed and continued with vigour until the lessees feel justified in setting about the construction of a modern dredge powerful enough to deal with the gravels in that very turbulent river.

Placer mining has been confined to a few itinerant Chinese and Indians.

OFFICE STATISTICS—CLINTON MINING DIVISION.

Mineral claims recorded	9
Placer claims re-recorded	1
Certificates of work	9
Mining leases in force	3
Bar leases in force	6
Dredging leases in force	12
Conveyances recorded	14

Revenue Collected.

Free miners' certificates	\$ 84 50
Mining receipts, general	5,270 50
	\$5,355 00

VANCOUVER ISLAND AND COAST.

—:—

WEST COAST OF VANCOUVER ISLAND.

REPORT OF H. CARMICHAEL, PROVINCIAL ASSAYER.

This section was visited by the Provincial Assayer in 1899, who then gave a general description of the district. It is now attempted in this report to give some account of the more important developments that have taken place since that time. The greater number of the claims have been re-visited, but some have not, in which latter case the information given has been obtained from various sources, and so carefully checked that it is believed to be reliable.

QUATSINO SOUND.

The Provincial Assayer visited and reported on the properties in the vicinity of Quatsino in 1903, since which time the only property upon which any important development work has been done is the *June Group*, situated a few miles back from the north shore of the south-east arm of Quatsino sound. As was then noted, there was on this property a marked mineralised zone, occurring as a ridge, shown up for a length of 300 feet. This showing had then been prospected by a series of open cuts and gave promise of the probable finding of an ore-body. Last year the owners determined to do some development work on the property, to demonstrate at a depth the promise given by the surface showing, and started a long cross-cut tunnel. This work has been done under the charge of Mr. Harold Grant, of Victoria, from whom the following account of work done has been obtained:—

“Development work has been actively carried on for the last twelve months. This has consisted principally in running a tunnel under the large open cut where ore shows on the surface. This tunnel has been driven through very hard ground for 410 feet. The formation cut by the tunnel is well mineralised along a contact between limestone and granite, much cut up by felsitic intrusives. In a 20-foot cross-cut, to the north, ore carrying 2 per cent. copper was struck, and a considerable quantity can be hand-sorted to a shipping grade.”

Yreka. The *Yreka* mine, which was being worked in 1903, and was then fully reported on, has since that date lain idle and no further development has taken place, so that nothing further can be added to the report then made.

Hematite Iron Ore. The hematite iron ore deposit, noted in 1903 Report as situated on the west arm of Quatsino sound, has been further prospected by small open cuts and test pits, with results that appear satisfactory to the owners. It is understood that the property has been under bond to a syndicate which contemplates the making of iron at Irondale, Washington, but, as far as can be learned, no ore has been mined or shipped from the property.

On some of the other claims within the district tributary to the Sound some little work has been done, but it has been in each case limited to the amount of assessment necessary to hold the property.

Kyuquot sound and Esperanza inlet are to the south of Quatsino sound, on the west coast of the Island. These inlets were prospected to a certain extent some three or four years ago, but no ore showing warranting further prospecting was found.

NOOTKA SOUND.

Nootka sound, which lies to the south of and adjacent to Esperanza inlet, was visited this year by the Provincial Assayer.

An attempt is being made on the shore of Deserted creek—an arm of Marble Quarry. Nootka sound—to develop a marble quarry, which is particularly interesting, as previous attempts on other parts of the Coast to develop deposits of marble have shown the deposits developed to be so fissured by the proximity of igneous rocks, developed locally, as to be of no value commercially.

Deserted creek is an arm some $2\frac{1}{2}$ miles long by about half a mile wide, running in a north-westerly direction, and has a depth of 40 fathoms of water at its mouth, gradually shoaling off to 14 fathoms at its head. From the water's edge the mountains rise abruptly to a height of over 1,000 feet, leaving little or no land anywhere along the shore.

At the mouth of the creek or inlet the country rock is syenitic granite, that about a mile up the inlet gives place to a highly crystalline limestone or marble, which has been traversed in places by diabase dykes, varying in width from a few inches to one that measured 45 feet across. These dykes seem to be more silicious on the western side of the inlet than on the eastern side.* On the east side of the inlet this limestone formation extends for $1\frac{1}{2}$ miles to the head of the inlet, rising to a height of several hundred feet and showing out strongly in great massive bluffs.

This entire mass of limestone has been rendered highly crystalline, probably by the great quantity of igneous rocks which surround and traverse it. While the entire mass has become crystalline, the crystallisation varies greatly in character, and it would appear, from close examination, that along the contacts of the limestones with the dykes the crystallisation is fine-grained, while farther away from the influence of the dykes the crystalline form is much coarser—in some places, very coarse. The original bedding of the limestone has been so completely obliterated by the metamorphism to which it has been subjected that no definite idea could be formed as to the strike of the beds, although this appeared to be N.E. and S.W., with an equally indefinite dip seemingly to the east.

The deposit on the east side of the inlet has been taken up by J. Hastie *et al.*, while that on the west side is held by J. Mortimer.

There is on either side of the inlet undoubtedly an extensive deposit of crystalline marble, of great purity and good quality, but as to whether this deposit will produce a commercial product—that is, solid, flawless slabs of commercial size—it is as yet impossible to say definitely, since no work has been done to open up quarries, and only a few shots have been blown out of the surface exposures to test them.

While, undoubtedly, in a number of places, the deposit has been considerably shaken and fissured, yet there are indications leading to the belief that there are several spots which have not been so affected, and where quarries may probably be opened up and blocks of even large size obtained, free from flaws or shakes.

The colour of the marble on the east side is somewhat variable, but it is generally a blue-gray, becoming darker towards the northern end of inlet.

* The following is the report of Dr. J. A. Dresser, of Montreal, on a microscopic examination of this dyke rock, taken from western side of the inlet—

“No. 4,004.—*Dyke Rock, Deserted Cove.*—This is a yellowish green rock of fine, even texture. In the thin section is found to consist essentially of feldspar, augite, quartz and hornblende, with accessory amounts of some iron ore and shreds of leucoxene. The feldspar is plagioclase, well crystalized; augite, which in amount is nearly equal to feldspar, is of the later crystallization than many parts of that mineral; at least several interstitial spaces are filled with quartz; hornblende occurs in rather small brown crystals, somewhat chloritized. The rock is a quartz diabase.”



YORK BOAT ON LESSER SLAVE RIVER, ALBERTA.



PATCHING CANOE, LESSER SLAVE RIVER, ALBERTA.

On the west side of the inlet, while the extent of the deposit is not quite so great as on the east, the texture is finer and the colour is good, varying from a pure white to gray, while at several spots it presents a mottled face—white with gray streaks—from which it would seem from surface indications as if blocks of considerable size might be obtained.

If the properties prove upon subsequent development to be workable, as the present exposures indicate, they are admirably situated as regards transportation, being right on the shores of a deep navigable inlet, well sheltered from storms or rough water.

The *Stormont*, *Glengarry* and *Texas* form a group of claims owned by Messrs. Stockham, Grant & Dawley, of Victoria and Clayoquot, situated at the upper end of Head bay, an arm of Nootka sound, and distant half a mile from the water. At an altitude of 350 feet above the sea some surface stripping has uncovered a body of magnetic iron ore, that appears to be of considerable size. The best exposure is a bluff over 40 feet high and uncovered for a width of 100 feet, in which exposed face the magnetite seems to be solid and unmixed with rock matter. At this point the ore has been partly stripped for a further distance of 200 or 300 feet, while it is said to have been traced through the three claims. The mineralisation appears to occur along the contact of a felsitic, igneous rock with a limestone, but sufficient work has not been done to render any very definite ideas being formed of the dip or strike of the ore-body or of its general character. An analysis of an average sample gave the following result: Iron, 66.42 %; sulphur, 0.26 %. The property is most favourably situated for cheap mining, and a railway two miles long, with easy grade, would convey the ore to a sheltered bay with navigable water.

HESQUIAT HARBOUR.

Hesquiat harbour is the next inlet to the south of Nootka sound, and was visited by the Provincial Assayer in 1902, since which time no new developments have been made, further than assessment work performed on the *Brown Jug Group*, owned by Norris & Smith, of Alberni, and situated on the east side of Hesquiat lake. The ore is reported to be zinc blende, carrying 20 to 25 oz. of silver to the ton.

SIDNEY INLET.

Sidney inlet is about 10 miles south-east from Hesquiat harbour, and about 12 miles north of the Indian village of Ahousat. This camp was visited in 1899 by the writer, but since that time considerable development has taken place on both the *Indian Chief* and *Prince Groups* of claims, and some ore has been shipped.

Neither of these claims were being actually operated, and there was no one on the ground to serve as a guide, nor could one be obtained. However, an attempt was made to find the various workings by following up the old trails; but as trails in this part of the country become rapidly obscured by the rank underbrush and moss, the attempt was not very satisfactory, and only three of the numerous openings could be found. This is to be regretted, as from reliable authority it is known that a number of new exposures of ore have been uncovered, which the owners consider very promising.

This group, consisting of nine claims—*Firefly*, *Leschhi*, *Brutus*, *Indian Chief*, *Mephistopheles*, *Scotlet*, *Victor Fract.*, *Victor*, *Dewdrop Fract.*, and *Tinnicanum*—is owned by Hon. Edgar Dewdney, of Victoria. The property extends from the shore of Sidney inlet back for some 6,000 feet, in which distance the hills rise to a height of over 2,000 feet. The mine camp has an elevation of 1,200 feet; the principal workings are farther up the mountain, and are reached by short trails from the main trail from the beach, which is one mile long, over which some 100 tons of ore have been

brought down to the beach by pack train and shipped to the Crofton smelter, yielding returns of 17 % Cu. The camp buildings consist of a cabin and stable on the beach and a good bunk-house up the hill.

The *Prince Group*, consisting of eight claims, the *Prince Nos. 1 to 8*, *Prince Group*. is situated to the north of and adjacent to the *Indian Chief Group*. The occurrence and the ore are very similar. This is a group of claims which was obtained and developed for a Scotch syndicate by Dr. T. R. Marshall, now of London, but since his departure from the Province, in 1904, the claims have remained idle.

The *Prince* and *Indian Chief Groups* use the same trail from the beach for a distance of 2,200 feet, when the trail forks, the right-hand branch going to the *Indian Chief* and the left-hand one to the *Prince Group*, this latter group being situated some 7,000 feet from the landing wharf.

AHOUSAT.

Ahousat is an Indian village situated on a sheltered bay, Matilda creek, making in on the east side of Flores island, and is a regular port of call for the coasting steamers. There is a store here owned by W. Dawley, of Clayoquot, where the more ordinary supplies can be obtained.

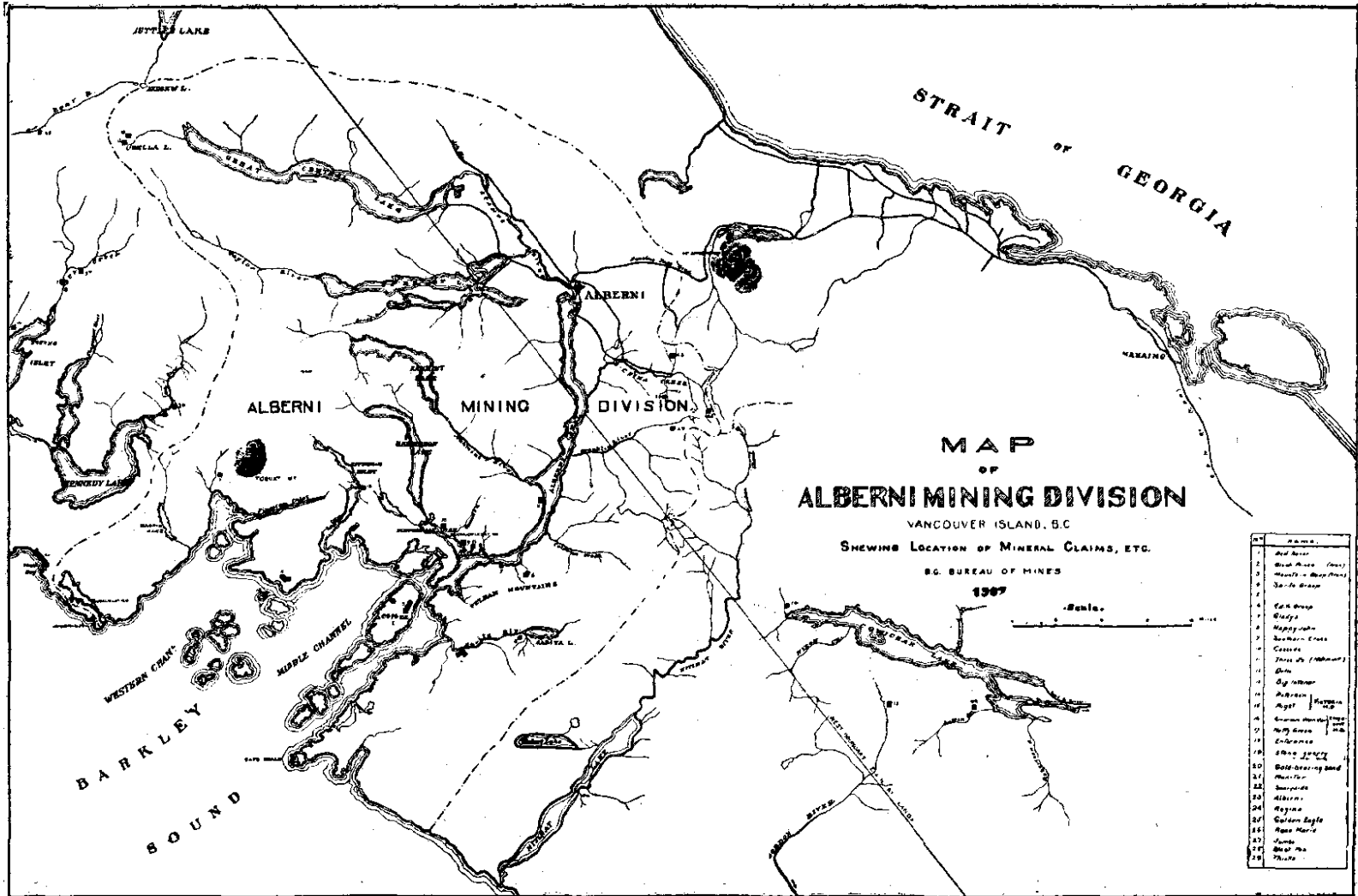
The *Ormond* is a claim owned by G. Beck and Gardhouse, of Ahousat, *Ormond*. and situated about a mile back from the west shore of Matilda creek or arm. At an altitude of some 950 feet a few blasts have been fired, breaking a few feet into an exposure of magnetite iron ore, showing here for a width of three or four feet, and occurring in epidote and diabase.

A little farther to the west and at about the same altitude there is to be seen, in a zone of movement in the diabase country rock, a mineralisation by copper pyrites and pyrrhotite, on which a short tunnel had been driven in for some eight feet. The mineralisation in this tunnel was very ill-defined and indistinct; consequently, a second tunnel was started some 30 feet lower down the hill, to prospect the showing at that greater depth. This tunnel is now in 54 feet, and has been driven on a well-defined slip wall in the diabase country rock. This slip forms the left side of the tunnel, and on that side no mineralisation was seen, but the right-hand wall is irregularly mineralised with iron pyrites and copper pyrites, which in certain spots ran as high as 6 or 7 % copper. Some 75 feet vertically and 150 horizontally back from the second tunnel several shots have been put in on a rock exposure showing mineralisation with pyrrhotite and copper pyrites.

A little to the south of and at 400 feet lower elevation than the *Ormond* there occurs in a basic eruptive rock a mineralised zone running in a north and south direction, and on this zone several claims have been located. Beginning at the northern end of this zone, the following claims were seen:—

The *Pete* and *Iron King*, adjoining claims, have been purchased by *Pete and Iron King*. Capt. John Irving and Wm. Wilson, of Victoria. At an altitude of 575 feet and half a mile west from the shore of Matilda creek or arm, several open cuts have been made, the longest being 27 feet. These cuts show the zone in the diabase to be strongly mineralised with pyrrhotite, with a little copper pyrites. A few feet to the south of this cut a few shots have exposed the rock, which here appears to contain a greater percentage of copper pyrites.

To the south of and adjoining the previously mentioned claims are the *Copper King Nos. 1, 2 and 3*. *Copper King Nos. 1, 2 and 3*. mineral claims, owned by Messrs. A. Watson and Sullivan. Towards its southern end the mineralised zone already referred to occupies a ridge, and into this a tunnel has been driven, which for the whole 30 feet of its length is in solid pyrrhotite. To the east and on the other side of



the ridge the rock is soft and very much crushed, and in this very little mineralisation could be seen. One or two inclines have been run into the hillside, and these are said to carry ore, but as they were full of water, such statement could not be confirmed by personal observation.

The *Ormond No. 2* mineral claim has been located by Beck and Gard-Ormond No. 2. house on the east shore of Matilda creek, and has been prospected by several open cuts and a few shots on surface. In one of these exposures, on a contact between diorite and diabase, there was seen from 3 to 4 feet of solid magnetite, while from some of the other showings a small quantity of very fair copper ore has been taken out, but no extensive mineralisation has been proved by the work so far done.

CLAYOQUOT SOUND.

Clayoquot sound is the first important inlet to the south of Sidney inlet, and it has many branches, affording a splendid landlocked waterway. This district was visited by the Provincial Assayer in 1899, when a number of claims were reported on in full. Since then many of the claims have lain dormant, and on a few only has even the requisite assessment work been done.

The *Good Hope* claim, owned by the Helga Mining Co., of Seattle, Washington, showed in 1899 a well-defined quartz vein from 4 to 7 feet wide; since then the owners started a tunnel 126 feet below the outcrop, to cross-cut the vein at depth. In and from this tunnel some 800 feet of drifting and cross-cutting has been done, without, it is regrettable to say, locating any body of pay ore. Still undiscouraged, the owners are preparing to do at least a small amount of further work, which, it is hoped, will meet with better reward, since such energetic development is rare on the west coast.

The *Killapa* claim is situated on the shore of Dissappointment inlet. Killapa. An attempt was made to find this claim, which was, however, not successful, as the trails were not traceable, being so grown over with underbrush. It was learned later that only the annual assessment work had been done on the property for some years. The following notes are from the report of an engineer who visited the property:

"The most important development work has been done at an altitude of some 600 feet, where a tunnel has been driven for 150 feet in ore. The vein-matter consists of quartz with iron pyrites and copper pyrites, carrying gold and silver, and is about 3 feet wide."

The *American Wonder* claim, situated on Tranquil creek and owned American Wonder. by General Aston, of Tacoma, was visited in 1899, when a good body of copper ore was exposed. Since then the claim has been Crown-granted and allowed to remain idle, no further work having been done, so that the conditions remain as they were when last visited.

The *Hetty Green* claim is situated on Deer creek and is owned by Hetty Green. Ward and Thompson, of Alberni. Considerable work has been done on the property, and in 1905 some 215 tons of very good copper ore were shipped out over a waggon road which was built with the assistance of the Provincial Government.

BARKLEY SOUND.

Barkley sound is the most important inlet on the west coast of Vancouver island, with many arms, extending for 35 miles in a north-east direction into the island, about two-thirds of the distance across, and at the head of the most important arm, Alberni canal, is the town of Alberni. There are a large number of claims situated in the district tributary to the various arms of this sound, and of which a number were visited this summer.

The *Red Rover* claim, owned by Messrs. Jay, Graham and Poole, is situated about $2\frac{1}{2}$ miles to the north from the shores of Toquat harbour, with which it is connected by trail, and at an elevation of 375 feet above tide water. A small creek flowing through the property has exposed a quartz vein from $2\frac{1}{2}$ to 3 feet wide, with a strike N. 30° W. and a dip of 65° to east at this point. Below this exposure, some 20 feet, an open cut 30 feet long was run, from which some quartz was taken out, carrying \$5 in gold per ton. From the exposure in the open cut it was seen that the vein was flatter than indicated by the outcrop, consequently, a tunnel was started at the end of the cut and under the vein as exposed. This tunnel gradually turns to the right, so as to cross-cut the course of the vein, but in the tunnel the vein does not appear to be clearly defined. The vein is in a diabase country rock, with fairly tight walls, although in the open cut the hanging wall is well defined. The vein-matter is somewhat brecciated in structure, containing enclosed fragments of the country rock. The owners claim to have obtained very good gold values from the vein and that the wall rock also carries values, but such values were not apparent in the samples taken by the writer for assay.

This claim is situated on Prideaux island, on Sechart channel, Barkley sound, and is owned by J. Crawford Anderson. On the south-east side of the island a quartz outcrop on the beach has been uncovered by an open cut and some surface work; a shaft has also been sunk on the lead to a depth of 40 feet. This latter was, however, full of water when visited. The lead is 22 feet wide on the surface between well defined slicken-sided walls; strike, N. 75° E. The vein-matter is brecciated and shows considerable movement. The mineralisation on the surface and of the dump consists of a little copper and iron sulphides, with slight indications of cinnabar. The owner of the property claims to have obtained high values in gold and an appreciable percentage of mercury from the vein, but the samples taken and assayed by the writer only gave a trace of gold and no mercury. The ore on the dump did not show high values, but as it is much decomposed it is possible the values may have been lost. The vein appears to occur on a lime diabase contact and is seen on Nettle island, farther to the S. E., and it is reported to have been traced on to other islands for one and a half miles.

On the east side of Effingham inlet, about 5 miles up, there is a high bluff of reddish brown rock, having a close, fine-grained texture and showing no cleavage or bedding plans.* Associated with this rock mass are intrusions of a greenish eruptive, having a more or less amygdaloidal structure. The deposit has been taken up as a quarry by Mr. J. C. Anderson, of Sechart, and it is possible the rock may have some value as a building stone.

This group consists of the *Black Bear, Eureka, United, Southern Cross, Sarita Group, Midday, British Pacific*, and also a leased strip of the Indian Reserve fronting on the Sarita River. The property is owned by Wm. Wilson and Capt. J. Irving, of Victoria. The claims are reached by following up the Sarita river from Barkley Sound about one mile from deep water, where an outcrop of ore is seen in the river. Some 10 feet above the river a tunnel has been driven under an outcrop of ore showing on the bluff above. This tunnel has been run in a nearly straight line S. 17° E. for 180 feet. At 117 feet in two drifts have been run at nearly right angles, the one to the right for 54 feet, and that to the left for 40 feet. Some years ago a winze was sunk at 47 feet in on the tunnel

* The following is the report of Dr. J. A. Dresser, of Montreal, on a microscopic examination of this rock:—

"No. 4,002.—*Anderson's Red Rock, Effingham Inlet, B. C.*—This rock consists of angular grains of quartz, which are cemented together by fine aggregate of granular material, which is almost wholly hematite. The rock is a jaspilite or impure jasper.

to a depth of 50 feet, and a drift run back towards the river of 50 feet. This winze and drift are now full of water. There has been a considerable amount of surface stripping done on different parts of the claim.

The entire surface is heavily timbered and covered with underbrush, but, from a general examination of the property, there would seem to be contact of a felsitic rock with limestone, and along this contact later diabase dykes* have intruded, carrying with them a little mineralization, consisting principally of pyrrhotite with a little chalcopyrite and arsenical iron. The mineralisation is not evenly distributed through the dyke matter, some parts carrying copper and others none. At present no body has been developed large enough to pay the cost of extraction.

The tunnel cross-cuts a diabase dyke 40 feet wide, while the drift to the left, where the work is now being done, starts on the dyke, but at 40 feet turns, cutting through the dyke and at the face is about 2 feet in the felsitic country rock, the strike of the dyke at this point being N. 6° E. with a dip of 66° to the north. A systematic tracing of these dykes on the surface would much facilitate the working of the claims and would save a considerable amount of work underground.

The assay values from samples taken were as follows:—

	GOLD.	SILVER.	COPPER.
Straight pyrrhotite	0.16 oz. per ton.	1.12 oz. per ton.	None.
Ore from outcrop	Trace.	0.2 "	6.2 %

The Cascade mine is situated on the north shore of Uchucklesat harbour.

Cascade Mine. Near the head of the harbour the mountains on this side rise abruptly to a height of 3,000 feet. The general country rock is limestone traversed by diabase dykes. At an elevation of 275 feet above sea level some surface work has been done and an incline sunk on a diabase dyke, which is impregnated with bunches of iron and copper pyrites. Some 25 feet lower down, a tunnel has been run into the mountain side, on the dyke, for 54 feet in a general N. 30° E. direction, but turning a little more to the north towards its inner end. At 20 feet in, the tunnel ran through a chute of ore, a few feet wide, which is cut off by a slip-wall in the dyke. The mineralisation is iron and copper pyrites. Selected samples gave the following assay:—Gold, 0.06 oz. per ton; silver, 0.12 oz. per ton; copper, 5.5 %. That there has been much movement is proved by the "slicken-sided" slip-walls which are seen. The evidence would point to the mineralisation having taken place during a second period of movement. The end of the tunnel is in the diabase dyke matter, but a little mineral is seen on a slip-wall near the floor. A considerable amount of ore has been shipped from this mine, taken principally from the open cut above and from the drift to the left of the tunnel. A gravity tramway has been erected to convey the ore to sea level, where it was shipped.

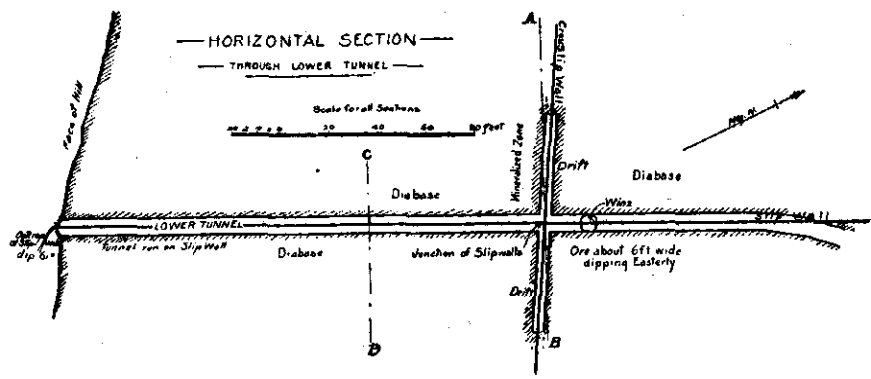
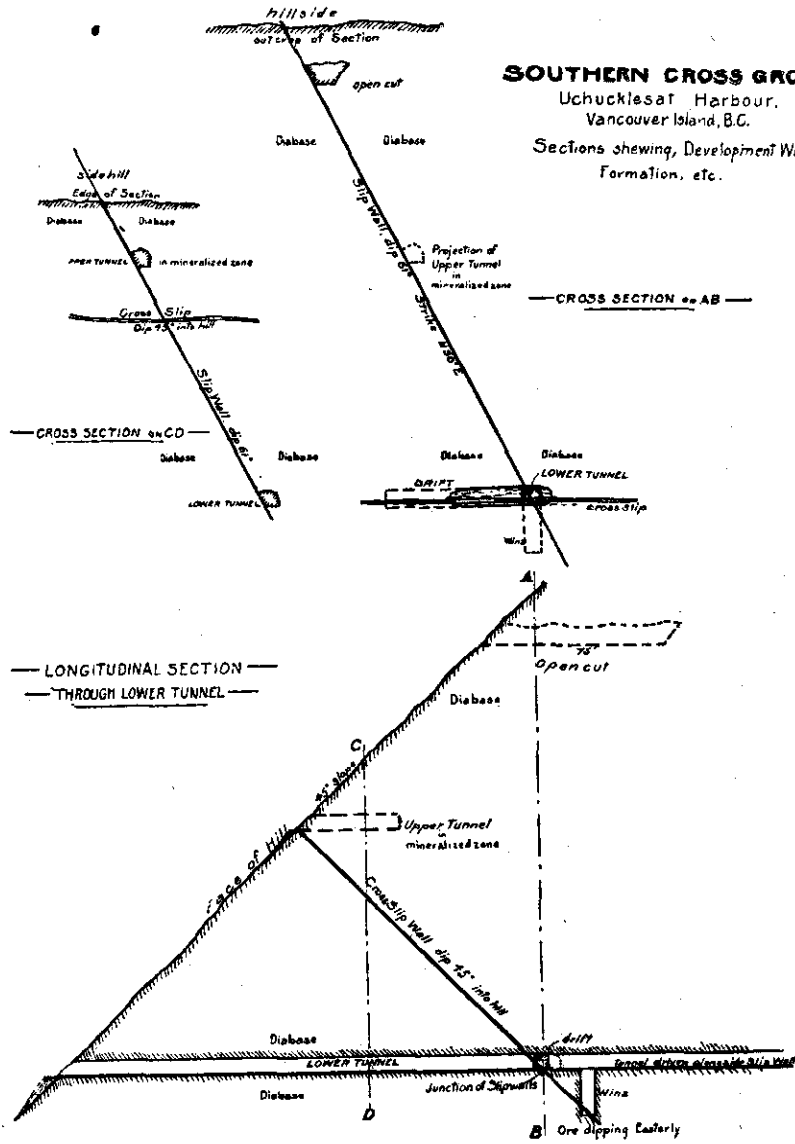
This group is situated on the north side of Uchucklesat harbour, near the mouth, and consists of five claims, the *Southern Cross*, *Ballarat*, *Little Southern Cross*, *Dipper Fraction*, *Constance Fraction* and *North Star*. The work has all been done on the *Southern Cross*. The mountain rises at an angle of about 45° and at an elevation of about 150 feet, on a contact of limestone with an intrusive

*The following is the report by Dr. J. A. Dresser, of Montreal, on a microscopic examination of this mineralised dyke matter:—

"No. 4,007.—This is a dark green or greyish green rock; consists of lath-shaped crystals of plagioclase feldspar arranged about crystals and the irregular masses of pyroxene. Smaller interstices amongst these minerals are filled with quartz. Grains of magnetite are enclosed in the various other minerals. The structure of the rock is that known as ophitic, and the rock is therefore a quartz diabase."

SOUTHERN CROSS GROUP,
Uchucklesat Harbour,
Vancouver Island, B.C.

Sections shewing, Development Work
Formation, etc.



rock, a well marked slip-wall is seen, having a strike N. 30° E. into the hill, with a dip of 60° towards the south-east.* This same intrusive rock also appears in the two after-mentioned claims, the *Happy John* and *Monitor*. Towards the south this slip-wall is cut off, nearly at right angles, by another slip having a strike of S. 55° E. and a dip of 45° into the hill. The north-easterly slip-wall, first mentioned, has been followed along by a tunnel 40 feet long, all in a body of low-grade ore, occurring in a mineralised zone in the diabase, following along the slip-wall.†

About 100 feet lower down the hill and slightly to the east, a tunnel has been driven to reach the point where the north-easterly slip and the cross slip, before referred to, intersect. This tunnel is now in 300 feet, and for 200 feet runs through diabase, at which distance it cuts the cross slip-wall, here found to have the same strike and dip as noted on the upper level. The north-easterly slip-wall was also struck, with an unchanged dip and strike, showing a well-developed ore body on the right hand-side, some 6 feet in thickness. This is seen in a short cross-cut of 46 feet which runs into the limestone to the right. The tunnel has been continued along the slip-wall for 60 feet, with the ore on the right side, when the tunnel swings slightly to the right, and is being run for the limestone contact, which should soon be reached. Where the ore showed strongest a winze was being sunk from the tunnel and was down 20 feet, good ore having been taken out as the winze was being sunk. The winze is now getting out of ore, as the body dips away from it on the main slip-wall. When a greater depth is reached cross-cuts will be run to the ore chute.

The cross slip-wall before noted has been followed from the main tunnel by a drift running to the left, which is now in a distance of 45 feet. This is fairly well mineralised and may develop a good body of ore. This cross slip is traceable on the surface and has been proved by an open cut to the left, in which direction the cross-cut is now being driven.

At 175 feet above the main shaft an open cut has been run for 75 feet along a mineralised zone in diabase on a limestone contact. In the open cut this zone shows for 17 feet, and is mineralised with iron pyrites and a little copper pyrites.

There has been no stoping done in this mine, and any ore taken out has been in the course of development. The management is pushing the development with three shifts and is making a strong endeavour to block out a good body of ore. The mine is equipped with two bunkers and ore chutes on the two working levels, and there is a good wharf on deep water for shipment. The bunkers were partially filled with a very good grade of ore, the values being principally in copper pyrites. A small shipment was made this year.

A sample taken of the best-looking ore in the bin gave, upon assay:—Gold, trace; silver, 0.56 oz. to ton; copper, 18 %.

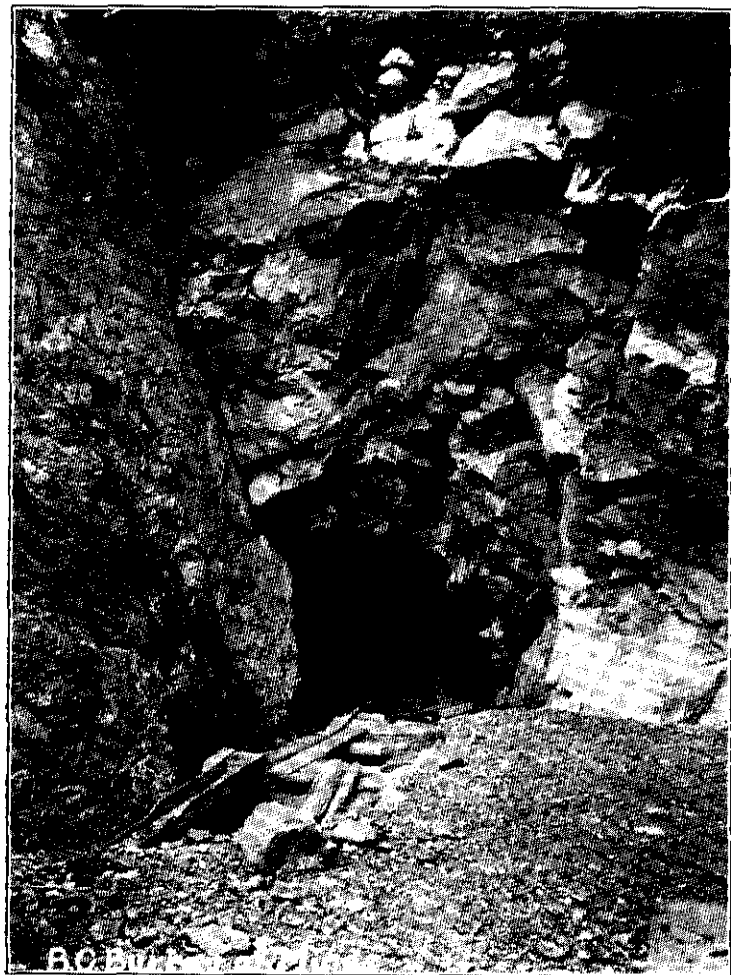
* The following is the report of Dr. J. A. Dresser, of Montreal, on a microscopic examination of this rock:—

"No. 4,013.—A fine-textured grey rock, showing a few grains of some yellow sulphide. A few rusty patches also appear in the hand specimen. They are evidently due to the oxidation of an iron-bearing mineral. The rock consists essentially of feldspar, which is principally orthoclase and much chlorized hornblende, with a considerable development of epidote. The rock is essentially similar to the last (No. 4,007), but contains little, if any, quartz. It is a syenite porphyry."

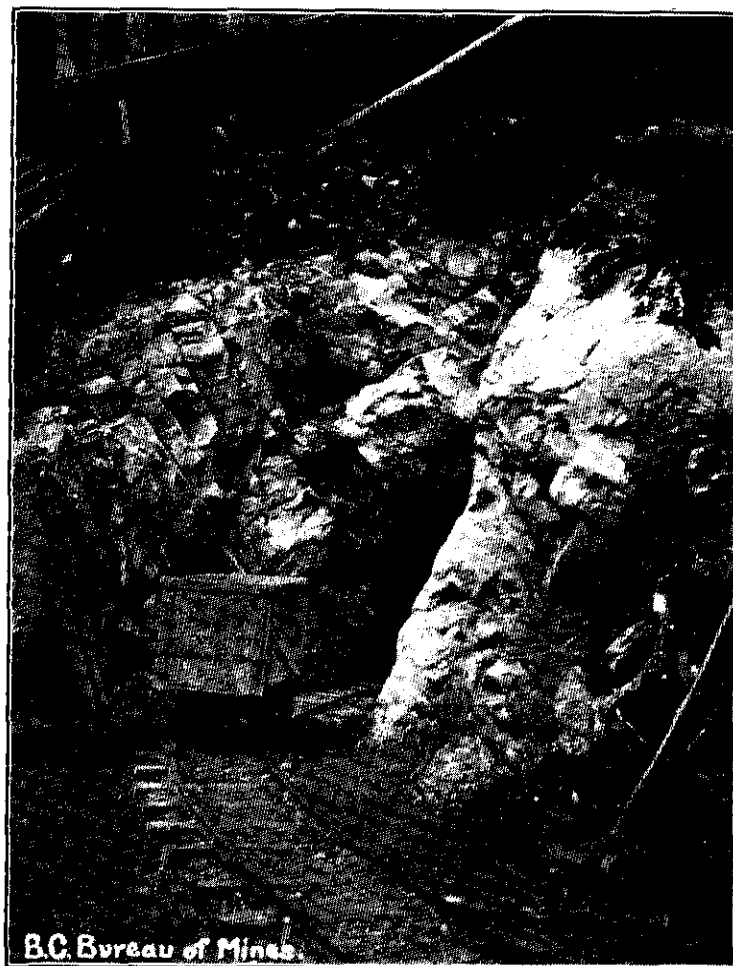
† The following is the report by Dr. J. A. Dresser, of Montreal, on a microscopic examination of two samples taken from this mineralised zone:—

"No. 0.—*The Southern Cross Ore*.—The rock of this ore, which is an altered porphyrite, is penetrated by narrow seams of ore which maintain a generally parallel direction. In the microscopic section these lines are found to be small fractures in the rock, into which the ore has been infiltrated after the rock has been solidified and fractured. In one case a large feldspar has been broken across and ore has been subsequently deposited in the crevice thus formed. The ore has thus been the latest part of the rock to form, while if it were due to magnetic segregation, it would have been one of the earliest constituents to solidify.

"No. 4,018.—*Gangue Material from the Southern Cross Mine*.—This consists of radiating tufts of hornblende, chiefly actinolite and masses of some light-coloured zeolite, which is often partially decomposed. This specimen does not seem to throw any satisfactory light on the relations of the ore to the enclosing rock."



UPPER TUNNEL, SOUTHERN CROSS M. C.
(Alberni Canal, Vancouver Island, B. C.)



LOWER TUNNEL, SOUTHERN CROSS M. C.
(Alberni Canal, Vancouver Island, B. C.)

The *Happy John Group* is situated on the west side of the Alberni canal, near its mouth, and consists of the *Happy John*, *Happy John No. 1*, *No. 2* and *No. 3 Fraction*, which have been surveyed and contain 125 acres.

The *Happy John* and *Happy John No. 1* have been Crown-granted, while the others will be this year. The property is owned by the Frank Brothers and A. J. Engvik. There are minor showings all over the claims, but the principal work has been done at an altitude of about 300 feet, where an open cut has been run on a diabase dyke near a contact of limestone with a felsitic rock.* This cut is 40 feet long and for the first 12 feet follows a slip-wall in the diabase. On this slip-wall is a body of solid copper pyrites about 2 feet 6 inches wide at the widest part, but wedge-shaped, with the apex upwards, which assays about 12 % copper, with 0.06 oz. gold and 1.7 oz. silver per ton.

To the east of this outcrop and some 40 feet lower down, a tunnel has been driven into a diabase dyke on a slip-wall. Ore shows in the bottom of the tunnel about 2 feet wide for 15 feet. This is not as strong a showing as that previously mentioned, although it is well mineralised, and it does not appear to be the same ore-body nor on the same dyke.

At a height of 50 feet above this lower tunnel, and farther to the east, another tunnel was run into the hillside, on a diabase dyke, and at 21 feet in cross-cuts diagonally a slip which showed ore, but this slip was not followed. This tunnel is being driven to the contact with the limestone and is now in 55 feet. At 40 feet in a detached horse of limestone was struck and a drift to the left was here started, which is now being run with the hope of reaching the contact of the solid limestone.

In the vicinity of this work there is considerable evidence of mineralisation, as shown by small surface strippings. The tunnels are situated in ground rising nearly vertically, for 80 feet or so, from the creek below. The means of ascent and descent is by ladders.

On the *No. 2* claim, higher up the mountain, a shaft was sunk 12 feet deep on a slip-wall in a diabase with 2 feet of ore. A tunnel, now in 40 feet, is being run at a level 300 feet lower to reach this ore.

Surface strippings show a number of parallel dykes more or less mineralised. Near the mouth of the creek a few shots disclose a mineralised dyke carrying arsenical iron, with traces of copper. Samples gave the following assay: Gold, 0.05 oz.; silver, 0.5 oz.; copper, 0.1 % to the ton. These claims show a considerable copper mineralisation and there is reason to hope that a good body of ore may yet be blocked out.

A description of this property was given in the 1901 Report, since
Monitor. when the company has ceased to ship ore, but has done some prospecting on its claims, which has been confined to surface stripping. At an altitude of 300 feet, a number of small surface strippings show what is apparently a diabase dyke running through or on a contact with limestone, which dyke appears to be fairly-well mineralised, in one place solid copper pyrites being seen. This ore gave the following assay: Gold, trace; silver, trace; copper, 16.2 %. While no defined body of ore has been disclosed, there is evidence which would warrant further prospecting by the company.

This mine is situated on the west side of the Alberni canal, 14 miles
The Nahmint. from Alberni. The Nahmint Mining Company, Limited, was organised in 1898, with a capital of \$100,000, and in 1899 had done 2,100 feet of underground development work, which disclosed a considerable amount of copper ore. In 1900 an aerial tramway was installed and ore shipped. The ore chute, however, gave out and a long tunnel has been driven to prospect for a new body, with, so far, negative results. The mine equipment is all in good order and in charge of a caretaker, but no work is being done on the property.

* See foot-note, page 192.

This claim is situated on the east side of the Alberni canal, near the mouth. The work on it has been done at an altitude of 400 feet and several hundred feet back from salt water, where a few shots have been put in on a horse of limestone appearing in the diabase dyke, mineralised with copper and iron pyrites, with a little arsenical iron. A shaft has been sunk on the dyke, 25 feet lower, from which a considerable amount of ore has been shipped. This shaft was full of water when visited, and the ore at present remaining on the dump is only second-class, the dump having been hand-picked and the first-class ore shipped. According to a miner who had worked in the mine, there was still good ore in the bottom of the shaft, but financial difficulties necessitated the temporary closing down of the property. The assay of some selected samples taken give the following results: Gold, 0.2 oz. per ton; silver, 2.32 oz.; copper, 16.43 %.

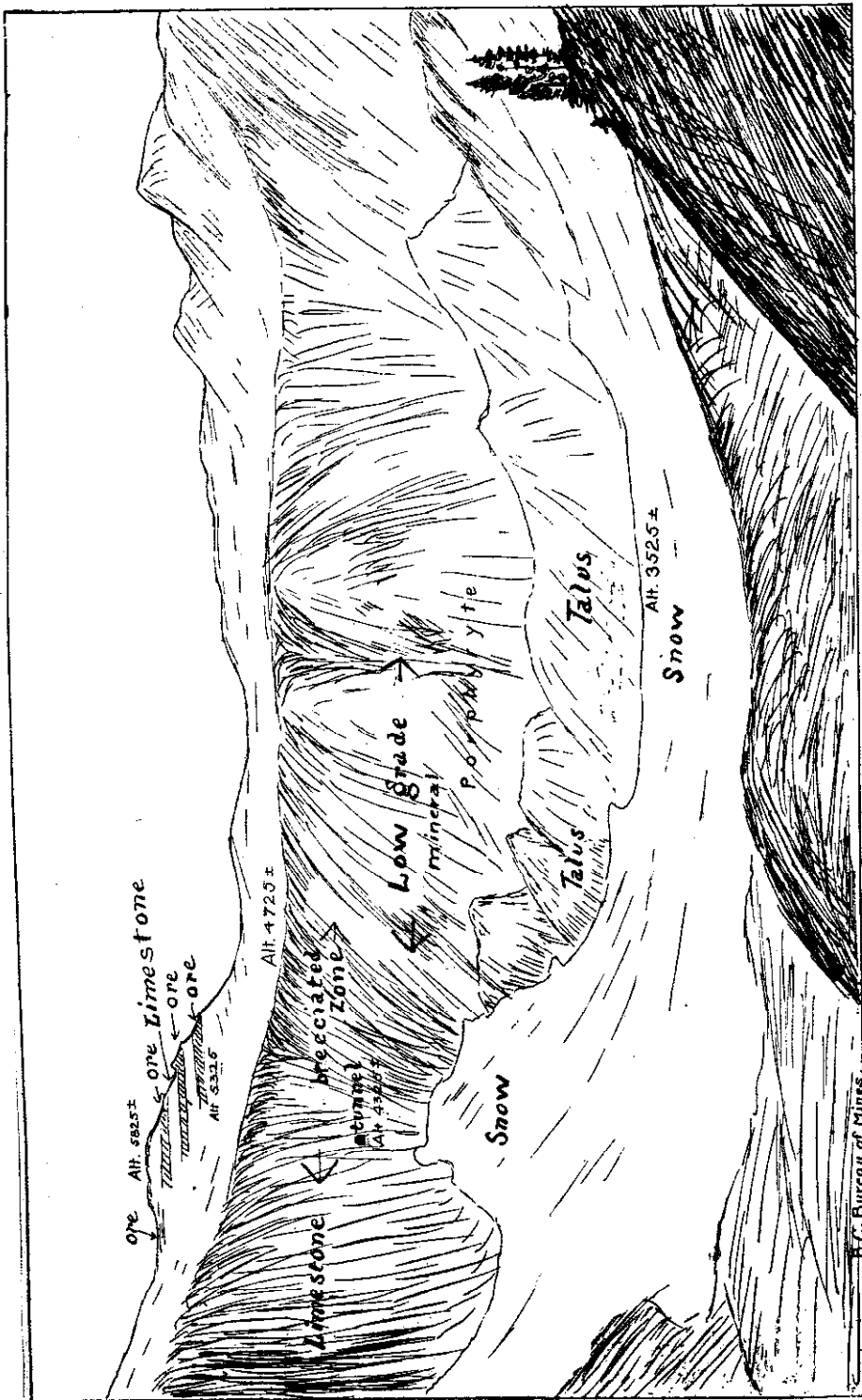
This group, consisting of the *Edith*, *Black Bear* and *Bruin*, owned by Edith Group. E. A. Waterhouse, of Alberni, is situated on the east side of the Alberni canal, a short distance from the mouth, and is reached by a trail from the beach about a mile long, although the distance to salt water would be less in a direct line. The workings are at an altitude of 475 feet, where a tunnel has been run in a S. 65° E. direction for 30 feet. This tunnel started to follow in a lime-diabase contact, but was diverted, continuing entirely in diabase, following a strong slip-wall along which no ore was visible, although some ore seen on the dump was presumably taken out of this tunnel. A few hundred yards to the east a number of open cuts have been made and shots blasted in diabase, which show more or less mineralisation with copper pyrites, iron pyrites and pyrrhotite, the latter, however, predominating, while in one of the open cuts solid pyrrhotite was noted.

Great Central Lake.

Considerable bodies of ore having been reported to exist at the head of Great Central lake, Alberni District, it was decided to make a preliminary examination of that region; which was done towards the end of August, 1906. Great Central lake can now be reached with ease from the town of Alberni, a distance of twelve miles, by waggon road, the elevation of the lake being 200 feet above the sea. This inland sheet of water presents the same physical features as do the inlets which indent the west coast of Vancouver Island, the mountains rising abruptly from the water, with here and there a valley extending back for a considerable distance, the most important valley being that extending to Ash lake on the north-east.

The general length of the lake is east and west, and it is about twenty-five miles long by a mile or so wide. At its western end two creeks flow in, heading from mountains still farther to the west. A trail from the lake follows the most northerly of these creeks on a gradual ascent for a distance of ten miles until it ends in a basin, shut in by high mountains, the basin having here an elevation of 1,500 feet above the Great Central lake, or 1,700 feet above the sea. To the south a precipitous bluff rises 2,075 feet high, from which pours a considerable stream of water that barely touches the rocks until it reaches the bottom, breaking into a mass of spray in its descent. The ascent of the bluff requires stout muscles and the aid of the small bushes which cling so tenaciously to the clefts in the rock. On the top there is a small rocky plateau or basin enclosing a lake about half a mile long by a quarter wide, the elevation of the lake being 3,350 feet above the sea. This mountain lake, situated in the heart of Vancouver Island, with snow-clad mountains rising 2,000 feet above it and the blue crevassed glacier of the "Nine Peaks" showing up to the south in the morning sun, forms a beautiful scene.

This group consists of seven claims, viz.: *Big Interior Nos. 1 to 7*, and was located by Drinkwater and Nicholls, of Alberni. The claims are reached from the head of the small lake referred to by following up a small second basin, slightly to the north of the main basin, about a quarter



SKETCH OF BASIN AT BIG INTERIOR MINE.

of a mile. The head of this second basin is hemmed in on three sides by precipitous cliffs a thousand feet high, on which rests a snow cap, terminating in peaks which are 2,000 feet above the lake below. Practically, this entire face, some 4,000 feet wide by 1,000 feet high, shows the strong red colour due to iron stain, while at the base there are thousands of tons of the same rock which have been mined by the action of the elements. A closer examination shows this cliff to be a granitoid rock,* mineralised with copper pyrites, pyrrhotite and pyrite in varying proportions, some zones showing strong mineralisation, while in others it is more sparse. To the west the rock assumes a brecciated structure and has been cemented together by a filling of calcite, with a considerable impregnation of copper carbonates and into this zone a tunnel has been driven a distance of 31 feet. The ascent of the bluff is somewhat dangerous, owing to the rather precarious foothold and the absence of vegetation, the top being reached at an elevation of 1,375 feet above the small lake. From the top of the bluff a snowslide was followed until a further elevation of 500 feet was reached, at which point the ore is uncovered and shows the strongly mineralised granitic mass which is seen to penetrate a nearly horizontal strata of limestone, alternate bands of which continue to the top of the mountain 500 feet still higher. This sharp ridge, with an altitude of 5,700 feet, may be considered as the backbone of Vancouver island, shedding the water to the south down the Alberni canal, to the north-east down Buttle lake and the Campbell river, and to the west by Bear river into Clayoquot sound.

SUMMARY.—The mineralised zone, showing in the face of the cliff to the north of the basin and forming the great mass of low grade mineral on the property, is so large, so inaccessible, and the mineralisation so scattered, that it would be impossible to obtain anything approximating an average general sample of the exposure without the expenditure of an amount of time and money not justifiable under the circumstances. However, at the foot of the cliff, and as illustrated in the accompanying sketch, there is a talus extending the whole length or width of the mineralised zone, made up of material broken away from the whole face of the zone in question. While this talus may to a certain extent have been affected by weathering, it still may be considered a very approximate sample of the inaccessible cliff. Samples were taken from this talus, from which it is judged that approximately the central portion of the mineralised zone will assay from $\frac{1}{2}$ to 1 % copper, with from $1\frac{1}{2}$ to 2 oz. silver per ton, and a trace of gold. These values extend over a width of about 1,500 feet, while to the right the mineralisation gradually fades off into the country rock.

To the left of the mineralised zone is what has been called, for purposes of designation, the "brecciated zone," and which is merely a continuation, to the left, of the mineralised zone which has here been subjected to a crushing due to movement, and in which the interstices between the fragments of the rock have been filled with secondary minerals, chiefly calcite, with some carbonate of copper, forming a secondary enrichment. This secondary enrichment has taken place, as would be expected, along defined channels, producing streaks of higher

*The following is a report of Dr. J. A. Dresser, of Montreal, of a microscopic examination made on two samples, the light and the dark-coloured varieties, of this rock :—

"No. 4,069.—*Light variety.*—This is a holocrystalline, a fine-textured rock having a light grey colour, and is flecked with small needles of green hornblende. In the slide it is found to consist of feldspar, hornblende and quartz. The feldspar is principally orthoclase, although small amount of plagioclase is also present. The hornblende is much altered, chiefly to chlorite. Quartz is present, both in large crystals and also filling smaller interstitial spaces. This rock is a granite porphyry.

"No. 4,070.—*Dark variety.*—This is a porphyritic rock. The larger crystals or phenocrysts consist of hornblende and feldspar; the former is green and occasionally somewhat chloritized. Feldspar crystals are well formed and belong to the lime soda series. One crystal showed symmetrical extinction parallel to its line of twinning, which was according to the albite law, at an angle of thirty degrees on either side, thus indicating that its composition is that of an acid labradorite. The groundmass is a finely crystalline aggregate of feldspar and biotite. Angular grains of magnetite are scattered somewhat sparingly through the rock. It is a porphyrite."



BASIN AT BIG INTERIOR MINE, ALBERNI M. D.

grade mineralisation often forming commercial ore. Here, again, no general sampling was possible; although a tunnel has been driven for some 31 feet into the bluff, it was found impossible to examine the face of the cliff for 10 feet on either side of the tunnel mouth.

The mineralisation just described, and which forms the great bulk of visible mineralisation on the property, is admittedly very much diffused through the rock, and is consequently so low grade as to be of value only if found to be amenable to some form of concentration, and of which there seems to be a fair probability.

On the top of the mountain, in the knob shown to the left of the centre in the sketch herewith, is an area in which the mineralisation seems to be more concentrated, producing, in places, ore of a grade to stand transportation and treatment charges. This higher grade ore appears to occur along the lines of contact of alternating bands of granitic rock and limestone. The extent of the latter deposit it was found impossible to determine, as the ore was found to be covered in most places by a heavy capping of gossan, and in many places seemingly permanent snow and ice covered up the formation. While the future of the property is far from being proven, the very great extent of the mineralisation, with occasional concentrations, certainly renders the proposition worthy of most careful investigation and prospecting.

These claims are situated on the small lake in the Big Interior Basin, Della and Glacier. and are owned by Drinkwater and Engvik. On the claims is a small quartz vein from 2 to 3 feet wide, mineralised chiefly with arsenical iron. Assays of the straight ore gave the following result:—Gold, 5.12 oz. per ton; silver, 5.2 oz. per ton; copper, 1.0%. The vein has not yet been worked to any extent, but an attempt is being made to extract the values by roasting the ore and grinding in an arastra, which has been erected and is being run by a small water-wheel constructed on the ground. The arastra had just been completed at the time of my visit.

Formation of Ore Bodies on West Coast.

An examination of the different properties on the west coast of Vancouver Island, especially those on which extensive development work has been done, would point to the following theory as to the mode of ore deposition:—

The properties, with the exception of those in Quatsino sound and Great Central lake, present nearly identical conditions. The mineralisation occurs in or close to diabase dykes. Sometimes there is sufficient quartz in the fissure to make a quartz vein, but more often there is an entire absence of quartz, the vein-matter being the crushed material of the dyke. There appear to have been two periods of movement, the first in which the dykes were formed, when no mineralisation took place; the second period in which these dykes were shattered and twisted, when probably secondary dykes of a similar composition to the first series were injected into the fissures found by the movement. A careful examination of these deposits would lead one to the conclusion that mineralisation took place at this time, not as a secondary enrichment, but as a direct deposit by ore-bearing solutions from below. The solid mineral is seen to penetrate what were originally cavities, and to follow along old slip-walls, inside of which, as a rule, no mineral whatever is seen, as would be the case if segregation had occurred. The deposits are often of brecciated structure, the ore enclosing fragments of the original dyke-rock and only occasionally is it seen forming a part of the dyke, and then it would be accounted for as forming part of the second upheaval when the later dykes were formed. Mineralisation is found along fractured zones in these diabase dykes, and where these fractures contained cavities for the entrance of mineral-bearing solutions we now have ore-bodies, but where the ground is tight or shows only slight movement, little or no ore is found.

Chalcopyrite forms the principal mineral of value, while pyrrhotite is a common mineral, occurring both massive and mixed with pyrite and chalcopyrite, but carrying little or no value in itself. Arsenopyrite occurs in many of the properties and, as a rule, carries gold values.

While no geological map or extensive examination of this region has been made, the general country rock outside of the mineralised zones appears to be syenite, occurring often as mountains of great size and connected with a series of felspathic dykes which penetrate the older rocks.

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, 1906 :—

Excepting a few properties, there has been little done beyond what was absolutely necessary for assessment work. The exceptions are :—

The *Big Interior*, where active operations have been carried on all summer and fall. This is a very promising property, and results so far have been very satisfactory.

On the *Phoenix Group* work has been carried on all summer, and is still continued.

Mr. Bailey has worked the *Three W's* until quite lately, when weather conditions prevented the continuance of operations.

The *Sarita* and *Copper Island Group* were actively worked for some time during summer, and further development of these properties is expected.

With these exceptions there has been little done, and the industry in the Division may be pronounced dull.

OFFICE STATISTICS—ALBERNI MINING DIVISION.

Free miners' certificates	58
Mineral claims recorded	32
Certificates of work recorded	59
Transfers recorded	24
Certificates of improvements	13
Crown-granted mineral claims on roll	143

Revenue.

Free miners' certificates	\$ 442 50
Mining receipts	349 75
Acreeage tax Crown-granted claims	1,049 50
	<hr/>
	\$1,841 75

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, 1906 :—

The year has seen very little activity in mining operations in this Division; in fact, it has been quieter than any other year since the Recorder's Office was opened here in 1898. The only property worked to any extent was the *Good Hope Group* of claims. The owners, the Helga Gold and Copper Co., of Seattle, had from four to six men at work most of the year tunnelling, but they have now closed down until spring, when they expect to sink on the property.

Owners of other claims have confined themselves to doing the annual amount of assessment work, and quite a few have had their claims surveyed, with the object of having them Crown-granted. From present hearsay, a number of the properties will be working early in 1907, noticeably the *Indian Chief Group*, at Sidney inlet; the *Good Hope Group*, at Trout river; the *Ormond Group*, at Ahousat; the *Brown Jug Group*, at Hesquoit; the *Kallapa* and *Golden Gate* claims, at Disappointment inlet, and the *Rose Marie Group*, at Kennedy lake.

OFFICE STATISTICS—CLAYOQUOT MINING DIVISION.

Free miners' certificates issued	25
Mineral claims recorded	13
Certificates of work recorded	61
Bills of sale, bonds, etc., recorded	4

Revenue.

Free miners' certificates	\$122 00
Mining receipts, general	234 75
	\$356 75

QUATSINO MINING DIVISION.

REPORT OF O. A. SHERBERG, MINING RECORDER.

I have the honour to submit my annual report of the mining operations in the Quatsino Mining Division for the year ending December 31st, 1906.

INGERSOL RIVER.

The *Blue Bird Group* consists of two claims, the *Mystic* and the *Blue Bird*, owned by Messrs. P. Cramer and O. Strandwold. An additional seven feet has been driven in the tunnel on the *Blue Bird* claim, and the surface stripping shows ore to a considerable extent. The property has recently been sold on option to A. F. Gwin, of Victoria.

The *Ingersol*, *Stella* and *Olga* are owned by B. O. Erickson and Wm. Hanson. The work done this year consists of eight feet of tunneling, open cuts and stripping, with very satisfactory results.

Other properties on Ingersol river are the *Elk*, owned by Frank Patterson; the *Hemlock*, owned by J. L. Leeson, and the *Eureka*, owned by Edw. Frigon; all of which have had the annual assessment work done on them during the season.

THE SOUTH-EAST ARM.

No work has been done on the *Yreka* mine during the year. Mr. H. Carmichael, Provincial Assayer, in his report on Quatsino Sound, fully described the property in the Annual Report of the Minister of Mines for 1903. No work worth mention has been performed since that time.

The *Edison*, adjoining the *Superior* claim of the *Yreka* mine to the east, and formerly owned by the Edison Mining Co., was sold to B. J. Murphy and J. D. Murphy in June, 1905, and Crown-granted during the year.

The *Climax*, owned by Evenson, Sorenson, Lokken, Bergh and Sherberg, adjoins the *Yreka* mine to the north, and lies higher up the mountain. This property has been prospected during the season and shows a well-defined lead running the full length of the claim. The lead is about four feet wide, carrying copper, gold and some silver.

The *Uncle Sam*, owned by H. S. Butler, is a continuation of the *Climax* lead to the west. The lead has been exposed for some distance by open cuts and stripping.

The *King Edward*, owned by Sherberg and Nordstrom, is situated to the east of the *Yreka* mine, and adjoining the *Comstock* claim. This property was formerly known as the *Blue Grouse*. The ore is copper pyrites, carrying small values in gold and silver.

The *Paystreak Group*, situated on Teta river, consists of three claims, the *Paystreak*, the *Royal* and the *Red Rock*. This is a promising property, having a well-defined lead, which has been exposed by open cuts, shafts and stripping for more than 2,000 feet. The owners are P. Cramer and Fred Pollock.

The *Annex* is an extension of the *Paystreak* lead, and belongs to the same owners.

The *Quatsino King*, the *Rubicond*, the *Hill Side* and *East Side* are owned by Chris. Nordstrom and G. Sorenson. The work done during the season consists of open cuts, and the old tunnel on *Quatsino King* continued 10 feet.

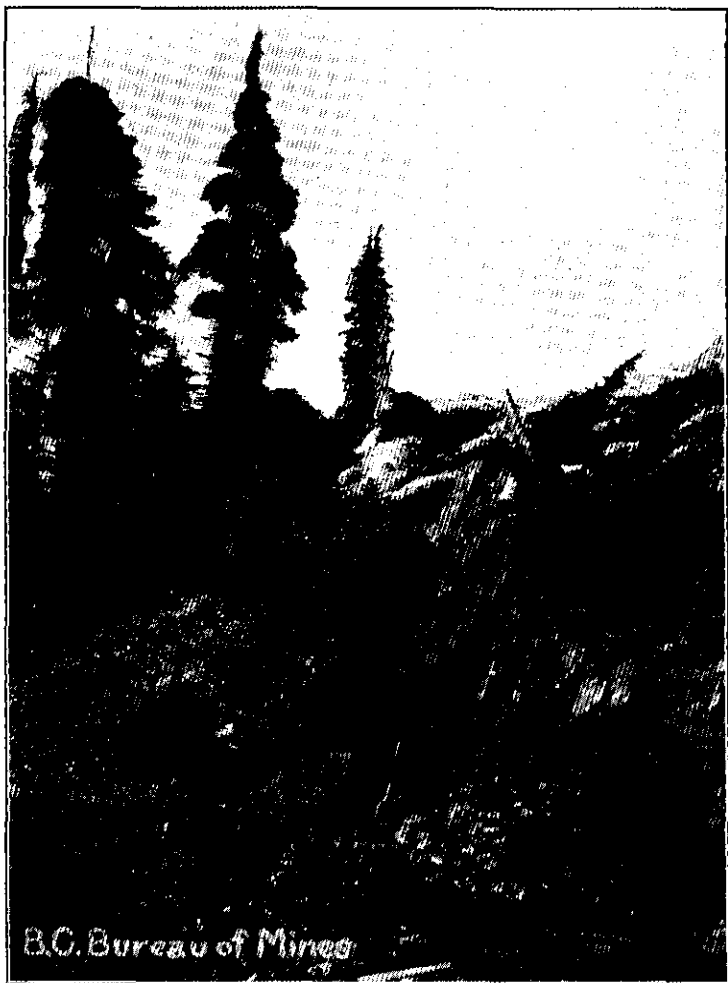
On the *Louise*, owned by Ed. Evenson and B. C. Lokken, assessment work has been carried on from year to year.

The *June Group*, under the management of G. Harold Grant, has been worked in a small way for the best part of the season, and is showing up well under development. The tunnel which was started in July, 1905, is in about 420 feet, and two cross-cuts have been made, 28 and 30 feet. Two ore-bodies have been struck in the tunnel; one that is 50 feet in the main tunnel, and a cross-cut of 30 feet was made, all in ore, besides some smaller showings. Assays of ore from the tunnel give higher values than from the surface. A test shipment of 145 sacks, taken from the open quarry on the *June* claim, was made in February to the Crofton smelter, but the values are not known here. Work was closed down temporarily in September, and I am informed that it is the intention of the management to start work again in the early part of 1907, by installing an electric plant with sufficient power to operate four or five drills. Power for mining operations can easily be obtained from Link creek, which flows through the *Amazon* claim of the *June Group*.

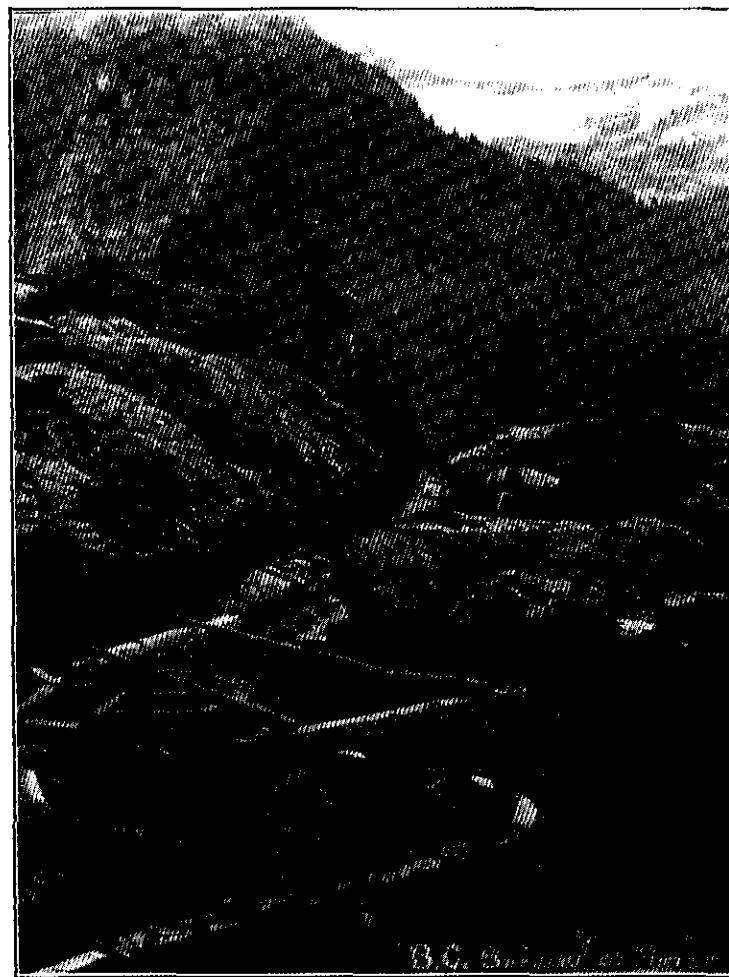
The *Peerless*, owned by Julian Satre and situated to the east of the *June Group*, also shows up well. Assessment work this year consisted of a 5-foot shaft on the lead and some surface stripping.

The *Morning Glory*, situated to the west of the *June Group* and owned by Sherberg and Bergh, is another promising property.

Rosland, owned by H. A. Thorn, has been thoroughly prospected this year and shows several small deposits of galena and yellow copper. Development consists of 4 feet tunnel, 4 open cuts and stripping. Certificates of work recorded for three years.



DELLA AND GLACIER MINERAL CLAIMS
(Big Interior, Vancouver Island, B. C.)



ARRASTRA ON DELLA AND GLACIER CLAIMS
(Big Interior, Vancouver Island, B. C.)

Minerva Fraction, owned by D. A. McDonell, lies between the *Olga* and *Iron Knob* claims of the *June Group*. This property was surveyed two years ago, and, having sufficient work done on it, a Crown grant will be applied for.

Other claims in the vicinity of the *June Group* are the *Lenore* and *Victoria Fraction*, owned by A. F. Macaulay; the *Alpha* and *Prince Rupert*, owned by Sherberg and McDonell; the *Independence*, owned by H. A. Thorn, and the *Dundee*, owned by D. A. McDonell.

The *Andrew*, owned by Frank Patterson, has recently been sold to a Seattle syndicate and work is already started. Only a few days' actual mining has been done since the camp was established. A few sacks of copper sulphide ore were shipped by last steamer for a smelter test.

WEST ARM.

The iron property situated on the north side of West arm comprises 36 claims and is owned by J. A. Moore and Wm. Pigott, of Seattle, Wash. A considerable amount of work has been done on the different claims during the year consisting of numerous open cuts, pits and shallow shafts. The two largest cuts are 425 feet long, 4½ feet wide, 7 feet deep; and 200 feet long, 2 feet wide and 4 feet deep, all in ore. Some of the shafts are sunk 14 feet deep. The results from this year's work are most satisfactory and large bodies of hematite have been opened up.

A new discovery of iron was made by Chris. Jacobsen and James W. Jackson and 4 claims, the *Iron Meadow*, the *Iron Meadow No. 1*, 2, and 3 were located. This property is situated about 10 miles farther up the arm than that above mentioned and quite a distance back from salt water.

The *Nel* and *Stella No. 1*, owned by James A. Moore and Ray C. Price, are other promising properties which were located last summer, and from the work done showings are very satisfactory. The ore is bornite.

OFFICE STATISTICS—QUATSINO MINING DIVISION.

Free Miners' Certificates issued	30
Mineral claims recorded	26
Certificates of work recorded	45
Certificates of improvements recorded	1
Bills of sale, etc., recorded	10

Revenue.

Free Miners' Certificates	\$144 25
Mining receipts, general	220 00
	<hr/>
	\$364 25

NANAIMO DISTRICT.

NANAIMO MINING DIVISION.

REPORT OF MARSHAL BRAY, GOLD COMMISSIONER.

SIR,—I have the honour to submit herewith my annual report on the mining operations in the Nanaimo Mining Division for the year ending the 31st of December, 1906.

The mineral resources of this Division are being steadily developed, and the results generally have been highly satisfactory, many important discoveries having been made during the past year. There were 496 mineral claims in good standing on the 31st of December, 1906, and more mineral claims were recorded than in the year 1905.

The returns for the year's work from the Tyee smelter at Ladysmith, although not as large as the year 1905, made a good showing for the number of days that the smelter was in blast. Tons of ore smelted at Tyee smelter for 1906: 29,110; value, \$477,300. With the exception of 4,744 tons, the above was all from British Columbia coast mines.

TEXADA ISLAND.

The *Marble Bay Group* of claims, belonging to the Tacoma Steel Co., under the management of A. Grant, mined and smelted during the year 1906, 10,560 tons dry weight. The development work done on the property consists of deepening the shaft 100 feet, 250 feet of drifting and 110 feet of winze sinking; the total depth of the shaft is now 760 feet below the surface, or 718 feet below the sea level. A new shaft-house, 40 feet by 40 feet, and 90 feet high, has been erected, in which has been installed a new 10-foot diameter sheave for the hoisting cable to run over.

They have added to the plant one "H" Sullivan diamond drill, capable of boring a hole 2,000 feet deep. The average number of white men employed in and about the mine for the year was 50, and 15 Chinese. The copper and gold values show a steady increase with depth.

The Cornell Operating Co., working the *Cornell* mine, under the management of J. A. Johnson, mined and shipped 1,000 tons of ore since the 1st of July, 1906. The development work consists of 100 feet of drifting and an uprise of 45 feet, and a lot of timbering to conform with the order of the Inspector of Mines. They are contemplating installing a new air compressor, new hoist and cage, and a new boiler.

Mr. W. Thos. Newman, who has charge of the exploitation of the *Commodore Group* of claims on Texada island, has kindly furnished me with the following particulars of the development work done on *Commodore* mine during the year 1906:—A plant, consisting of a 40-horse-power, wood-burning, locomotive-type boiler, built by the Jenckes Machine Co.; a 16-horse-power double cylinder hoisting engine, by same maker; a Cameron sinking pump; a duplex Morris Station pump; with full complement of blacksmith shop and essential machine tools, was installed, and has been constantly worked throughout the year. A bunk-house and cook-house to accommodate about 40 men, with boiler- and engine-house (the former containing bath-room and drying room), was also built, and a substantial gallows frame, and tramways therefrom, complete the surface plant.

With the above outfit 180 feet of sinking has been done during the year. The main shaft is a two-compartment incline, 5 feet by 8 feet, in the clear. From the bottom of main shaft a level has been run north and south for 725 feet, and 128 feet of cross-cutting has been accomplished. On an average 12 men have been employed during the year, in two shifts, under Bruce Kirk as foreman. The *Commodore* mine has three veins capable of being operated from the same set of openings. The main or contact vein is to be the first explored and tested, and is situate directly in the main contact crossing Texada Island between several miles of limestone on the south-eastern side, and about the same extent of eruptives on the north-western side. These operations have demonstrated the vein to be a true fissure, as three dikes have been encountered coming in from the lime wall side, and the vein has gone straight on without being faulted, even the strong clay parting on this wall being unbroken. The only effect of these dikes has been increased mineralisation on the vein in their proximity. The shaft was sunk between two large exposures a distance of 1,140 feet apart, the drift being pushed either way. To the north the values on the surface are in silver, lead, zinc and copper, in the order named, while the exposures on the south consist of gold and copper. To the south, at a depth of 180 feet, the ore carries a very satisfactory amount of gold, and the gangue is mainly quartz. When driven 1,500 feet this level is expected to intercept both the lateral veins which run out into the limestone a known distance of over 2,000 feet in the *Commodore* ground.

The Loyal Lease Co., working the *Loyal Group* of claims, has not shipped any ore during the year 1906, but has installed a 50-h.p. boiler, and employed 10 men. The development work for the year consisted in sinking the shaft 100 feet deeper; the shaft is now 300 feet deep, with 700 feet of drifts.

The Puget Sound Iron Co. has not been working the iron mines during the year 1906; but proposes starting up again in the near future.

The *Forest Queen* is getting ready to ship ore again, after having been shut down for the past year.

There are many other properties on Texada island on which the owners have done development work enough during the year to keep the claims in good standing.

VALDES ISLAND.

The Copper Cliff Mining Co., operating the *Copper Cliff Group* of claims, situate at Copper cliff, Valdes island, under the management of Wm. Simison, has just begun to open up what promises to be a very valuable property, and shipped 120 tons to the Tyee Smelter late in the fall of 1906. It has drifted into the mountain 45 feet, close to the sea beach. Only three men were working, but it is the intention to provide accommodation for 20 next year. The ledge is well defined and of unknown width, but on the foot-wall there is said to be 11 feet of chalcopyrite of shipping grade. A bunker to hold 150 tons has been built.

The Islands Copper Co., owning the *True Blue Group* of claims on Valdes and Gowland islands, at Gowland harbour, has done considerable development work, sinking 50 feet, and has opened up a large body of copper ore in the diorite several feet in thickness. The percentage of copper shown by the smelter returns on a trial shipment of 22 tons of ore to the Tyee smelter was 2.84 and 6.2 on low and high-grade ores, respectively. A small trial shipment to the Tacoma smelter gave 4.30 per cent. in copper; gold, $\frac{2}{100}$ oz.; silver, $1\frac{3}{10}$ oz. The cost of transportation to the Tyee smelter, together with the smelter charges, will not be more than \$3.50 a ton; this would leave a handsome profit on even the low-grade ore, and if the ore-body holds good with depth, this property should be the making of a mine. There are other properties on Valdes island that have made good showings for the amount of work that has been done on them.

Considerable work has been done during the past year on Phillips and Frederick arms, Thurlow and Cracroft islands. Most of the peninsula between Hardy bay and Beaver harbour, at Fort Rupert, has been located, and some fine showings of copper ore have been found there.

DUNSMUIR DISTRICT.

The Nanaimo Jubilee Mining Co. has not done much development work on its two groups of mineral claims, situate some distance up the south fork of the Nanaimo river.

OYSTER DISTRICT.

Considerable work has been done on many claims in this district during the past year, resulting in very favourable showings.

OFFICE STATISTICS FOR 1906—NANAIMO MINING DIVISION.

Free miners' certificates issued (individual)	194
" " (companies)	6
Mineral claims recorded	182
Certificates of work recorded	126
Paid in lieu of work	2
Certificates of improvements recorded	5
Crown grants applied for and issued	5
Bills of sale recorded	52
Permissions given to re-locate	10
Rental mining lease	1

The revenue collected from the above free miners' certificates and mining receipts generally, for the year ending the 31st of December, 1906, was \$2,653.35, being a little less than for the year 1905.

THE NANAIMO-COMOX COAL-FIELD.

FROM REPORT OF DR. H. S. POOLE, OF GEOLOGICAL SURVEY.

In accordance with instructions, I left Ottawa on May 10th. On reaching Victoria, the courteous officials of the local Government freely placed at my disposal such information as they possessed respecting the coal fields of Vancouver Island. Through the kindness of Mr. W. F. Robertson, the Provincial Mineralogist, I made the acquaintance of many who had been, and some who were now, connected with the coal industry of the island. Mr. E. B. McKay, the Surveyor-General, kindly supplied me with copies of all available maps of his department. These, however, seldom showed, even approximately, the country roads, so the services of Mr. Thomas Budge were called in. With a cyclometer on his bicycle, and a prismatic compass, he traversed the roads and ways in the neighbourhood of the mines and the district between Ladysmith and the entrance to Nanoose bay.

Mr. A. Dick, who has spent the best part of his life among the mines of this country, aided me by the exercise of his retentive memory, and was as painstaking to keep me historically correct as he is zealous to require compliance with the law in his office of Inspector of Mines.

Records of several bore-holes in both the Nanaimo and Comox fields were obtained through the kindness of Mr. T. Stockett, General Manager of the Western Fuel Co., and Mr. F. D. Little, General Manager of the Wellington Colliery Co., who also were good enough to furnish copies of maps.

Information was sought for data obtained in the course of prospecting and working the coal fields since they were reported on by Mr. J. Richardson in 1876-7.

Inquiry indicated that in the northern section of the island nothing further had been disclosed of the structure about Fort Rupert, Coal harbour, McNeill's harbour, etc., than what was described by Dr. G. M. Dawson, in his Report of Northern Vancouver, Part B, 1886.

Mr. W. Hogan, who was a good deal with Mr. Richardson in the seventies, advises that prospecting on the coal measures at Gillies bay, Texada island, disclosed that the outcrop of coal seen there was only a patch, apparently on a fault.

Opposite Crofton, on Osborne bay, explorations were made on Salt Spring island, between the public wharf and Vesuvius bay. Two bore-holes were put down in 1901, where some coal and black shale cropped vertically on the shore, one near the public wharf to a depth of 400 feet, computed by the drill man 1,500 feet over the coal. This is in line with the theoretical continuation southward of the horizon of the coal beds at Nanaimo, but the bore-hole record was not obtained, and general report makes the prospect unsuccessful and the ground faulted. At Koksilah, in the Cowichan section, an exposure of black shale, reported to be coaly, induced the sinking of a trial pit by Mr. Wood. The locality was not visited nor the statement confirmed that limestones in the neighbourhood, which is south of Duncans, are full of fossils.

Explorations outside the field of immediate examination, on a more extensive scale, were those at Tumbo island in 1893, when people of Victoria sank a shaft at No. 1 bore-hole, some 60 feet on the eastern side, opposite its mid-length. Next they bored on the western side, close to the water, from a base blasted out of the rock, so I am informed by Mr. A. Dick. The bore reached a depth of 300 feet, having passed through bituminous shale and coal at 280 feet, the coal being so friable that a large quantity was pumped up in the bore. The channel alongside is reported to be 40 feet deep, and it was thought it gave access to the bore-hole. Contrary to his advice, says Mr. Dick, a shaft was sunk on the site of the bore-hole and this at 200 feet met so heavy a flow of water that it was abandoned, and then the 60-foot shaft was put down and stopped for want of funds. The surface on the island here slopes with the strata at 16° to the eastward.

Besides the help obtained from Government and colliery officials, information was had of private individuals, so much at least as they felt at liberty to make known; but I found myself unexpectedly barred from some records of exploration by the view that the secrecy insisted on while borings are in progress was still binding, although necessity for reticence and private interests had long ceased. In the absence of official data, and with press notices of the closing down of collieries, an impression of late was produced away from Vancouver Island that the workable coals are of less extent than Ottawa and the East had been led to suppose. Now, there are some people who have a vague idea that a coal mine is like a spring of water, with a flow to last at least their day, and they do not realise what "worked out" really means. What has happened is this: Wellington, which for many years was a busy centre of trade, has ceased to have an output of coal, the openings there have been abandoned, and in their stead mines at Extension have been developed, and Ladysmith has increased its population. At the same time, it is true the coal operator in Vancouver island has had many disappointments, many unexpected difficulties to meet that are specialties of this coal field, in comparison, say, with the structure of the coal-bearing deposits of the opposite side of the continent.

In Cape Breton the beds carry a fairly uniform thickness for miles. Coal, sandstone, shale and fire-clay, each occur and re-occur in their due order of deposit, while in Vancouver Island the records of sections taken only 1,000 feet apart read so differently that it is hard to determine which are the beds continuous in both, which have been suppressed, and which have been unduly developed within that short distance.

Under guidance of Mr. John Matthews, manager at Cumberland, in the Comox coal field, the reported occurrence of anthracite coal was examined, together with exposures of coal altered and coked by igneous dikes on Brown river, some four miles from No. 7 slopes, which are being opened by the side of the Puntledge or Courtenay river, two miles below Comox lake. At an exposure on a small water-course half-way between the two place a lava flow has converted some coal into a dense silvery coke. The exposure was limited, but so far as it permitted inspection the alteration extended but a short distance from the dike. From this point to Brown river the flow of andesite has made a hill 1,000 feet above the sea and capping the coal measures. What its effect may be on the underlying coal seams can only be conjectured; but neither here nor at No. 7 slopes could the coal mined be classed as in any degree anthracitic. The exposure at Brown river is above where Richardson took his No. 1 section, published in the Survey Report for 1872-3, page 36; and it is opposite where the river takes its plunge in cascades through a narrow gorge of the older diabase against the outcropping sedimentaries. Mr. Matthews wrote an article on this locality in the "Mining Record" of Victoria, November, 1901.

Another unusual, close association of coal and igneous rocks occurs also in the same district, but in this case under reversed and ordinary conditions, the coal being the newer of the two. Right in the heart of the town of Cumberland, in the workings of No. 6 shaft, bosses of diabase project up through the pavement of the lowest seam at several places; there is no dislocation, the coal merely thins over them, but the contact is very close; in one case not an inch of what may have been mud intervenes between the weathered surface of the igneous protrusion and the coal. The bosses appear to have belonged to a spur from the hills; among its depressions first were deposited the grey shales and sandstones, these overlapping its sides apparently failed to complete the levelling up of the surface and so left these knobs of rock still exposed when the time came for the deposition of the coal seam. In a comparison of the conditions attending the workable seams of coal in the two great divisions of the coal field, the Nanaimo and Comox, this proximity of the workable coals to the unconformable rocks beneath in the latter division is in marked contrast with those in the former, where depths of 1,000 feet, or even more, of sediments, with thin coals and massive blue shales prevail.

Another important feature of differentiation between the two divisions is the association at Nanaimo of the working coals with thick beds of conglomerate, and their practically total absence in the worked portion of the Comox Division.

As to the area of the coal-bearing series, it may, in general terms, be said to extend down the whole east coast of the island, but the area in which it is probable coal in workable thickness exists is very much less, while the area that may be regarded as proved is comparatively small. The difficulties in the way of exploration are numerous; vegetation is rank, the surface is largely disguised under thick layers of wash gravels, and there are no inducements to the public to prospect over the major portion of the more immediately promising ground, as these lands are held by the present coal operators, who have no occasion to explore much ahead of their requirements. Still, if it be desired that a conjecture be hazarded of the quantity of coal exceeding a thickness of two feet, and within a vertical depth of 4,000 feet, an estimate of 600 million tons, though based on most incomplete data, would seem conservative, and yet at the same time sufficiently large to allay apprehensions of any immediate shortage in the output.

The fossils collected in connection with the above geological work have been submitted to Dr. Whiteaves, palæontologist to the Survey, for determination.

VICTORIA DISTRICT.**VICTORIA MINING DIVISION.****REPORT OF GRANVILLE CUPPAGE, MINING RECORDER.**

I have the honour to submit herewith the annual report on mining in this division during 1906.

Through the courtesy of Mr. Clermont Livingston, I am enabled to supply some particulars of work done by the Vancouver Island Mining and Development Company, Limited, and the Tyee Copper Company, Limited.

VANCOUVER ISLAND MINING AND DEVELOPMENT CO., LIMITED.

The work done by this company has been concentrated on Koksilah mountain, about five miles from Cowichan, a station on the E. & N. Railway. From the *Bluebell* five carloads of ore have been shipped, ranging from 5% to 8% copper; several prospect shafts have been sunk, which have proved the existence of good copper to a depth of 60 feet below the outcrop. This work was suspended at the end of November, as weather conditions were an obstacle to the extensive surface work that was being undertaken. This work will be continued in the coming spring. Although it is too early yet to speak definitely, conditions appear to be very favourable for the development of marketable ore.

THE TYEE COPPER COMPANY, LIMITED.

While the *Tyee* mine has been reported on for the last few years, still a few remarks on the past year's work will prove interesting. *Tyee* ore to the amount of 23,823 tons was smelted at the company's smelting works at Ladysmith. This produced 2,115,617 pounds of copper, 3,776 ounces of gold, and 77,085 ounces of silver, the cash returns, after deducting refining and freight charges, being \$396,500. The *Tyee* main shaft has attained a depth of 1,250 feet, and the same low-grade ore body has been met with that had been previously intersected at the 1,000-foot and 1,150-foot levels. A winze has just been commenced at the 1,150-foot level, and this will be sunk from 200 to 300 feet, which will prospect the mine to a depth of about 1,500 feet from the actual surface of the ground. At the same time, heavy prospecting work in the form of drifts and cross-cuts will be done in the lower levels, to follow up and explore the ore that has been exposed. Concentration tests are also being made, in order to find out the best method of utilising the large tonnage of low-grade material which has been developed in the mine.

In addition to the work at the *Tyee* mine, a shaft has been sunk to a depth of 500 feet on the neighbouring claim, called the *I.X.L.*, which is also the property of the Tyee Company. Several thousand feet of work has been done on this ground on a formation very similar to the *Tyee*, and the indications are distinctly favourable for pay ore.

The diamond drills are also working continuously on the property. One of these is a "B" drill made by the Sullivan Machinery Company, and has a capacity of 3,000 feet.

RICHARD THE THIRD.

The Tyee smelter has secured the contract for the ore from the *Richard the Third*. There is now some 400 tons on the dumps ready to be shipped, and regular shipments will continue.

SAN JUAN DISTRICT.

The necessary annual assessment work has been performed on a number of claims, but no reports of any import have come to my knowledge.'

OFFICE STATISTICS—VICTORIA MINING DIVISION.

	1905	1906
Free miners' certificates.....	450	490
" " special.....	8	7
Mining claims recorded.....	83	81
Certificates of work recorded.....	219	163
Certificates of improvement recorded.....	58	10
Conveyances recorded.....	78	30
Permits ".....	2	2
Lay-overs ".....		1

Revenue.

	1905	1906
Free miners' certificates.....	\$4,166 02	\$5,115 45
Mining receipts, general.....	2320 30	1,684 90
	<u>\$6,486 32</u>	<u>\$6,800 35</u>

NEW WESTMINSTER MINING DIVISION.

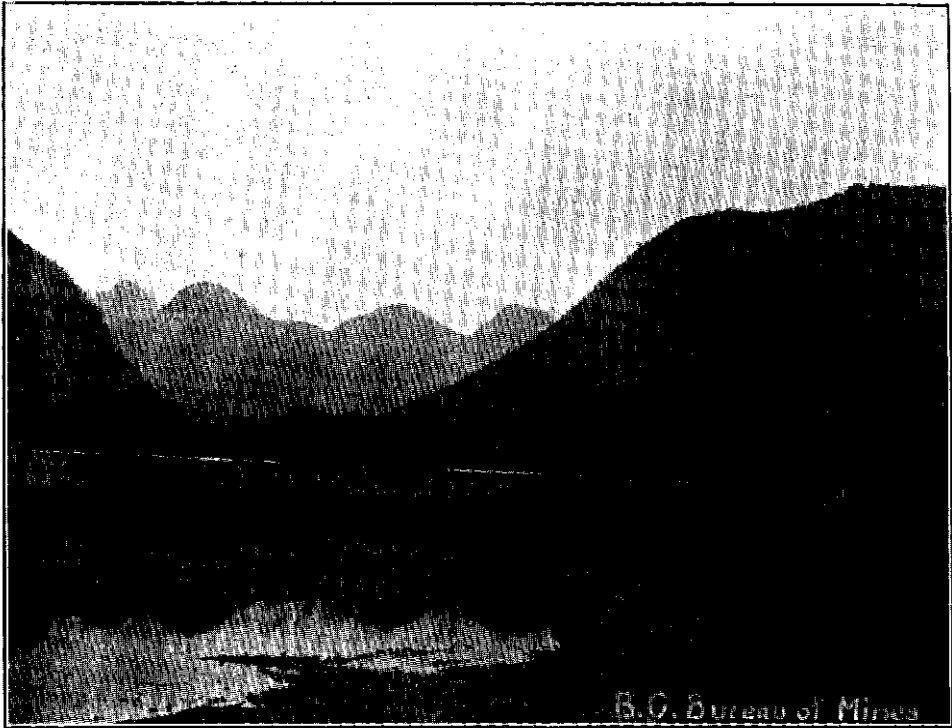
REPORT BY J. MAHONY, MINING RECORDER.

I have the honour to submit the following report of mining operations in the New Westminister Mining Division for the year 1906:—

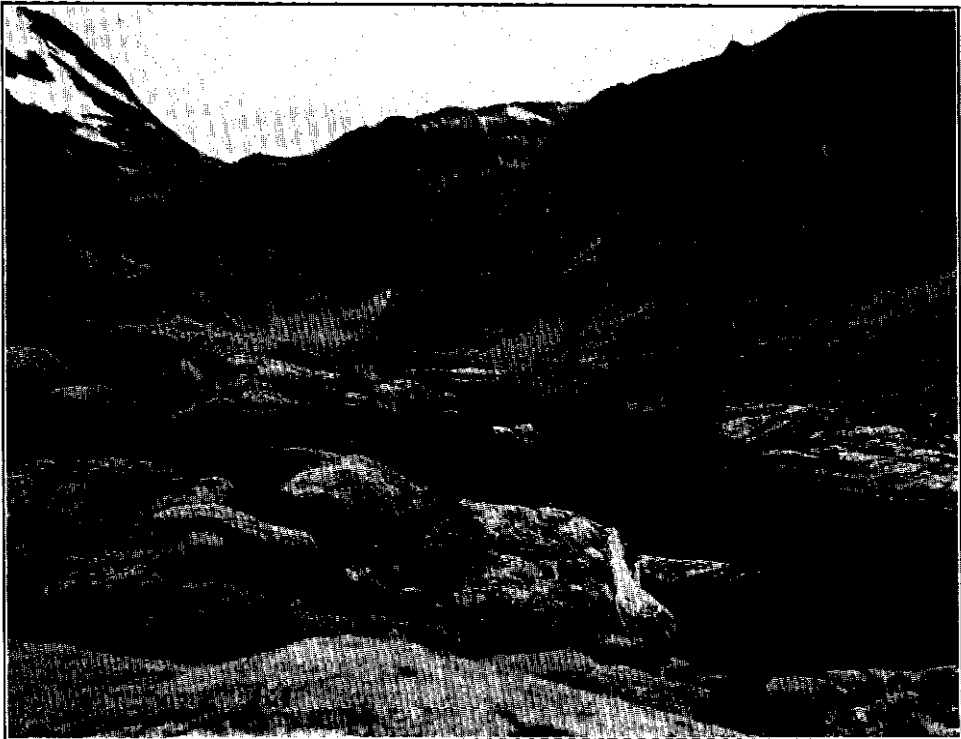
The claims recorded during the year were distributed as follows:—

Howe sound and vicinity.....	41
Britannia and vicinity.....	57
Bowen island.....	21
Gambier island.....	2
Salmon arm and vicinity.....	24
Burrard inlet and vicinity.....	4
Capilano, Lynn and Seymour creeks.....	33
Pitt lake.....	35
Stave lake.....	2
Lillooet river.....	9
Wharneck and vicinity.....	12
Harrison lake and vicinity.....	3
Chilliwack and vicinity.....	5
Jervis inlet.....	21
Nelson island.....	6
Welcome pass.....	3
25-Mile creek.....	3
Porpoise bay.....	2

The number of claims recorded shows a considerable increase over the year before, and shows that there is greater activity in prospecting than there has been for the two preceding years. Some good prospects have been found between Salmon arm and Howe sound, and it is the intention of the holders of the mineral claims recorded in that locality to do considerable development work during the year 1907. There has been a great deal of prospecting in Howe sound and vicinity, and also throughout the whole Mining Division, and there is every prospect that the year 1907 will show an increase over the preceding years.



GREAT CENTRAL LAKE, VANCOUVER ISLAND, B. C.



DELLA LAKE, VANCOUVER ISLAND, B. C.

From the office statistics it will be seen that there has been a considerable increase over the year 1905.

OFFICE STATISTICS—NEW WESTMINSTER MINING DIVISION.

	1905.	1906.
Free miners' certificates issued.....	738	1,158
Quartz claims recorded.....	107	283
Certificates of work recorded.....	191	157
Certificates of improvement recorded.....	13	15
Conveyances recorded..	46	94

Revenue.

	1905.	1906.
Free miners' certificates.....	\$4,606.65	\$6,484.85
Mining receipts, general.....	1,810.40	2,507.70
	<u>\$6,417.05</u>	<u>\$8,992.55</u>

CLAY DEPOSITS OF ANVIL ISLAND.

By PROVINCIAL ASSAYER.

Anvil island is situated up Howe sound, 23 miles from Vancouver City; the island is a granitic peak rising to a height of 2,700 feet, and is three miles long by two miles wide. At the southern extremity of the island there is an extensive deposit of glacial clay. This is now being worked by the Columbia Clay Co., Ltd., under the management of J. A. Brownsword. The clay bank has an area of some 90 acres and a thickness of about 100 feet. For a glacial clay it is very uniform in texture, being practically free from stones. A floor has been run into the bank, slightly above the level of the mixer and brick machine, so that the clay is shovelled into small cars and run by gravity a short distance to the hopper; the brick machine is of the "soft mud" type. The bricks are burned in a continuous kiln, the draught being maintained by a fan and exhausted through a dryer, in which the bricks are dried before being burnt. The kiln is only a few feet from the water, the brick being loaded direct from the kiln by small cars on to scows, which are towed to market. The plant has a capacity of 30,000 per day.

The following is an analysis of the Anvil island clay, made by the Provincial Government Assay Office:—

Loss by ignition.....	3.0 %
Silica.....	58.6 "
Alumina.....	26.7 "
Oxide of iron.....	7.5 "
Lime.....	4.0 "
Magnesia.....	Trace.
Fusion point.....	2,000 Fahr.

COWICHAN LAKE AND VICINITY.

REPORT OF WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

In the early part of the summer the Provincial Mineralogist, having been requested to visit the mineral claims being developed in the vicinity of Cowichan lake, in the Victoria Mining Division, reported as follows:—

In compliance with the memorandum mentioned, I beg to report that I left Victoria on May 28th, and visited the claims in question.

CHEMAINUS SLOPE.

The claims on the Chemainus slope are situated on a small creek which flows into the south fork of the Chemainus river, and about two miles from its junction. The claims may be reached by a trail up the Chemainus river, and also by a trail from Cowichan lake, which starts from a point a little to the east of the mouth of Cottonwood creek. The former route would, eventually, be that over which any ore from this section would be taken out, and by which any important trail or waggon road would be built; but, for the preliminary development of properties and for prospecting purposes, the trail from Cowichan lake is the one best suited, as, at present, supplies can be transported by waggon and boat to a point nearer the claims than by the Chemainus trail. I followed the Chemainus trail down some three miles below the junction of the creek mentioned, and found that it ran through finely timbered land, large trees with no undergrowth and little or no fallen timber, with a solid, stony and gravelly soil, unfit for agriculture, but perfect for a trail, over which a pack-train could be driven without any previous preparation; in fact, a line of blazes is the only trail work necessary. I am informed that these conditions prevail all down the Chemainus valley.

Cowichan lake is about 20 miles from Duncan station, on the Esquimalt and Nanaimo Railway, with which it is connected by a very fair waggon-road to the east end of the lake. A regular daily stage and a couple of independent stages are run over this road, making the distance in a little over three hours; there are no heavy grades on the road.

The elevation of Cowichan lake is about 550 feet above the sea level; from the east end of the lake to the mouth of Cottonwood creek, by water, is estimated at almost nine miles. The water of the lake is everywhere deep enough for any steamer, and a landing can be made on the beach at any point. A company logging on the lake has a small tug capable of towing scows or rafts, and, consequently, if so desired, any supplies or horses could be landed at the mouth of Cottonwood creek.

The present Cottonwood trail to the summit follows the main creek up to "Doc's" cabin, at the junction of the east fork, which fork it then follows up to the summit. The summit is about nine miles from the lake, and at an elevation 2,000 feet higher, some 2,600 feet above sea level.

The claims located by Sherk, Jones and others are nearly a mile north of the summit, and at about 300 feet lower elevation, about 2,300 feet above sea level. I was given to understand that locations have been made two or three miles farther down the creek, and at an altitude of about 1,700 feet. No work has been done on these and I was personally unable to locate them. The Cottonwood Creek trail is through magnificently timbered land, with no underbrush or fallen timber, and not a single standing tree has had to be cut to make the present trail, the few small ones that were cut serving merely to blaze the trail. The country traversed is almost entirely covered to a considerable depth by "wash," consisting of slide rock, volcanic in origin, embedded in clay produced from the disintegration of such rocks. More or less clearly-defined benches follow the course of present streams. The trail in question has been laid out with very poor judgment: it follows the first bench as far as the junction of the east fork, when it drops to the creek level, or follows the steep hillside bordering thereon, thereby necessitating an amount of side-hill cutting, and crossing in and out of ravines, with many "reverse grades," all of which might have been avoided by keeping to and following up the first bench, above the ravines and side-hills, with no greater distance to travel to the summit.

The country is smooth, with solid footing, no mud holes, and open to a degree scarcely comprehensible to one accustomed to the Kootenay Districts, and is such that no Kootenay

prospector would dream of asking for a trail through, for a pack-horse could go anywhere. The difficulty in this section is that there is practically no "horse feed" on the hills, and, for the small amount of work going on, it does not pay to bring in hay and grain with horses.

MINERAL POSSIBILITIES.

On the Cottonwood creek slope there are few rock exposures and such few as were seen on the higher levels are much altered and shattered igneous rocks, in which I could not see any indication of mineral nor hear of any having been discovered.

On the Chemainus slope, in the cutting made by the creek, were seen sedimentary rocks, shales, silicious limestones, etc., in contact with the igneous rocks mentioned. Near such contact are the mineral locations referred to, which, from the fact that most of the mineral locations of value on the Island are similarly located, gives these claims greater possibilities than the present meagre development has proved, and renders the locality well worth prospecting.

It was expected that some of the prospectors would be on the properties, but such was not the case, the snow having scarcely left the ground; consequently, having followed the blazed trail to the Sherk cabin, the various claims had to be found by tracing, from there, foot trails which had been made by the men when doing the work.

The *Cascade* is known as one of the Sherk claims, but the location post bears the name of George Lawrence, the date of location being 21st August, 1902. This claim is located about a mile from the summit, and on the Chemainus slope, on a small creek flowing eastward into the south fork of the Chemainus river, and at an altitude of about 2,300 feet. The work has been done in the creek cutting just below a small falls, where the solid formation is exposed in the steep bank. Here there is exposed an igneous dike of considerable, although undetermined, width, which exhibits a number of parallel vertical fissures from one to two feet apart. Along these fissures has been deposited quartz, with some chalcopyrite and bornite, together with a certain amount of magnetic iron oxide, which has been again enriched by a secondary deposit of calcite carrying copper sulphides. The width of these individual stringers is from 2 inches to 4 inches, and they are, apparently, disconnected. The extent of the deposit, as at present exposed, is commercially unimportant. The amount of development work done at this point consists of an open cut about 10 feet wide, and 6 feet into the solid formation, with a height of face of about the same. In the open cut a pit has been sunk, of what depth it is impossible to say, since it has been nearly filled in again by the creek and rock from the face. A few yards farther down the creek a little surface blasting has been done, exposing a small amount of copper mineral. The workings did not disclose any defined strike or dip to the deposit. A sample taken of what might be considered the ore from the claim gave copper, 5.6 %; silver, 0.2 oz. to the ton, and gold a trace. A short distance to the south of the creek some surface stripping and small cuts were seen, apparently on the same claim, which did not, however, promise as well as the creek exposures.

Still farther to the south, and towards the summit, were found the stakes of the *Empire* mineral claim, located by Jac. Sherk, on the 26th August, 1902, but no development work could be found. Mr. Sherk, however, who was seen later, says some work has been done here.

The stakes of the *Hornet* mineral claim, located by F. H. Lewin and Walter Jones, 27th September, 1905, and also the stakes of the *Wasp*, were found, but no development work or exposure of mineralised rock could be found.

Mr. Jones, of Crofton, subsequently met with on Cowichan lake, says he has a property, the *Garnet* mineral claim, lying to the south of the *Cascade*, and farther up the hill, upon

which he claims to have run a tunnel driven on a considerable deposit of copper sulphides, which he says is "a direct extension of the *Cascade* lead and assays a little over two per cent. copper (wet), with low gold and silver contents." These workings I was unable to find, or any trace of a trail leading thereto.

SUMMARY.

While I do not consider that the mineral so far exposed, in the workings I saw, has any commercial value, still, the rock formation is undoubtedly mineral-bearing, and the conditions are favourable for the existence of ore-bodies, and I think it would be advisable to encourage prospecting in the vicinity. I would, therefore, recommend that an expenditure be made on the trail from Cowichan lake, sufficient to render the trail fit for use with pack-horses.

I would draw attention to the fact that all the land in this district is well within the Esquimalt & Nanimo Ry. "land grant," to which Company the "base metals" (copper and iron) are supposed to belong, and the claims only show nominal values in the precious metals (which belong to the Crown), and that, in my opinion, any permanent trail, or road, should be up the Chemainus valley, the claims lying within a couple of miles of timber limits already sold on that river.

On the morning of May 31st a canoe was taken from the mouth of Cottonwood creek to the mouth of Sutton creek, a small creek flowing from the west into the Little Cowichan lake—i. e., that portion of Cowichan lake east of the narrows—at its western extremity. Starting at Venier's cabin, a trail was followed up the north slope of the Sutton creek valley, which, gradually climbing the hills separating Sutton creek from the main lake, for a distance for about one and a half miles, reached the cabin of the *Sunnyside* and *Here-it-is* mineral claims, at an elevation of about 400 feet above the lake. These claims are owned by Messrs. Douglas, Shelton and Prevost. Considerable work has been done on the claims, but it consists chiefly of small open cuts and strippings and is so scattered as to give no definite idea of the deposit. The most extensive development work is No. 1 Tunnel, elevation 550 feet above the lake, which has been driven in about 35 feet, N. 24° E., gaining thereby a depth at the face of only about 35 feet from the surface. The rock formation is a very much altered and shattered igneous rock, with a high percentage of iron, and containing numerous red garnets along the fissures. Near the portal, the tunnel passed through a somewhat ill-defined body of copper pyrites, pyrrhotite and arsenical pyrites, which seemed to be deposited along and near a black, "slickensided" fissure cutting the tunnel. The inner portion of the tunnel was devoid of mineralisation, having seemingly cut through the ore deposits in the first 10 feet. This tunnel starts on the *Sunnyside* ground, but in a few feet is into *Here-it-is* ground. An approximate sample taken of the sorted ore gave, upon assay: Copper, 9 % (wet); silver, 0.3 oz.; gold, trace. A special sample taken of the pyrrhotite and the arsenical-pyrites assayed: Copper, 5.6 %; silver, 0.2 oz.; gold, trace.

Some 40 feet vertical above the tunnel there is an iron capping containing copper and iron sulphides, with iron oxides, on which a little stripping had been done. Scattered over an area several hundred feet wide, there are a number of these exposures of mineral, but on none of them has sufficient work been done to show whether the mineral, which shows on the surface so abundantly, is a "surface flow" or whether it continues with depth. One of the ore exposures occurs near an outcrop of lime, which lies above the workings, but, as far as could be seen, not lying on such contact for any distance. Above the outcrops mentioned was seen a quartz vein of very irregular width, carrying a small amount of copper sulphide. The owners report a similar, though stronger, quartz vein some 250 feet vertical higher up the hill, also carrying some copper.

The *Peterson* claim is situated on the east side of a small creek, dry in summer, which flows into the extreme western end of Cowichan lake, and is at an elevation of about 300 feet above the lake and half a mile from the mouth of the creek. To reach it from the end of the lake, the old Nitinat waggon road, now almost overgrown, is followed up for about a quarter of a mile, when the trail strikes off to the right, up the hillside. In the face of an overhanging cliff a narrow seam in the country rock shows a small percentage of copper ore, but not any great quantity. From this showing a tunnel has been driven in to the north-east for a distance of 15 feet, along a fissure in the rock; the cost of the work done was estimated at about \$100. The shattered character of the rock in the roof of the tunnel and the overhanging cliff renders the workings absolutely dangerous for men to work in; but a prospect of this class does not come under the operation of the "Metalliferous Mines Inspection Act." The property is owned by Mr. Peterson, of Duncan. No ore could be seen in the tunnel workings, nor in the vicinity, except in the seam already mentioned. The country rock is a highly-altered shale, much shattered and cut by fine-grained igneous dikes. A sample taken from a small pile of ore at the tunnel mouth assayed 1% copper, with traces of gold and silver.

From the shore of Cowichan lake, about $1\frac{1}{2}$ miles east of the mouth of **Paget Claims.** Nixon creek, a trail, four miles long, leads up over the summit of the hills to the south of the lake, on to the slope drained by the Gordon river. Here a large amount of work has been done on a group of claims by a Mr. Paget, an Englishman not now in this country, and whose local representative is not known. Large log buildings, consisting of an office and store-house, bunk-house, cook-house, blacksmith shop, etc., were built, but, as the property has not been worked for some years, these have nearly gone to ruin. The principal workings are at an altitude of 2,650 ft., and consist of an upper tunnel driven N. 70° E. into the hillside for about 60 feet, with, near its inner end, a cross-cut to the left of 5 feet and another to the right of 10 feet. At some 50 feet lower elevation another tunnel, nearly in line with the upper tunnel, had been driven in for, it is reported, 60 feet, but, as it was flooded with water dammed back by fallen material, this could not be verified; this lower tunnel seems to have been in gravel for the greater part of its length, and no ore was visible. The upper tunnel is on a well-defined quartz vein about 6 ft. wide, the mineralisation consisting of arsenopyrite, pyrite zinc blende, and a little galena. Very fair gold values are reported to have been obtained in the working of the property, but these values must be "spotty," as samples taken of the most promising looking arsenopyrite on the dump yielded negative results. The quantity of galena is insignificant.

There are a number of other claims in the vicinity of the lake, or a few miles back, notably "Doc's" claims up the Robertson river, but the exact location of these was not known and no guide to them could be found, so they were not visited.

INSPECTION OF METALLIFEROUS MINES.

—:O:—

REPORT OF JAMES MCGREGOR, INSPECTOR, WEST KOOTENAY AND BOUNDARY DISTRICTS.

I have the honour to submit my annual report for the year 1906, with respect to the condition of the metalliferous mines in my district.

NELSON DISTRICT.

In this district there has not been an increase in the number of mines shipping ore, but there has been a marked increased activity in the development of the existing mines and in prospecting of new ground. In my visits of inspection I have always found that the requirements of the "Metalliferous Mines Inspection Act" were being carefully observed.

SLOCAN DISTRICT.

The general outlook in this district seems to be less depressed than it has been; although fewer large properties are working, there is an increased number of mines working under the lease system. I have invariably found the underground workings safe, the timbering properly done, and in the handling of explosives all precautions are observed.

LARDEAU DISTRICT.

In this district there has been this past year no increase in the number of mines shipping ore, but some of those operating have enlarged their plants and increased their outputs, while much prospecting is under way. I have in every instance found the bunk-houses, powder magazines, man-ways and ladder-ways to be in compliance with the Act.

SIMILKAMEEN DISTRICT.

There are no new shipping mines in this district, but those in operation have worked continuously, and I have found them to be worked and equipped in compliance with the Act.

KAMLOOPS DISTRICT.

There is no increase in number of shipping mines in this district; those working are being operated in compliance with the Act.

BOUNDARY DISTRICT.

In this district the number of mines being operated is constantly increasing, and the various mines are each year making larger outputs and keeping up development work. Upon inspection, I have found this year, as formerly, that great care was being exercised in complying with the requirements of the Act, and every disposition shown to carry out its spirit as well as letter.

AINSWORTH DISTRICT.

There has been greatly increased activity in mining in this district, both in shipping and developing, and with all the enlargements of plant I have found every precaution which would tend to safety being observed.

 ROSSLAND DISTRICT.

Much progress has been made in this district during the past year, in the enlargement both of the mines and surface plants; the larger properties sinking to still greater depths. I have invariably found, upon inspection, a desire to comply with every requirement of the Act.

Appended is a list of accidents which have occurred in or about mines within my Inspection District during the past year.

 REPORT OF THOS. MORGAN, INSPECTOR OF EAST KOOTENAY DISTRICT.

I have the honour, as Inspector of Metalliferous Mines for the East Kootenay District, to submit my annual report for the year 1906.

The following mines, situated within my district, have been worked during the past year:—

The *St. Eugene*, at Moyie, the *Sullivan*, the *North Star* and the *Stemwinder*, near Kimberley. I have visited these mines at every opportunity and have always found them in very good condition; the ventilation is good and every precaution is used for the safety of the men employed.

The *St. Eugene* mine is situated at Moyie, on the line of the Canadian Pacific Railway, and is owned and operated by the Consolidated Mining and Smelting Co., of Canada. I last visited the property on October 1st and 2nd. Extensive work has been carried on during the past year, with satisfactory results. There is an abundance of fresh air in the mines, supplied by natural ventilation and by compressed air. The timbering was in first class order.

The *Sullivan* mine is situated about 2½ miles north of Kimberley, and when I visited it on November 2nd I found everything in first class order, the mine well timbered and the ventilation good. The bunkers and tramway have not been changed in any way during the year.

The *North Star* mine is near Kimberley, and was last inspected by me on October 4th. Considerable work had been done during the year, mainly of a prospecting nature. The mine is well ventilated by natural ventilation and compressed air, and the timbering is good.

The *Stemwinder* mine is located 1½ miles to the west of Kimberley, and was last inspected by me on October 5th. This property has only recently been opened up and as yet very little work has been done, other than prospecting, which, however, gives indications of an extensive body of low-grade lead ore.

 REPORT OF ARCHIBALD DICK, INSPECTOR OF COAST DISTRICT.

I have the honour, as Inspector of Metalliferous mines for the Vancouver Island and Coast District, to submit my annual report for the year 1906:—

During the past year I inspected the following working mines:—*Britannia* mines, New Westminster Mining District; *Marble Bay*, *Cornell* and *Loyal* mines, on Texada island, in the Nanaimo Mining District.

The *Britannia* mines, C. M. Dull, General Manager and Superintendent, **Britannia.** are located on Britannia mountain, at an altitude of 3,500 feet, and are connected with the beach on Howe sound by an aerial tramway $3\frac{1}{2}$ miles long, at which point are located the concentrating and power plants. The entire plant is operated by water power, obtained from a stream on the mountain side, including the concentrator with 70 tables, etc., mill, machine shop, and electric lighting plant. The mine plant, consisting of rock crusher, air compressors and electric lighting plant, is also operated by water power.

There are at the mine four operating tunnels, two at the *Jane* and two at the *Bluff*. At the *Jane* the No. 1 tunnel is higher than the top of the pockets at the upper terminal of the aerial tramway, and the ore from here is lowered down a "back balance" incline. No. 2 tunnel is practically on a level with the top of the pockets, to which the ore is trammed direct, and a similar arrangement is in use from No. 2 tunnel of the *Bluff*.

I found everything about the mines in good condition, the timbering in good condition and well placed, and the "Metalliferous Mines Inspection Act" was being complied with in every way.

The *Marble Bay* mine, on Texada island, owned by the Tacoma Steel **Marble Bay.** Co., is under the management of Mr. A. Grant. The bottom of the shaft is now down 700 feet from the surface, and as the collar of the shaft is only 52 feet above sea level, the bottom is 648 feet lower than sea level. I inspected all parts of the mine now being worked, and found everything in very good condition, the timbering well done, and the ventilation good. There were 30 men employed underground and 27 on the surface. At the time of my visit a new shaft-house and hoisting plant were under construction. The shaft-house is 40 feet square at the bottom, and 90 feet high, and will contain ore chutes, sorting tables, etc.

The *Cornell* mine is being worked under lease by the Cornell Operating **Cornell.** Co., W. C. Tonkin, Superintendent. This mine has been idle for some years, and has been recently leased by the present company, and work is being energetically pushed as far down as the 160-foot level, to which depth the workings had been unwatered; but arrangements are being made to take out the remainder of the water. The mine is equipped with a 25-h.p. hoisting engine and a 34-h.p. boiler. Seven men were employed.

The *Loyal* mine is situated to the north of Van Anda, on the east side **Loyal.** of Texada island, and is under lease to and being worked by the Loyal Lease, Limited, Co., under the management of Mr. C. Jacobs. On September 11th, 1906, the date of my visit, there were two miners at work timbering the bottom portion of the shaft, then down some 300 feet, and they were making a good job of it; but I found some of the upper portion of the shaft in need of repair, and I notified Mr. Jacobs that it would have to be attended to, which he promised to do.

I append a list of accidents occurring during the past year at metalliferous mines within my district.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1906.

No.	Mine.	Date.	Name.	Occupation.	Details.
1	Centre Star, Rossland..	Jan. 6	John Santello..	Trammer ...	Slightly injured; explosion of powder in chute.
2	" " ..	" 9	Dan Lanson...	Blacksmith ..	Eye slightly injured by chips of steel.
3	" " ..	" 23	John McDonald	Trammer ...	Eyes injured by explosion of powder while picking loose coal.
4	Tyee, Vancouver Island	" 23	Arthur Dawson	Shiftboss ...	Metacarpel bone injured by small piece of ore.
5	Providence, Greenwood.	Feb. 7	H. Violette ...	Trammer ...	Face bruised while picking loose ore, by powder explosion.
6	Centre Star, Rossland..	" 11	James Anson..	Timberman..	Foot broken by log rolling on it in lumber yard.
7	St. Eugene, Moyie.....	" 15	E. H. Ross....	Mucker	Preparing for set and rock fell on his head.
8	" "	" 18	Jas. Pizzette ..	Miner	Freeing muck in chute by blasting; rock fell on him.
9	Providence.....	Mar. 1	A. Nichelsen..	"	Eyes blown out; picking into missed hole, powder exploded.
10	Britannia	" 13	L. C. Morrison.	Timberman..	Picking out bed for timber, some powder exploded; cut about head.
11	"	" 13	A. A. Brett ...	" ..	Same place, same result.
12	Centre Star, Rossland..	April 18	D. Kennedy ..	Motor brake-man.	Finger broken at chute by rock.
13	Brooklyn, Phoenix.....	" 23	J. W. Carscaden	Miner	Found dead in stope; head crushed by rock.
14	Centre Star, Rossland..	" 28	Chris. Curry ..	Ore sorter ..	Killed by falling down shaft.
15	Brooklyn, Phoenix.....	" 28	John Adgers ..	Miner	Ankle broken while barring down rock.
16	Sunnyside, Hedley ...	May 8	Isah Doran....	"	Killed by explosion of a case of dynamite.
17	" "	" 8	Jos. Dumais ..	"	Same accident, same result.
18	American Boy, Sandon..	" 9	T. McGuigan..	Manager....	Killed by fall of rock in drift.
19	Stemwinder, Phoenix...	" 15	Mike Cantfield	Carman.....	Injured by falling into shaft.
20	Britannia	" 21	A. Church	Mucker	Using pick at face of tunnel, struck powder which exploded; head and neck injured.
21	Centre Star, Rossland..	" 22	Herbert Verco.	Miner	Foot slightly injured by fall of rock.
22	St. Eugene, Moyie.....	June 1	W. A. Brown..	Machineman	Leg broken by rock he picked down.
23	" "	" 7	C. Anderson ..	Miner	Killed by explosion of powder; had carried sack of powder to face, alone.
24	Centre Star, Rossland..	" 11	Com. Leopoldo	Mucker	Killed by contact with electric wire.
25	Strathmore, Greenwood	" 13	C. A. Petterson	Miner	Killed by fall of rock in drift.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1906.—Continued.

No.	Mine.	Date.	Name.	Occupation.	Details.
26	Wakefield, Silverton...	June 14	Jas. Adams ...	Miner	Killed by fall of rock in drift.
27	Centre Star, Rossland..	" 18	L. H. Reid....	"	Finger injured by drill.
28	Tyee	" 19	Fred. Carter ..	"	Legs injured by fall of rock at drill.
29	Brooklyn, Phoenix.....	" 24	Wm. Neavis ..	Skiptender..	Killed by falling from the skip.
30	Skylark, Greenwood...	" 26	Patrick Clump.	Miner . . .	Seriously injured by fall of rock in slope.
31	St. Eugene, Moyie.....	July 11	Tim Farrell ...	"	Picking down loose rock, which fell and broke his ankle.
32	" "	" 14	R. W. Stringham.	Labourer ...	Became entangled in engine machinery; killed.
33	Le Roi, Rossland.....	" 15	Robt. Inches..	Carpenter...	Killed by falling off shaft-house.
34	St. Eugene, Moyie.....	" 18	Jno. Chestnut.	Miner	Fell into chute; back bruised.
35	" "	Aug. 2	Phil. Summers	Timberman..	Took hold of cable, which drew him into sheave-wheel and injured him.
36	" "	" 14	A. Zossutt ...	Labourer ...	Hand injured by cap in lump of coal exploding.
37	Snowshoe, Phoenix.....	" 20	Geo. Williams.	Trammer ...	Ankle broken by ore car.
38	Centre Star, Rossland..	" 20	Chas. Crow ...	Labourer ...	Foot crushed by piece of machinery falling on it.
39	" " ..	" 21	R. A. Jackson.	" ...	Face cut by flying splinter of wood from saw.
40	" " ..	" 25	John Strang ..	" ...	Injured by motor car at head works.
41	St. Eugene.....	" 25	Wm. Bird	Timberman..	Arm broken by fall of rock.
42	Queen, Salmo	" 28	B. McNiven...	Trammer ...	Finger cut off by car.
43	Victoria, Phoenix.....	" 30	Ron'd McInnes	Carpenter...	Killed by contact with electric wire.
44	Centre Star, Rossland..	Sept. 7	Bert Piper	Miner . . .	Leg broken by a fall of rock.
45	St. Eugene, Moyie.....	" 15	Neil McDonald	Timber help.	Hand injured by timber falling on it.
46	Tyee	" 16	J. Carmichael .	Miner	Leg broken by fall of rock.
47	Broadview, Trout Lake.	Oct. 23	James Scott... ..	"	Hand blown off by drilling into missed hole.
48	Old Ironsides	" 25	Jas. Peacock ..	Trammer foreman.	Severely injured in shaft by car falling on him.
49	Providence, Greenwood.	" 25	Erich Lund ...	Miner .. .	Slightly injured by machine drill.
50	Old Ironsides, Phoenix..	" 28	John Holmes..	Trammer....	Killed by a car running over him.
51	Brooklyn, " ..	Nov. 4	H. Matheson..	Trammer foreman.	Killed by walking into quarry.
52	Providence, Greenwood.	" 24	Arthur Murray	Trammer....	Picking in loose ore, powder therein exploded; injured eye.
53	St. Eugene, Moyie.....	" 3	J. Cavanaugh .	Driver	Hand injured by moving cars.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1906.—*Concluded.*

No.	Mine.	Date.	Name.	Occupation.	Details.
54	St. Eugene, Moyie	Nov. 26	Geo. Smith	Top-carman..	Pushed car into shaft and went down, being killed.
55	Silver Dollar, Camborne	Dec. 9	Dan McDonald	Miner	Face injured; drilled into unexploded powder.
56	" "	" 9	J. Coventry	"	Leg broken, eye injured; drilled into unexploded powder.
57	Knob Hill, Phoenix	" 18	Sam Jones	Shoveler	Leg injured; died of blood poisoning.
58	Providence, Greenwood.	" 18	Wm. Tattersall	Miner	Finger broken by machine drill.
59	Centre Star	April 18	Fred Girrard	Timberman..	Leg slightly bruised by piece of timber.
60	Sunnyside, Hedley	May 8	Jno. Anderson.	Trammer.	Slightly shaken by explosion of gas.

TABULATED LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1906.

	CAUSE OF ACCIDENT.	EXTENT OF INJURY.			TOTAL.
		Fatal.	Serious.	Slight.	
A	Blasting	3	0	0	3
B	Defective powder	0	0	0	0
C	Drilling into old holes containing powder	0	4	0	4
D	Powder in muck	0	2	5	7
E	Shafts and cages, accidents connected with	1	1	0	2
F	Falling down shafts or winzes	2	0	1	3
G	Falling down chutes	0	1	0	1
H	Mine cars	2	3	0	5
I	Rock falling in stopes, levels, etc.	4	6	4	14
J	Rock falling down chutes or openings	0	0	1	1
K	Timbering	0	1	2	3
L	Miscellaneous, underground	0	1	4	5
M	Surface	5	2	5	12
	Totals	17	21	22	60
	Accidents for each 100,000 tons ore mined	0.86	1.06	1.12	3.06
	Accidents for each 1,000 men employed	4.61	5.38	5.64	15.38

COAL MINING IN BRITISH COLUMBIA.

—:O:—

Although workable coal seams have been proven in several places scattered over the Province, the only coal-fields actually producing coal are the Vancouver Island coal-field, on the east coast of Vancouver Island, and the Crow's Nest Pass coal-field, situated in the extreme south-eastern portion of the Province, on the western slope of the main range of the Rocky mountains. In the former field two companies are operating, the Wellington Colliery Co., Ltd., at Extension and Comox, and the Western Fuel Co. at Nanaimo; in the Crow's Nest field the three collieries opened are all operated by the Crow's Nest Pass Coal Co., Ltd.

The collieries of British Columbia have felt the wave of general prosperity which has swept over the country, and find themselves in such a position that they have more orders for coal and coke than they can fill. It seems probable that this condition will exist for some time to come. The mines are all sufficiently developed and equipped for a larger tonnage than is at present produced, and to such cause the present stringency of coal supply can not be attributed, but rather, it is claimed, to the scarcity of labour, both skilled and unskilled, to mine the coal and operate the mines on a more extensive scale.

The gross amount of coal mined in the Province during the year 1906 was 1,899,076 tons (2,240 lbs.), an increase over the preceding year of 73,244 tons. Some 381,773 tons of this coal was manufactured into coke, of which there was produced 199,227 tons.

The distribution of this output of coal and coke is shown in the following table:—

COAL AND COKE PRODUCED, EXPORTED, ETC., BY PROVINCE, 1906.

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lbs.)	COAL.				COKE.			
	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	681,889				149,193			
" export to U. S.	679,829				61,704			
" " to other countries								
Total sales			1,361,728				210,897	
Used in making Coke	381,773							
Used under colliery boilers, etc.	170,416							
Total for colliery use			552,189					
Retailed locally			2,389					
			1,916,306					
Stocks on hand first of year	30,456				13,228			
" last of year	13,226				1,558			
Difference taken from stock during year			17,230				11,670	
Output of collieries for year			1,899,076				199,227	

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.
Supervision and clerical assistance	87	.....	63	.....	150	.....
Whites—Miners	1,396	.....	.....	.....	1,396	.....
Miners' helpers	442	.....	.....	.....	442	.....
Labourers	660	.....	471	.....	1,131	.....
Mechanics and skilled labour	319	.....	270	.....	589	.....
Boys	132	.....	50	.....	182	.....
Japanese	73	.....	13	.....	86	.....
Chinese	281	.....	493	.....	774	.....
Indians and Hindus	25	.....	30	.....	55	.....
Totals	3,415	.....	1,390	.....	4,805	.....

The spring of 1907 witnessed the unprecedented occurrence of a Vancouver Island smelter importing coke from Australia, and an Alaskan smelter temporarily shut down for lack of British Columbia coke. The collieries of the Crow's Nest Pass—both in British Columbia and across the Provincial boundary, in Alberta—have had a greater demand for coal and coke than they could supply, which is partly due to shortage of labour, combined with a labour dispute in the fall, and partly to a shortage of cars to move the coal, the railways being also handicapped later by heavy snowfalls.

While not yet producing coal in the commercial sense, certain properties in the Nicola valley are being opened up systematically since the completion of the railway from Spences Bridge, on the Canadian Pacific Railway, to the coal field at Nicola, and at least one of these properties will be shipping coal during the year 1907.

The Nicola Valley Coal & Coke Co., under the management of Alex. Faulds, formerly with the Wellington Colliery Co., has opened up a coal seam on its property, and has a prospecting slope now down 1,000 feet, at an angle of about 25°, on a seam of coal 6 to 8 feet thick. A tunnel is being driven to strike the seam at the level of the bottom of this slope; this tunnel will be used as the working tunnel through which the coal will be brought out, and at the mouth of which the tippie will be placed. Development has so far progressed that the property should be shipping in 1907.

The following are analyses of coal and coke from the Nicola valley :—

SAMPLE.	Moisture.	Volatile Comb. Matter.	Fixed Carbon.	Ash.	Sulphur.	British Thermal Units.	Coking Properties.
Nicola "Jewell"	3.4	34.9	56.7	5.0	0.65	12,486	Fair.
Coal from Princeton	3.4	34.3	54.1	8.2	0.74	12,176	Fair.
Nicola coke	1.2	1.2	84.0	13.6	0.63	11,215	.....

The Diamond Vale Coal & Iron Co., of Nicola, has made extensive tests of its coal areas with a diamond drill and has selected a site for its colliery plant. A shaft has been started through the overlying surface deposits and is down some 50 feet, but trouble is experienced with water and good progress is not being made.

The lignitic-coal deposits in the vicinity of Princeton have remained with little or no further development done on them; much development could scarcely be expected until a railway is actually constructed to the camp.

Prospecting for coal continues in the vicinity of Kamloops, but no property has been opened up as yet.

No fresh developments worthy of note have occurred in the Flathead district of East Kootenay.

Some further prospecting work has been done up Elk river, but no active development of the known seams has taken place.

The Pacific Coal Co., at Hosmer, between Fernie and Michel, on the Canadian Pacific Railway, has begun active operations, and at the end of the year had two tunnels driven in on the coal for a distance of 1,000 feet each; the larger of these tunnels is $8\frac{1}{2}$ x 22 feet in the clear and the smaller $8\frac{1}{2}$ x 13 feet. It is proposed to take the coal from these tunnels to the tippie by an incline 4,000 feet long. This property also should become a producer during the coming year.

The Crow's Nest Pass Coal Co., on the 1st of April, 1906, abandoned work, at least temporarily, at its Carbonado collieries.

Dr. R. W. Ells' report on the coal measures of Queen Charlotte islands will be found on pages 74 *et seq.* of this report; and a report by W. W. Leach, also of the Geological Survey, on the coal of the Telkwa valley is reproduced on pages 95 *et seq.* of this Report.

Some notes on the coal formation of the Peace river valley, by the Provincial Mineralogist, will be found on pages 101 *et seq.*

On Vancouver Island by far the greater area of the possible coal-producing measures is included in the grant of land made to the Esquimalt & Nanaimo Railway, and the coal that may be therein is now owned by the Dunsmuir interests, and as they have sufficient coal land being worked and explored to last for some years, no active steps need be taken by them to further prospect at present. Certain areas of land, however, in the Railway Belt, had been alienated from the Crown before the railway grant was made, and these carry with them the coal rights. On an area of this description bore-holes have been sunk in the Cedar district, near Nanaimo, with fair prospects of success; and similar work is about to be begun near Comox.

Some prospecting has been done on the coal seams in the vicinity of Fort Rupert on the north-east coast of the island, but no definite results have been announced.

Active development of the coal measures on Tumbo has again been started, after many years of inactivity.

VANCOUVER ISLAND COLLIERIES.

The gross output of coal from the Vancouver Island collieries for the year 1906 was 1,178,627 tons (of 2,240 lbs.) of coal actually mined, in addition to which 17,230 tons were taken from stock, making together an actual consumption of 1,195,857 tons. Of this gross consumption 980,072 tons were sold as coal, 138,057 tons were consumed by the producing companies, and 77,728 tons were manufactured into coke, of which there was produced in 1906 some 9,842 tons (2,240 lbs.), and there was taken from stock piles some 13,009 tons, making the total coke sales for the year 22,851 tons.

The following table gives an aggregate summary of the output of the Vancouver Island collieries for the year 1906, and shows the disposition made of such product.

In the subsequent pages of this Report the detailed returns of the individual mines are given, except from the mines of the Western Fuel Co., which Company has refused the permission, without which such details may not be published.

AGGREGATE SUMMARY OF RETURNS FROM VANCOUVER ISLAND COLLIERIES FOR THE YEAR 1906.

	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	531,106	.....	14,547	.....
" export to United States	448,966	.....	8,304	.....
" " other Countries .....	.....	.....	.....	.....
Total sales .....	.....	980,072	.....	22,851
Used in making Coke	77,728	.....	.....	.....
" under Colliery boilers	138,057	.....	.....	.....
Total for Colliery use .....	.....	215,785	.....	.....
Stock on hand first of year	30,456	1,195,857	13,228	.....
" last of year	13,226	.....	219	.....
Difference taken from stock during year .....	.....	17,230	.....	13,009
Output of Collieries for year 1905 .....	.....	1,178,627	.....	9,842

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC., VANCOUVER ISLAND.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.
Supervision and clerical assistance	52	.....	44	.....	96	.....
Whites—Miners	846	.....	.....	.....	846	.....
Miners' helpers	341	.....	.....	.....	341	.....
Labourers	469	.....	56	.....	525	.....
Mechanics and skilled labour	21	.....	164	.....	185	.....
Boys	108	.....	44	.....	152	.....
Japanese	73	.....	13	.....	86	.....
Chinese	281	.....	493	.....	774	.....
Indians and Hindus	25	.....	30	.....	55	.....
Totals	2,216	.....	844	.....	3,060	.....

INSPECTION OF COAL MINES, 1906.

VANCOUVER ISLAND AND COAST INSPECTION DISTRICT.

REPORT OF ARCH. DICK, INSPECTOR.

The collieries operating during the year were:—

NANAIMO: Western Fuel Company—No. 1 shaft, Protection Island shaft, No. 4 North-field mine.

EXTENSION: Wellington Colliery Company—Nos. 1, 2 and 3 mines, all worked from what is known as the No. 1 tunnel.

CUMBERLAND: Nos. 4 and 7 slopes and Nos. 5 and 6 shafts.

Western Fuel Company.

(This Company is the only one in the Province which has refused permission to publish its Official Returns.)

The Western Fuel Company has been working the following mines during the year, under the direction of Mr. Thomas R. Stockett as general manager and Mr. Thomas Graham as superintendent.

No. 1 SHAFT, ESPLANADE, NANAIMO.

Thomas Mills, Manager.

I have examined this mine each month during the year, making monthly reports of the condition in which I found it.

No. 1 shaft and Protection island mine may properly be regarded as one mine, as they are connected underground and under one system of ventilation. The workmen employed in the Protection island section of the mine go up and down that shaft, but all the coal mined there is conveyed to and hoisted through No. 1 shaft.

The most productive district in the upper seam of this mine is known as No. 1 north level, and here work is chiefly confined to the extraction of pillars from what are known as Lamb's, Kileen and No. 2 inclines. From this upper seam there is a rock tunnel, driven nearly all the way through hard conglomerate, to the lower seam, which is some 60 feet vertically deeper. In this lower seam the coal varies in thickness from 30 to 40 inches, all of it being of excellent quality and very hard, which is worked on the "long-wall" system, to which it is well adapted.

The coal from the districts mentioned is loaded into mine cars, which are collected at the different sidings and taken to the bottom of No. 1 shaft by electric motors; two such motors are kept busy, it being no unusual thing to see a train of 70 loaded mine cars.

No. 1 slope branches off No. 1 north level, to the east, about 70 yards from the shaft bottom, and is down 6,513 feet. No. 7 east level branches off from this slope at a point 5,055 feet from its head, and has been driven therefrom 4,960 feet, being at a depth of 1,200 feet vertically below the mud flats of the Nanaimo river. The seam here looks particularly well,

the coal being hard and of good quality. About 1,000 yards down No. 1 slope, the diagonal slope branches off. In my previous reports, No. 7 level and the diagonal slope were mentioned as not then being worked; now this portion of No. 1 mine is producing largely and seems likely to do so for some time.

PROTECTION ISLAND MINE.

Thos. Mills, Manager; Chas. Graham, Overman.

This mine is now a continuation of No. 1 mine. The coal from the No. 3 north level is brought along the level by electric motors to No. 1 slope, up which it is taken by an "endless rope" system of haulage. The operations in the upper seam at this part of the mine are confined to the extraction of pillars; the coal produced is very fine and hard.

From No. 3 level, where it joins Protection Slope, a rock tunnel has been driven to the lower seam, already mentioned in No. 1 mine, and it is here found to be from 30 to 40 inches thick, this proving its existence and thickness under Nanaimo harbour, Protection and Newcastle islands, and its probable extension for a considerable distance under the Straits of Georgia. As a rule, the coal in this lower seam is very hard and of first-class quality. There are now very extensive workings in this lower seam on either side of the slope, and a large number of men are here employed.

The ventilation of these mines is good, there being an average of 90,000 cubic feet of air a minute travelling along the return airways from the slope and No. 1 north level to the No. 1 mine fan, and this does not include the air that goes out at the Newcastle shaft. On the morning shift there is a general average of 176 men and 26 mules employed. In making my examinations of this mine I have always carried a Wolf safety lamp, and it has been very seldom that I have been able to find even a trace of gas. In the districts in which the extraction of pillars is in progress, the Wolf safety lamp only is used, and it is found to be very satisfactory, giving a good light and having a magnetic lock which can only be opened by a powerful magnet.

NO. 4 NORTHFIELD MINE (NANAIMO COLLIERY).

George Wilkinson, Manager.

Reference was made to this mine in a previous report as likely to become a productive mine; it has been working continuously this past year, with the exception of a period from May 25th to October 1st, when, owing to a dullness in the coal trade, due to the earthquake in San Francisco temporarily shutting off that market, to which most of this Company's coal is shipped. Conditions became normal again in October, when work was resumed, and now the mine is producing 600 tons of coal a day, and double this quantity could be marketed if available.

The haulage outlet of this mine was formerly a slope, but this has now been converted into a travelling road for men and animals, while the coal is brought along a parallel slope by endless rope haulage to the bottom of a shaft, 60 feet deep, through which it is hoisted. This haulage slope has not been extended any during the past year, but the rope haulage has been extended another 400 yards along it and is now down 1,400 yards. The levels to the right and left are the same as mentioned in my report of last year, somewhat extended. All the workings here are on the "long-wall" system and are well timbered and in good condition. The slope, as well as a great part of the travelling roads, is well lighted by 16-candle power electric lights, placed at intervals of 30 feet, with extra lights at sidings and entrances to levels. This is the same seam as mentioned in No. 1 and Protection mines as the lower seam; the coal is hard and bright and continues very regular, being little troubled by faults, which all goes to show the regularity and large extent of this seam.

I have always found the ventilation good and sufficient, there being some 40,000 cubic feet of air a minute circulating in the airways of the mine, in which a total of 125 men and 10 mules are at work. I have examined the mine frequently during the past year with a safety lamp, but have been unable to detect any gas, nor has the presence of such been noted in the fireman's report book.

Wellington Colliery Company, Limited.

Head Office—Victoria, B. C.

Capital, \$2,000,000.

<i>Officers.</i>	<i>Address.</i>
Hon. James Dunsmuir, President,	Victoria, B. C.
F. D. Little, Vice-President,	"
H. M. Hills, Secretary,	"
J. A. Lindsay, Treasurer,	"
F. D. Little, General Superintendent,	"

The Wellington Colliery Company, Limited, has been operating the following mines during the year 1906, under the general management of F. D. Little, M.E. :—

The Extension Colliery, in Cranberry District (Extension) ; Andrew Bryden, Manager.

The Union Colliery, in Comox District ; John Matthews, Manager.

The amount and disposition of the combined output of this company's collieries is fully shown in the following table :—

RETURNS FROM WELLINGTON COLLIERY COMPANY'S COLLIERIES.

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lbs.)	COAL.				COKE.			
	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	408,399				14,547			
" export to United States	221,000				8,304			
" " to other countries.....	15,673							
Total Sales.....			645,072				22,851	
Used in making Coke	77,728							
" under Colliery Boilers.....	98,923							
Total for Colliery Use.....			175,651					
Stocks on hand first of year.....	22,633		821,273		13,228			
" last of year.....	3,858				219			
Difference taken from Stock during year			18,775				13,009	
Output of Colliery for Year.....			802,948				9,842	

By products..... Fire Clay (tons) .. 3,463.75

NUMBER OF MEN EMPLOYED IN WELLINGTON COLLIERY COMPANY'S COLLIERIES.

CHARACTER OF LABOUR.	NUMBER EMPLOYED.		TOTAL NUMBER EMPLOYED.
	Underground.	Surface.	
Supervision and clerical assistance	26	20	46
Whites—Miners	529	.....	529
Miners' helpers	292	.....	292
Labourers	52	45	97
Mechanics and skilled labourers	21	100	121
Boys	72	26	98
Japanese	73	13	86
Chinese	281	336	617
Hindus	22	30	52
Total	1,368	570	1,938

EXTENSION COLLIERY.

Andrew Bryden, Manager.

No. 1 OR TUNNEL MINE.

William Jones, Overman.

The developing drivages in this mine have, during the past year, been confined to the slope and to the dip of the east level off this slope. There has also been some work done west of the slope. The face of the slope and the east level have been advanced into new ground, of which there is a large extent and which is showing up very well, and improving as the work goes on. The motor road mentioned in my last report was completed some months ago, and by it the coal is now being brought out.

This mine was originally worked by the "pillar and stall" system, by which not more than one-third of the coal in the seam was extracted, the remainder being left as pillars; besides which, in some cases, 3 feet of coal was left in the stalls for a roof. Now, however, in the rise or higher levels of the tunnel, these pillars, as well as the coal left for a roof in the stalls, are being extracted, so none of the coal may be lost. A sufficient number of pillars are being left around the shaft to amply protect it.

There are four openings from the mine workings to the surface, by two of which the men and mules travel to and from their work, leaving the motor road with its exposed electric wires free from travel except by the haulage motor. The fourth opening is the fan shaft, which is in close proximity to the pillar workings.

I have visited the mine frequently during the past year, and have always found it in fine order and well timbered, while the manager has been prompt to attend to any little safeguard I might suggest.

NO. 2 MINE.

Alex. Shaw, Overman.

This mine is now being worked from two slopes driven to the dip from No. 4 level, an extension of No. 1 or the Big Tunnel mine. The slope to the west is known as No. 2 slope, and that to the east as the New or East slope; both are developing new ground. The East slope has gone down into and across a basin, and is now working up a rise; the No. 2 slope has not yet reached the bottom of the basin, the coal still pitching ahead of it. The coal at the face of both workings is very good, and, from prospecting done, it would appear that there is a very extensive coal-field ahead of the present workings.

I have examined this mine frequently during the past year with a Wolf safety lamp, and very seldom have I ever been able to detect even a trace of gas; the ventilation is sufficient, being about 66,900 cubic feet of air a minute for 68 men and 11 mules.

NO. 3 MINE (EXTENSION.)

Jas. Sharp, Overman.

This is now the most extensive mine of the Wellington Colliery Co.; the winning drivages are now confined to the levels off the No. 3 slope. The No. 4 West level is the motor road over which all the coal is taken out to the No. 1 or Big Tunnel. The workings are all on the pillar and stall system, but the extraction of pillars has now been begun. There are four openings from these mine workings to the surface, three of which are used as air intakes and as travelling and timber roads.

The three last-mentioned mines might almost be considered one mine, as they are all connected underground at different places, and all the coal goes out the same tunnel, but there are large barriers left between each, so that, in case of a fire, one section may be flooded without interfering with the others.

The general supervision of these mines is entrusted to Mr. Andrew Bryden, with an overman at each mine.

The following are the official returns of the Extension Colliery for the year ending 31st December, 1906 :—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lbs.)	COAL.				COKE.			
	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	181,451							
" export to U. S.	163,738							
" " to other Countries.								
Total Sales			345,189					
Used in making Coke								
" under Colliery Boilers, &c.	51,870							
Total for Colliery use			51,870					
Stock on hand first of year	2,980		397,059					
" last of year	611							
Difference taken from stock during year			2,369					
Output of Colliery for year			394,690					

By products—Fire Clay (tons), 2,124.

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 ..	3	.....	9	.....	12	\$
Whites—Miners	362	\$3.00 to \$4.50	.....	.....	362	3.00 to 4.50
Miners' helpers	229	\$2.50 to \$3.00	.....	.....	229	2.50 to 3.00
Labourers .....	.....	.....	9	\$2.25 to \$2.75	9	2.25 to 2.75
Mechanics & skilled labour ..	9	\$2.50 to \$2.75	40	\$2.50 to \$4.00	49	2.50 to 4.00
Boys	44	\$1.00 to \$2.00	5	\$1.15 to \$2.00	49	1.00 to 2.00
Japanese .....	.....	.....	.....	\$1.35	1	1.35
Chinese .....	.....	.....	113	\$1.25 to \$1.50	113	1.25 to 1.50
Totals	647	.....	177	.....	824	.....

Name of Seams or Pits—Wellington.

Description of seams, tunnels, levels, shafts, &c., and number of same—No. 1 Mine, with airways and levels; No. 2 Mine, with airways and levels; No. 3 Mine, with airways and levels.

Description and length of tramway, plant, &c.—10 miles railways and sidings; 6 locomotives; 196 gondola coal cars, capacity 25 tons; 150 coal cars, capacity 3 tons; 4 stationary engines; electric power house, with 2 generators; electric tramway, with 4 locomotives; wharves and bunkers at Ladysmith, Oyster harbour.

The Minister of Mines is hereby authorised to publish these returns.

JAMES DUNSMUIR.

UNION COLLIERY.

John Matthews, Manager.

No. 4 MINE.

David Nellist, Overman.

No. 1 Slope.

This slope and the Diagonal slope have not been advanced any during the year, but Nos. 11, 14 and 15, West levels, levels off these slopes, have been worked steadily during the year and have been advanced long distances. In the No. 11 level the coal has been continuously good, but in Nos. 14 and 15 there has been much trouble with faulty ground.

To the dip on north side of No. 15 level, the coal is very good, clean and hard, varying in thickness from six to eight feet. The coal from Nos. 9 and 10 levels is lowered by self-acting inclines to No. 11 West level, along which it is hauled by mules to the slope.

The ventilation throughout the mine is good, the amount of air travelling in the return airway from No. 11, west level, was 33,500 cubic feet a minute, for 102 men and 15 mules. In addition to this, there is an air division from the slope to Nos. 14 and 15, west levels, in

which there is travelling 13,220 cubic feet of air for 32 men and 6 mules. I was unable to detect gas in either of these return airways, and gas has only been reported in the mine on four occasions during the past year.

No. 2 Slope.

This slope branches off No. 1 slope to the right, a short distance after going under cover, and is, at the face, the deepest workings of No. 4 mine. Some years ago the bottom portion of this slope was on fire, which necessitated its being flooded, and this water is not yet entirely removed. The water caused some bad caves of roof, which have seriously interfered with getting the mine in working order again. The slope itself has been cleared out down to the 13th level, but the levels have yet to be cleared out and put in order. On the east side of the slope, levels Nos. 8, 9, 10, 11 and 12, and on the west side, levels Nos. 10 and 11, are now being worked, the extraction of pillars being in progress.

The ventilation in the mine is good ; there are two air intakes, the slope and the travelling road, in the former of which I found 27,000 cubic feet of air a minute circulating, and in the latter 10,500, a total of 37,500 cubic feet for 63 men and 10 mules. Very little gas is now met with in this mine.

NO. 5 SHAFT.

John Kesley, Overman.

In the Lower seam, the only work being carried on is a little prospecting in one place. The Upper seam is about 240 feet from the surface and 350 feet from the bottom of the shaft. The seam is about 6 feet thick, with a very hard, strong rock roof ; the coal is very hard and of good quality, but is very much mixed with rock. The ventilation is very good ; some 20,000 feet of air circulating for 18 men and 5 mules.

At present this mine has only one shaft or surface connection, although work is being pushed to make another with No. 6 shaft ; consequently, under the "Coal Mines Regulation Act," not more than 19 men may be employed at any one time underground until such connection is made, although there are places in the mine for three times that number.

The shaft landing is so particularly well protected that it seems impossible for any accident to occur from men, etc., inadvertently falling down it from the level ; there is a strong iron gate at the entrance to the workings, catches on the tram track, as well as the usual large bar, which must be hoisted when a car is put on or taken off the cage.

NO. 6 SHAFT, UPPER SEAM.

This shaft is on the same seam as is No. 5, but is about a mile farther south ; the workings are all on the "pillar and stall" system. The coal is very hard and has to be blasted ; this was formerly done without undercutting, but now the mining machines are in operation. The undercutting is made in the middle of the seam ; the top coal is blasted down and the bottom coal up, which gives nearly all lump coal, with a much smaller consumption of powder, and the cost of mining has been materially reduced.

The ventilation is very good, there being 26,250 cubic feet of air a minute for 19 men and 6 mules. There has seldom been any gas found in the mine, except along an "upthrow" fault, which gave a little trouble for a few days.

The number of men employed in this mine is also restricted, owing to there being but one connection with the surface ; this restriction will be removed in a short time, when No. 5 and No. 6 are connected. The same precautions are used at this shaft as in No. 5 mine and a proper "by-road" is provided around the shaft, which does not need to be crossed.

NO. 7 MINE (SLOPE).

David Walker, Overman.

This mine is about four miles in a north-westerly direction from No. 5 shaft, and about two miles from No. 4. A standard gauge track from the Company's railway extends to the mine, where extensive sidings and labour-saving appliances are provided for handling a large output of coal. The mine has been opened by a slope, which is now down 1,000 yards on a gentle incline. This coal is very good and hard and is greatly in demand as "Cumberland anthracite." Some trouble has been experienced in the past by faults, but these are believed to have been passed and a more regular field entered upon.

During the past year several bore-holes have been put down from the surface, a considerable distance in advance of the workings, all of which gave evidence of the continued quantity and quality of the coal.

The ventilation in the mine is good; I have never been able to detect gas with a safety lamp, although I have tried it on several different occasions. The amount of air circulating is about 19,300 cubic feet, for 31 men and 5 mules.

In anticipation of future enlargements of the mine, a 30 x 11 ft. exhaust fan has been erected some 100 ft. from the upcast shaft, with which it is connected by a passage-way of 130 sq. feet, sectional area. The fan has been in place for some time, but has not yet been run for lack of boiler power.

The "picking table" at the tippie has been greatly enlarged, thus providing better facilities for the removal of rock or other impurities from the coal.

The following are the official returns of the Union Colliery for the year ending 31st December, 1906 :—

COAL AND COKE PRODUCED, EXPORTED, ETC.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
(Tons of 2,240 lbs.)								
Sold for consumption in Canada.....	226,948	.....	.....	.....	14,547	.....	.....	.....
" export to United States.....	57,262	.....	.....	.....	8,304	.....	.....	.....
" " other Countries	15,673	.....	.....	.....	.....	.....	.....	.....
Total sales.....	.....	.....	299,883	.....	.....	.....	22,851	.....
Used in making Coke	77,728	.....	.....	.....	.....	.....	.....	.....
" under Colliery boilers, etc.....	47,053	.....	.....	.....	.....	.....	.....	.....
Total for Colliery use .....	.....	.....	124,781	.....	.....	.....	.....	.....
Stock on hand first of year	19,653	.....	424,664	.....	13,228	.....	.....	.....
" last of year	3,247	.....	.....	.....	219	.....	.....	.....
Difference taken from stock during year .....	.....	.....	16,406	.....	.....	.....	13,009	.....
Output of Colliery for year .....	.....	.....	408,258	.....	.....	.....	9,842	.....

By products Fire Clay (tons), 1,340.

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.
Supervision and Clerical Assistance	23	\$ 3.00 - 10.00	11	\$ 3.00 - 6.00	34	
Whites—Miners.....	167	3.00 - 4.50			167	
Miners' Helpers	63	1.50 - 1.75			63	
Labourers	52	2.50 - 2.75	36	2.50 - 2.75	88	
Mechanics and Skilled Labour ..	12	3.00 - 3.25	60	3.75 - 5.00	72	
Boys	28	1.25 - 1.75	21	1.00 - 1.50	49	
Japanese	73	1.35 - 1.50	12	1.25	85	
Chinese.....	281	1.35 - 1.50	223	1.15 - 1.50	504	
Hindus.....	22	1.25 - 1.50	30	1.25	52	
Totals	721		393		1,114	

Name of Seams or Pits :—No. 4 Slope, No. 5 Shaft, No. 6 Shaft, No. 7 Slope.

Description of seams, tunnels, levels, shafts, etc., and number of same :—No. 4 Slope, with airways and levels ; No. 5 Shaft, with airways and levels ; No. 6 Shaft, with airways and levels ; No. 7 Slope, with airways and levels.

Description and length of tramway, plant, etc. :—20 miles of railway, 4' 8½" gauge ; four locomotives, 150 coal cars, one second-hand passenger coach, five stationary engines, five steam pumps, five electric pumps, one dynamo, one steam saw-mill, one coal washer, 200 coke ovens, two wharves and one pile driver.

The Minister of Mines is hereby authorised to publish these Returns.

JAMES DUNSMUIR.

PROSPECTIVE COAL MINES.

I have received official notice from Mr. F. H. Lantz, managing director of the Nicola Valley Coal and Coke Co., Ltd., informing me that his company had started mining operations on its property near Coutlee, in the Nicola valley, known as the "Middlesboro Collieries," and had employed, in December, three men above ground and six under ground. It is probable that within the coming year we may thus have another producing camp.

In the vicinity of Nanaimo there are two new independent coal properties being prospected, viz. :—

In the Cedar District a company has secured an option on a considerable portion of the coal area in that district, and has begun diamond drilling operations to prove the existence of coal, and if so to determine its thickness and quality.

Another company is carrying on similar operations at Englishman's river, near the Nanaimo-Alberni stage road, in a new coal-field, with prospects of success.

EAST KOOTENAY INSPECTION DISTRICT.

REPORT OF THOMAS MORGAN, INSPECTOR.

I have the honour, as Inspector of Coal Mines for the East Kootenay District, to submit my annual report for the year 1906. The only company actually producing coal in this district, as yet, is the Crow's Nest Pass Coal Co., Ltd., but this company is operating three separate and distinct collieries.

Crow's Nest Pass Coal Co., Ltd.

<i>Officers.</i>	<i>Address.</i>
Hon. Geo. A. Cox, President,	Toronto, Ont.
Robert Jaffray, Vice-President,	"
G. G. S. Lindsey, Secretary and Managing Director,	"
E. R. Wood, Treasurer,	"
R. G. Drinnan, General Superintendent,	Fernie, B. C.

Capital of the Company, \$3,500,000.

The above company is now operating the following extensive collieries on the western slope of the Rocky mountains in the East Kootenay District, viz. :—

Coal Creek Collieries, situated on Coal creek, about five miles from the town of Fernie, on a branch railway to the mines.

Michel Collieries, situated on both sides of Michel creek, on the line of the C. P. Railway, being 23 miles in a north-easterly direction from Fernie.

Carbonado Collieries, situated on Morrissey creek and connected by a branch railway with the C. P. Railway and the Great Northern Railway at Morrissey. The colliery is about 14 miles from Fernie by rail, in a south-easterly direction. This colliery worked only the first three months of the year.

The total output of the Company's collieries for the past year was 720,449 tons. Of this 304,045 tons were used in the manufacture of coke, yielding 189,385 tons, of which 1,339 tons were added to stock, 134,646 tons were sold for consumption in Canada, and 53,400 tons were exported to the United States.

The coal exported to the United States amounted to 230,863 tons, while 150,793 tons were sold for consumption in Canada.

The amount and disposition of this combined output is more fully shown in the following table :—

RETURNS FROM CROW'S NEST PASS COAL COMPANY'S COLLIERIES.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
(Tons of 2,240 lbs.)								
Sold for consumption in Canada.....	150,793				134,646			
" export to United States.....	230,863				53,400			
" " to other countries.....								
Total sales.....			381,656				188,046	—
Used in making coke.....	304,045							
" under colliery boilers.....	32,359							
Retail coal.....	2,389							
Total for colliery use.....			338,793					
Stocks on hand first of year.....								
" last of year.....					1,339			
Difference added to Stock during year.....							1,339	—
Output of Colliery for year.....			720,449				189,385	—

NUMBER OF HANDS EMPLOYED.

CHARACTER OF LABOUR.	NUMBER EMPLOYED.		TOTAL NUMBER EMPLOYED.
	Underground.	Surface.	
Supervision and clerical assistance	35	19	54
Whites—Miners	550	.....	550
Miners' helpers	101	.....	101
Labourers	191	415	506
Mechanics and skilled labour	298	106	404
Boys	24	6	30
Total	1,199	546	1,745

MICHEL COLLIERY.

Charles Simister, Manager.

This colliery is situated about 24 miles north-east of Fernie, on the Crow's Nest branch of the Canadian Pacific Railway. Mines Nos. 3, 4, 5 and 6 are on the south-west side, and Nos. 8 and 9 on the north-east side of Michel creek, the railway running up the valley between the two groups of mines.

No. 3 MINE.

John John, Overman.

This mine is worked from a level started off a main tunnel 1,000 feet in. The level has been run to the west for a distance of 1,400 feet, from which stalls have been turned off to the rise. The mine is worked on the pillar-and-stall system, with the subsequent extraction of the pillars. The seam averages about 6 feet thick of good, hard coal; the coal is so hard as to necessitate blasting, which is done at night, when the miners are out of the mine; only Negro powder is used, and the shots are fired by a battery.

On my last inspection, on December 3rd, I found the mine clear of gas, well timbered, old workings fenced off, man-holes at proper distances and free from obstruction. I found 22,000 cubic feet of air a minute circulating in the mine, in which there were employed 40 men and 3 horses.

The general and special rules, a plan of the mine and a barometer are placed at the mouth of the tunnel for the guidance of the men.

No. 4 MINE.

John John, Overman.

This mine is off the same tunnel as is No. 3 mine, commencing 600 feet from its mouth. The east side only has been worked since the "strike" in September last, the water not being yet out of the west side. The mine is worked on the pillar-and-stall system, with the extraction of pillars.

On my last inspection, December 4th, I found the mine clear of gas, well timbered, and everything in good order. No blasting is done in this mine at present; 35,000 cubic feet of air a minute is supplied to 14 men and 2 horses. The same fan ventilates both Nos. 3 and 4 mines; the total air at the fan shaft was 140,000 cubic feet; the air taken from the west side was 15,000 cubic feet; leakage from doors, curtains and the old workings were 63,000 cubic feet a minute. A copy of the general and special rules, a plan of the mine and a barometer are posted at the entrance of the tunnel, for the guidance of the men.

No. 5 MINE.

The level of this mine commences 250 feet from the mouth of the same main tunnel as do Nos. 3 and 4 mines, but has not been worked since the strike, the water not being yet out of the mine, but will be started as soon as possible.

On my last inspection, in August, I found everything in good order and the mine free from gas, with 30,000 cubic feet of air a minute circulating for the use of 40 men and 3 horses.

No. 6 MINE.

This mine has also been idle for the last few months. My last inspection was made on July 20th, when I found everything in good order and the mine well ventilated by 22,500 cubic feet of air a minute, for the use of 34 men and 3 horses; safety lamps only are used. The mine is worked on pillar-and-stall system with extraction of pillars.

No. 8 MINE.

This level is in about $1\frac{1}{2}$ miles and is still being driven ahead. The seam is from 4 to 20 feet thick, and is worked on the pillar-and-stall system with extraction of pillars; the coal makes an excellent coke.

On my last inspection, on December 5th and 6th, I found a little gas above the timbers in Nos. 35 and 36 stalls, in the east level, and a little in No. 5 incline, but bratticing was put in and the gas cleared out; the remainder of the mine was clear of gas and well ventilated, some 12,600 cubic feet of air a minute circulating for 50 men and 6 horses in the main east level district, while in the main incline district 22,040 cubic feet was in circulation for 24 men and 1 horse, 38,500 cubic feet in the No. 2 incline district for 50 men and 5 horses, and 12,960 cubic feet in the west side of No. 3 incline district for 16 men and 1 horse. The total air at the fan shaft was 94,500 cubic feet; the fan, 6 feet by 14 feet diameter, making 170 revolutions a minute and producing 2 inches on the water gauge. The old workings receive 9,400 cubic feet of air a minute to keep them ventilated.

The general and special rules, a plan of the mine and a barometer are posted at the mouth of the tunnel for the guidance of the men employed.

No. 9. MINE.

The tunnel to this mine was driven from the main east level in No. 8 mine, through the strata, to No. 9 seam. No work has been done here since last April. On my last inspection, April 21st, I found everything in good order and the ventilation good, with 12,000 cubic feet of air in circulation for 5 men and 1 horse.

The following are the official returns of the Michel Colliery for the year ending December 31st, 1906:—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lbs.)	COAL.				COKE.			
	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	105,347	.....	.....	.....	59,395	.....	.....	.....
" export to U. S.	3,176	.....	.....	.....	36,819	.....	.....	.....
" " to other Countries.....	.....	.....	.....	.....	.....	.....	.....	.....
Total Sales.....	.....	.....	108,523	.....	.....	.....	.....	96,214
Used in making Coke	154,292	.....	.....	.....	.....	.....	.....	.....
" under Colliery Boilers, &c.....	10,682	.....	.....	.....	.....	.....	.....	.....
Total for Colliery Use.....	.....	.....	164,974	.....	.....	.....	.....	.....
Retail coal .....	.....	.....	.....	.....	.....	.....	.....	.....
Stocks on hand first of year.....	.....	.....	.....	.....	.....	.....	.....	.....
" last of year .....	.....	.....	.....	.....	.....	.....	.....	.....
Difference taken from stock during year.....	.....	.....	.....	.....	.....	.....	.....	.....
Output of Colliery for Year.....	.....	.....	273,497	.....	.....	.....	.....	96,214

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC., VANCOUVER ISLAND.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.
Supervision and Clerical Assistance ...	14	.....	9	.....	23	.....
Whites—Miners.....	150	.....	.....	.....	150	.....
Miners' helpers	101	.....	.....	.....	101	.....
Labourers	78	.....	172	.....	250	.....
Mechanics and skilled labour	55	.....	47	.....	102	.....
Boys	2	.....	.....	.....	2	.....
Japanese .....	.....	.....	.....	.....	.....	.....
Chinese.....	.....	.....	.....	.....	.....	.....
Indians .....	.....	.....	.....	.....	.....	.....
Totals.....	400	.....	228	.....	628	.....

Name of seams or pits—Nos. 3, 4, 5 and 8 working; No. 6 not working.

The Minister of Mines is hereby authorised to publish these returns.

ROBERT G. DRINNAN,
General Superintendent.

COAL CREEK COLLIERY.

Andrew Colville, Manager.

This colliery is situated on Coal creek, about five miles in an easterly direction from the town of Fernie, on the Crow's Nest Pass branch of the Canadian Pacific Railway, from which town the coal company has a standard gauge railway running up to the colliery. In this colliery the following mines are being operated :—On the north side of Coal creek, mines Nos. 1, 4, 5 and 9, and on the south side of the creek, No. 2 mine.

No. 1 MINE.

David Martin, Overman.

This mine has not been worked since September. On my last inspection, on August 9th, I found a little gas in No. 3 stall, off No. 2 north level, over the timbers; the remainder of the mine was clear of gas and the ventilation good, with 27,500 cubic feet of air passing a minute for the use of 65 men and 7 horses.

No. 2 MINE.

John McClimont, Overman.

The main tunnel has been driven for $1\frac{1}{4}$ miles in good coal; the coal is mined on the pillar-and-stall system, with removal of pillars. No blasting is done in the mine. On my last inspection, on December 13th and 14th, I found the mine in good order, with ventilation and timbering first-class. The old workings are all fenced off; there is a travelling road for the men separate from the haulage road; and man-holes are provided within proper distances.

In No. 2 district of the mine, 38,200 cubic feet of air is provided for the use of 84 men and 8 horses. In No. 3 district 66,500 cubic feet of air is travelling for 87 men and 10 horses. The total air circulating in the fan shaft is 160,000 cubic feet, leaving 55,200 cubic feet of air for leakage through doors, stoppings, etc., which serves to ventilate the old workings. The fan is 8 feet by 16 feet in diameter, and makes 100 revolutions a minute, producing a vacuum of $1\frac{1}{2}$ inches on the water gauge. In the No. 3 return-air-course the percentage of gas was one-quarter of one per cent., taken with a Pieler gas-testing lamp.

No. 4 MINE.

John Hunt, Overman.

This mine has not been worked since the strike, last September. On my last inspection, September 13th, I found the mine in good order, well ventilated and well timbered, with 29,400 cubic feet of air circulating for 11 men and 1 horse. Very little work has been done in this mine, and it is in only a short distance, but safety lamps only are used.

No. 5 MINE.

John Hunt, Overman.

The seam in this mine varies from 4 to 12 feet in thickness, and it is worked on the pillar-and-stall system. On my last inspection, on December 11th, I found a little gas above the timbers in No. 4 stall, but it was soon removed, while the remainder of the mine was free from gas and well timbered. The level is in 2,600 feet, and all the workings are to the rise. A travelling road is provided for the men, separate from the haulage road.

The main level district received 29,120 cubic feet of air a minute, for 60 men and 5 horses, while in the incline district 10,000 cubic feet of air is provided for 28 men and 3 horses. In the fan shaft a total volume of 48,000 cubic feet of air was passing each minute, which indicates a leakage of 8,800 cubic feet through doors and old workings. No powder is used in this mine, and safety lamps are exclusively employed.

No. 9 MINE.

David Martin, Overman.

The coal seam in this mine varies from 4 feet to 8 feet in thickness, and is worked on the "long-wall" system. On my last inspection, December 12th, I found everything in good order, the mine well ventilated, well timbered and cogged throughout. In the slope district I found 27,500 cubic feet of air for 70 men and 8 horses, which air is conveyed to the No. 1 mine fan through a rock drift. The size of this fan is 4 feet 8 inches by 14 feet diameter, and it makes 70 revolutions a minute. In the incline district 40,000 cubic feet of air was circulating for 70 men and 9 horses; the fan producing this is 8 feet by 16 feet in diameter, and it makes 40 revolutions a minute. The total air thus circulating was 75,600 cubic feet, leaving 8,100 cubic feet for leakage through doors, stoppings and the old workings.

RETURNS FROM COAL CREEK COLLIERY, FERNIE, EAST KOOTENAY DISTRICT.

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lbs.)	COAL.				COKE.			
	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	43,115				75,251			
" export to U. S.	211,736				16,561			
" " to other countries								
Total sales			254,851				91,832	
Used in making Coke	149,753							
Used under colliery boilers, etc.	22,189							
Total for colliery use			171,942					
Retailed locally								
Stocks on hand first of year								
" last of year					1,339			
Difference added to stock during year ..							1,339	
Output of colliery for year			426,793				93,171	

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.
Supervision and clerical assistance	21		10		31	
Whites—Miners	400				400	
Miners' helpers						
Labourers	113		243		356	
Mechanics and skilled labour	243		59		302	
Boys	22		6		28	
Japanese						
Chinese						
Indians and Hindus						
Totals	799		318		1,117	

Name of Seams or Pits—Nos. 2, 5 and 9 Mines working all year. Nos. 1 and 4 Mines working only part of year.

Description of seams, tunnels, levels, shafts, &c., and number of same—No. 6 Mine being developed. Tunnels just started at end of year.

Description and length of tramway, plant, &c.—Same as last year. Tramway to No. 6 Mine in course of construction.

The Minister of Mines is hereby authorised to publish these returns.

ROBERT G. DRINNAN,
General Superintendent.

CARBONADO COLLIERY.

This colliery is situated about four miles east of Morrissey, a station on the Canadian Pacific Railway, and also on a branch of the Great Northern Railway, from which town the coal company has built a standard gauge railway to the colliery. The colliery was shut down at the end of March, 1906, since when it has not been worked, and up to which time my reports have been sent to the Department.

The following are the official returns from this colliery for the three months of this year that it was in operation :—

	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada.....	2,331			
" export to United States.....	15,951			
" " other Countries.....				
Total sales.....		18,282		
Used in making Coke.....				
" under Colliery boilers.....	1,877			
Total for Colliery use.....		1,877		
Stock on hand first of year.....				
" last of year.....				
Difference taken from stock during year.....				
Output of Collieries for year 1905.....		20,159		

Colliery closed on April 1st, 1906. No mines working since that date.

The Minister of Mines is hereby authorised to publish these returns.

ROBERT G. DRINNAN,
General Superintendent.

ACCIDENTS IN BRITISH COLUMBIA COLLIERIES DURING 1906.

CAUSES OF ACCIDENT AND NATURE OF INJURY.	NAME OF COLLIERY.												TOTAL FOR 1906.				
	Nanai-mo.			Union.			Extension.			Crow's Nest.			Fatal.	Serious.	Slight.	Total.	
	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.					
Gas—Explosion of.....																	1
Fatal.....																	1
Serious.....																	
Slight.....								1								1	
Falls of Coal.....																	14
Fatal.....				3			1			1			5				
Serious.....		2			2			2						6			
Slight.....			1						1			1				3	
Falls of Rock.....																	22
Fatal.....	1				2			1			3		7				
Serious.....		2				3			1			2			8		
Slight.....			7													7	
Mine Cars.....																	28
Fatal.....	1									1			2				
Serious.....		3						4			6			13			
Slight.....			10						2			1			13		
Shot or powder.....																	2
Fatal.....																	
Serious.....		1												1			
Slight.....						1									1		
Ropes, Hoisting or Haulage.....																	3
Fatal.....																	
Serious.....		2												2			
Slight.....			1												1		
Post or Timber.....																	2
Fatal.....																	
Serious.....											1			1			
Slight.....			1												1		
Miscellaneous—Underground.....																	5
Fatal.....																	
Serious.....		1						1						2			
Slight.....			2			1									3		
Miscellaneous—Surface.....																	6
Fatal.....										1			1				
Serious.....								1			2			3			
Slight.....											2				2		
Total.....	2	11	22	5	5	2	2	9	4	6	11	4	15	36	32	83	

SUMMARY—TABLE SHEWING ACCIDENTS OCCURRING IN B. C. COLLIERIES IN TEN YEARS—1897 TO 1906.

For the year	1897.				1898.				1899.				1900.				1901.				1902.				1903.				1904.				1905.				1906.				Total for 10 years.							
	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.												
Output of coal—tons.	882,854				1,135,865				1,306,324				1,590,179				1,691,557				1,641,626				1,481,913				1,685,698				1,825,832				1,899,076				15,140,924							
No. persons employ'd	2,433				2,988				3,780				4,178				3,974				4,011				4,264				4,453				4,407				4,805				39,293							
Nature of Injury.																																																
Cause of Accident.																																																
Explosion (cause unknown).																	64				64				125				125				14				14				203				203			
Gas explosions	2	2	4	2	14	3	19	3	9	18	30	2	22	24	2	2	12	16	1	8	9	21	16	37	7	8	15	9	9	1	1	36	29	99	164													
Falls of coal	1	3	2	6	3	4	7	1	4	3	8	2	14	3	19	6	9	2	17	1	4	1	6	4	5	2	11	5	12	1	18	2	8	3	13	5	6	3	14	30	69	20	119					
" rock	2	7	2	11	1	5	3	9	3	5	4	12	6	15	3	24	6	8	4	18	7	6	2	15	8	8	4	20	4	7	1	12	4	6	1	11	7	8	7	22	48	75	31	154				
Mine cars	3	4	7	14	1	9	3	13	3	9	4	16	4	7	3	14	3	5	5	13	3	6	5	14	5	7	2	14	3	15	5	23	3	9	8	20	2	13	13	28	30	84	48	162				
" mules	1	1	2	4	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	3	3	6	12				
" timber	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6
Hoisting, ropes, &c ..	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6
Powder, &c., explo'n ..	3	1	4	8	2	1	3	6	1	3	3	7	4	6	10	1	1	1	3	1	1	1	3	5	6	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	3	19	16	38			
Shot	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12	3	3	6	12
Underground—Miscellaneous	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6	2	1	3	6
On surface—miscellaneous.	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8	2	2	4	8
Fire in Mine	19	19	38	76	19	19	38	76	19	19	38	76	19	19	38	76	19	19	38	76	19	19	38	76	19	19	38	76	19	19	38	76	19	19	38	76	19	19	38	76	19	19	38	76				
	6	21	6	33	7	39	10	56	11	29	30	70	17	43	38	98	102	34	31	167	139	21	18	178	42	33	26	101	37	41	16	94	12	30	26	68	15	36	32	83	388	327	233	948				

 DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1906.

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VANCOUVER ISLAND COLLIERIES.

REPORTED BY ARCHIBALD DICK, INSPECTOR.

No.	Colliery.	Date.	Name.	Occupation.	Details.
1	Nanaimo	Jan. 6	Andrew Bennett.	Machine helper	While helping to operate coal-cutting machine he lost his balance and fell against cutter wheel, which cut his leg.
2	Nanaimo	" 8	Russell Bennett.	Trip runner . . .	Having a loaded trip of cars hauled off siding, was caught in switch by foot, foot being run over by loaded car.
3	Extension	" 10	Wm. Kipling . . .	Miner	Piece of rock fell from the side of his stall, striking him on the head and killing him. The stall was well timbered.
4	Nanaimo	" 15	T. G. Hamilton .	Rope runner . .	Riding on front car coming up Protection Slope was struck across ribs by being caught between car and timbers; ribs broken and hips bruised.
5	Nanaimo	" 15	Jas. Gear	Miner	Was wedging down coal, a mass fell unexpectedly, falling on his foot and breaking his ankle.
6	Union	" 31	Chow Yow	Miner's helper.	Helping Wm. Kilpatrick; pulling down a piece of coal, it fell unexpectedly on to his leg, breaking it above the ankle.
7	Nanaimo	Feb. 1	Chas. Swanson . .	Miner	Taking down piece of rock, which, when it fell, rolled over and struck him on the leg and foot, bruising foot.
8	Union	" 3	Richard Coe, Sr.	Miner	He was undermining when a piece of coal fell on him breaking three ribs and badly bruising chest.
9	Nanaimo	" 8	Hemle Vansshoff.	Brusher	He was removing a prop, preparing to set the break-off timbers for a shot, when a piece of rock fell on him from a slip, breaking his leg.
10	Extension	" 16	Alex. Strang . . .	Miner	A shot did not bring down all the coal that was expected and whilst working at the mass left, a piece of coal fell on him, breaking his leg.
11	Nanaimo	" 19	Wm. McLeod . . .	Mule driver . . .	Was taking mine car out with a mule, when car jumped the track, jamming McLeod against a prop, bruising his arm.
12	Nanaimo	" 27	Hy. Tammer . . .	Minecar pusher	Taking a loaded car out of a pillar, he got in front of it to ease it down to a block set to receive it. In easing the car down he fell and was jammed between car and block, his pelvis being broken and other injuries being sustained. A rope was at hand for the purpose of lowering cars. He died on 3rd March, at Nanaimo Hospital.

ACCIDENTS IN V. I. COLLIERIES DURING 1906.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
13	Union	Feb. 28	Fong Yoon Jun..	Miner	He was mining under a piece of top coal, which fell and killed him instantly. The coal was known to be loose and should have been spragged up, or pulled down.
14	Nanaimo	Mar. 27	L. McDonald....	Surveyor	Caught between loaded car and prop and badly bruised about thighs.
15	Nanaimo	" 29	Walter Calverly.	Mule driver...	Coupling cars at bottom of shaft, when mule started and two of his fingers were caught and bruised in coupling.
16	Union	April 7	Wm. Potter.....	Miner	He had fired a shot, and on returning to see the work it had done a rock fell on his leg, breaking it.
17	Nanaimo	" 14	Wm. Forest.....	Machine helper	He was scraping mining dirt from machine when a piece of coal fell from cleavage crushing his foot.
18	Union	May 11	Chin Gat	Miner	Small piece of top-rock fell on his head, killing him; place was well timbered.
19	Extension.....	" 15	David Wright...	Mule driver...	Arm caught between two mine cars and broken.
20	Extension.....	" 19	Jno. Nunnery...	Miner	Fired a shot in middle bench, loosening coal. While attempting to load a car in front of this loosened bench the coal fell over and killed him.
21	Nanaimo	" 22	Peter Woodburn.	Miner	Piece of rock bruised hand, while loading mine car.
22	Nanaimo	" 28	Jas. Langdon ...	Mule driver...	Riding on a car train coming out of mine, cars ran into some empties on siding, jamming him and breaking two ribs.
23	Nanaimo	" 28	Alf. Wardle.....	Mule driver...	Bruised jaw from kick by a mule.
24	Union	June 1	Albert Brambery	Timberman ...	Fall of rock, while timbering, caused one broken rib and bruises.
25	Union	" 8	Geo. Reid.....	Miner	Standing near his place, a piece of rock fell and bruised his side; ribs also broken.
26	Nanaimo	" 11	Jno. Drake	Mule driver...	Piece of rock fell on him, bruising his back.
27	Nanaimo	" 20	Henry Cooper ...	Winch driver .	Winch he worked usually brought out two cars. Three were on this trip, and he, not knowing this, caught hold of second car on a siding, the third car jamming him against a prop and bruising his chest.
28	Nanaimo	" 22	Alex. Matheson..	Coggman	While adjusting a final stick of timber in a cogg, a piece of rock fell and bruised his back and head.
29	Union	" 25	Poy	Miner	A spark from his lamp, while charging a shot, ignited some loose powder; burned about face and hands.
30	Nanaimo	" 27	Thomas Fail	Loader	Piece of rock fell from a slip and feather edge on him, bruising thigh; also scalp wound.

ACCIDENTS IN V. I. COLLIERIES DURING 1906.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
31	Nanaimo	July 13	Wm. Williamson	Rope rider . . .	Coming up slope as usual, rope jerked and threw him on to car, where he was jammed between car and roof. Bruised about hips.
32	Nanaimo	" 17	Fred. Bramley . .	Miner	His partner was pulling down some loose coal when it fell suddenly, struck a prop, which gave way and struck Bramley, rendering him unconscious.
33	Nanaimo	" 20	Thos. LeMuir . . .	Motor driver . .	Endless rope was being used to lower cars, when grip gave way and LeMuir was crushed between cars, his collar-bone being fractured.
34	Extension	" 24	Wm. Johnston . .	Miner's helper.	Attempted to board a trip of cars drawn by motor; a drill he was carrying struck the trolley wire, and he was knocked under cars. Lost finger and bruised.
35	Extension	" 30	Harry Hughes . .	Miner	Had fired a shot and was disengaging top coal, when it fell, breaking an arm, a leg, and two ribs.
36	Nanaimo	Aug. 16	Jas. Tunstall . . .	Shot lighter . . .	Although not his place, he was digging down coal, when a large piece of rock fell on him, causing instant death.
37	Extension	" 17	T. Rastus	Miner	Getting coal down, it fell and bruised his leg.
38	Extension	" 17	Tom Noye	Pusher	Pushing cars over an incline, they ran away. He was squeezed and bruised by cars.
39	Union	" 27	Ot. Okura	Miner	Fatally injured by fall of top coal, leg and foot broken; died in Cumberland Hospital 12 hours after.
40	Nanaimo	Sept. 1	Peter Harwood . .	Timberman . . .	Coming down from face to roadway he leaned his weight against a prop; this gave way and let down a mass of rock, which broke his leg and arm.
41	Nanaimo	" 6	Geo. Waring	Rope rider	Caught between roof and car, and bruised about ribs.
42	Nanaimo	" 7	Wm. Wilkinson.	Labourer	Struck by a moving car on the slope, and bruised.
43	Nanaimo	" 27	Wm. Stolsen- [burgh	Mule driver . . .	Fell on his own arm, breaking it.
44	Union	" 26	B. Pasella	Miner	Some powder was ignited while he was loading a hole; was burnt about face and hands.
45	Nanaimo	Oct. 22	Fred. Killeen . . .	Mule driver . . .	Riding up incline on empty cars, he got off and was struck by descending loaded cars, being bruised.
46	Union	" 24	Mayeda	Miner	A shot removed some posts; while re-setting them rock fell on him. Lived a short time.

ACCIDENTS IN V. I. COLLIERIES DURING 1906.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
47	Extension.....	Nov. 3	Alex. Young ...	Pusher	Was attending balance car, and called on his partner to detach loaded car too soon, the balance car running away, giving him a scalp wound.
48	Nanaimo	" 3	Wm. Wells	Miner	Car was being lowered by means of a rope round a prop. Prop came out, bruising him on the leg.
49	Nanaimo	" 2	Jas. McMeekin..	Miner	While detaching top coal, some rock fell and bruised his shoulder and head.
50	Nanaimo	" 6	F. Birda Sano	Brusher	Rock falling from side injured his ankle.
51	Nanaimo	" 6	Chas. Rowbottom	Switchboy....	Was switching cars on slope; cars got away and bruised him about hips.
52	Extension.....	" 8	J. Doumont....	Miner	Had fired a shot, was loading car, when rock fell, breaking his leg.
53	Extension.....	" 13	Mat. Martello...	Runner	Fell on car track, broke small bone in leg.
54	Nanaimo	" 7	Hy. Cooper	Gripper.....	Had loosened grip at top of incline and was removing sprag, when grip caught again, and pulled car over his leg, breaking it.
55	Extension.....	Dec. 7	Albert Matson ..	Miner	He was standing on the roadside of his place, when a passing car jumped the track and pinned his leg against the wall, breaking it.
56	Extension.....	" 7	Nicholas Keserick	Mule driver...	Stepped off moving car and was run down, small bone in leg being broken.
57	Extension.....	" 9	Yeet.	Labourer	While working at a pile of timber, he slipped and fell over pithead. Broke thigh, forearm and two ribs.
58	Union	" 14	Chung Lung Joy	Miner	Fatally injured by a fall of top coal and died shortly after arriving at hospital.
59	Nanaimo	" 20	Jas. Lefley. ...	Mule driver...	Sitting on loaded, moving car, he was caught between car and timbers and bruised on body.
60	Extension....	" 22	Jas. Sharp	Overman	While giving instructions to a miner, he kindled a little gas, which burned his hand.
61	Nanaimo	" 21	A. Stone.....	Driver.....	Engaged in switching a car, he was caught by two other cars and bruised about the thighs.
62	Nanaimo	" 30	Mike Crook.....	Brusher	He was putting a cap on a fuse when the cap exploded, blowing off the first joint from a finger and thumb.

CROW'S NEST COLLIERIES.

REPORTED BY THOMAS MORGAN, INSPECTOR.

No.	Colliery.	Date.	Name.	Occupation.	Details.
1	Carbonado	Jan. 6	J. Tomashy.....	Miner	Ribs fractured on both sides and shoulder-bone broken. Caught between cars and coal side.
2	Coal Creek	Feb. 23	Michel Saint	Miner	Leg broken by rock falling from the face.
3	Coal Creek	" 24	C. Webber.....	Miner	Leg broken by a moving car he attempted to stop.
4	Coal Creek	" 26	L. Leoski.....	Driver.....	Collar-bone broken. He was riding on trip, when his horse knocked out some timber, which, with some rock, fell on him.
5	Coal Creek	Mar. 3	F. Rutherford...	Dumpman	Whilst looking to see if apron feeder was all right, his hand being on the rail, a car was uncoupled and ran over his hand.
6	Michel	" 27	J. Croft	Back-hand	Killed in No. 8 Mine; he was breaking coal in the chute when the roof caved in and buried him.
7	Coal Creek	April 13	F. Stamp	Miner	While preparing for a set of timber, roof rock fell on him. Leg broken.
8	Coal Creek	June 6	H. Snow.....	Dumpman	Fell on track when arm caught in gear of dump motor. Arm had to be amputated.
9	Coal Creek	" 8	H. Julian.....	Miner	He was entering a place worked by two other men, when a piece of rock fell on him, crushing him so that he died shortly after arrival at hospital.
10	Coal Creek	July 9	Jno. Burda	Miner	Was driving, when he fell off car, which ran on to him. Abdomen bruised and wrist sprained.
11	Coal Creek	" 26	Adam Watson...	Fire boss	He had fired a shot and went to look at the place, when the loosened coal fell over, bruising him about the hips.
12	Michel	Aug. 4	Jos. Bargo.....	Miner	Was mining, when a mass of coal fell from the face, killing him.
13	Coal Creek	" 13	Jno. Smolik	Driver.....	While riding rope, was squeezed between top of car and bridge stick; collar-bone broken.
14	Coal Creek	" 14	Wm. Palmer	Miner	Stepped between cars and leg was bruised; small bone broken.
15	Coal Creek	" 14	Atto Nardone...	Box-car loader.	He was dropping in a box car and allowed cars to collide too hard. Fell off and broke left thigh.
16	Coal Creek	Dec. 5	Ido Fiorese	Box-car loader.	Caught under a car in yard and fatally injured. Died December 6th.
17	Coal Creek	" 5	Jno. E. Smith...	Miner	Horse fell on rail; bow of shaft struck Smith on leg and broke it between ankle and knee.

CROW'S NEST COLLIERIES.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
18	Coal Creek	Dec. 6	Mike Augen	Top hand	While dismantling an old tippie, he was struck with a piece of scantling and injured about head.
19	Michel	" 13	Geo. Skuse . . . . .	.....	Had his arm broken while winding in a cable after firing a shot. A prop fell out and struck his arm in No. 8 Mine, Michel.
20	Coal Creek	" 29	F. Megget	Miner	Working in stall of No. 9 Mine; killed by fall of rock.
21	Michel	" 24	Rich'd. Eccleston	Motorboy	Run over by motor in No. 8 Mine and killed.

METALLIFEROUS MINES SHIPPING IN 1906.

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FORT STEELE MINING DIVISION.

Mine or Group.	Locality.	Owner or Agent.	Address.	Character of Ore.
North Star.....	Kimberley.....	North Star Mg. Co.....	Kimberley, B. C.....	Silver, lead.
St. Eugene.....	Moyie.....	Con. M. & S. Co. of Canada, Ltd.	Moyie.....	"
Sullivan.....	Kimberley.....	Sullivan Group Mg. Co.....	Spokane, Wash., U.S.	"

GOLDEN AND WINDERMERE MINING DIVISIONS.

B. C. & Tilbury.....	North Fork Toby Creek.....	Chas. E. Fitzsimmons.....	Athalmer.....	Silver, lead.
Black Diamond.....	Toby Creek.....	J. Lake.....	".....	"
Delphine.....	".....	R. R. Bruce.....	Willmer.....	"
Nettie M.....	".....	G. A. Starke.....	".....	Silver, copper, lead, gold.
Paradise.....	".....	R. R. Bruce.....	".....	Silver, lead.
Ptarmigan.....	McDonald Creek.....	Ptarmigan Mines of the Selkirks	".....	Silver, copper, gold.
Tecumseh.....	".....	Wm. Haupt..... (Co., Ltd.)	".....	Silver, lead.

NELSON MINING DIVISION.

Alice.....	Goat Mountain.....	Alice Broughton Mg. Co., Ltd.....	Creston.....	Silver, lead.
Arlington (Erie).....	Erie.....	Hastings (B. C.) Explor. Sy., Ltd.	Nelson.....	Gold, silver, lead.
Dandy and Ollie.....	Toad Mountain.....	Dandy and Ollie Con. Mines, Ltd.	".....	Copper, silver, lead.
Double Standard and Emerald (Hunter V.).....	Porcupine Creek.....	B. C. Standard Mg. Co.....	".....	Silver, gold.
Eureka.....	".....	John Waldbeser.....	Salmo.....	Lead, silver.
Fern.....	Eagle Creek.....	Eureka Copper Mines, Ltd.	Nelson.....	Copper, gold, silver.
Greenhorn.....	Hall Creek.....	The Fern Gold M. & M. Co. Ltd.	".....	Gold.
Keystone.....	Nelson.....	Unknown.....	".....	"
Kootenay Belle.....	Mineral Mountain.....	Frank Finney (lessee).....	Erie.....	Gold, silver, lead.
La Plata Mine.....	Salmo.....	Bell Bros.....	Salmo.....	Gold, silver.
May and Jennie.....	Kokanee Creek.....	La Plata Mines, Ltd.....	Kokanee.....	Silver, lead.
Mother Lode (Salmo).....	Forty-nine Creek.....	Reliance Gold M. and M. Co.....	Nelson.....	Gold, silver.
Ore Hill.....	Sheep Creek.....	Thos. Bennett.....	".....	"
Poorman.....	".....	G. G. Eitel.....	Minneapolis, Minn.....	Gold, silver, lead.
Queen.....	Granite.....	Duncan United Mining Co.....	Nelson.....	Gold, silver, copper.
Sarah B.....	Salmo.....	Wm. Waldie.....	Salmo.....	Gold, silver.
Second Relief.....	Nelson.....	K. G. McLeod.....	Seattle, Wash.....	Silver, gold.
Selina.....	Erie.....	Second Relief Mining Co.....	Nelson.....	Gold, silver.
Silver King.....	Anderson Creek.....	W. H. Moore.....	".....	Silver, lead, gold.
Summit.....	Toad Mountain.....	Hall Mining & Smelting Co., Ltd.	".....	Copper, silver.
Ymir.....	Salmo.....	Collins & Miller.....	Salmo.....	Gold, lead, silver.
Yosemite.....	Ymir.....	Ymir Gold Mines, Ltd.....	Ymir.....	Gold, silver, lead.
	Sheep Creek.....	Thos. Bennett, Kootenay Belle Co	Nelson.....	Gold, silver.

AINSWORTH MINING DIVISION.

Baltimore.....	North Fk, Woodbury Ck.....	Wm. English.....	Kaslo.....	Silver, lead.
Black Diamond.....	Ainsworth.....	H. J. Wright.....	Ainsworth.....	"
Blue Bell.....	Kootenay Lake.....	Canadian Metal Co.....	Nelson.....	Silver, lead, zinc.
Bismark.....	South Fork Kaslo Creek.....	N. F. McKay, Hanson & Gerard.	Kaslo.....	Silver, lead.
Charleston.....	Whitewater Creek.....	H. J. Wright.....	Whitewater.....	Silver, zinc.
Cork.....	South Fork Kaslo Creek.....	Silver Star Mining Co.....	Kaslo.....	Silver, lead.
Empress.....	Bear Lake.....	A. C. Van Moerkerke.....	Whitewater.....	Silver.
Krao.....	Ainsworth.....	Krao Silver-Lead Mining Co.....	Ainsworth.....	Silver, lead, zinc.
Little Donald.....	".....	H. J. Wright.....	".....	Silver, lead.
No. One.....	".....	H. Giegerich.....	Kaslo.....	Silver.
Silver Glance.....	Bear Lake.....	J. W. Power.....	".....	"
Spokane Trinket.....	Ainsworth.....	Pacific Bullion Mining Co.....	Nelson.....	Silver, lead.
United.....	".....	Canadian Metal Co.....	".....	Silver, lead, zinc.
Whitewater Deep.....	Whitewater.....	Erl Syndicate.....	".....	Silver, lead, gold.
Whitewater Mines.....	".....	Whitewater Mines, Ltd.....	".....	Silver, lead, gold, zinc.

SLOCAN MINING DIVISION.

American Boy.....	Sandon.....	American Boy M. & M. Co.....	Spokane, Wash. U.S.	Silver, lead.
Arlington.....	Springer Creek.....	Arlington Mines, Ltd.....	Slocan.....	"
Black Prince.....	Slocan City.....	Pioneer Mining Co., Ltd.....	Nelson.....	"
Bosun.....	New Denver.....	Monitor & Ajax Frac., Ltd.....	New Denver.....	" zinc.

SLOCAN MINING DIVISION.—*Concluded.*

Mine or Group.	Locality.	Owner or Agent.	Address.	Character of Ore.
Buffalo	Four Mile	Buffalo Mining Co.	Silverton	Silver, lead.
California and Clipper	New Denver	Cal. & Clipper Silverlead M. Co.	Nelson	"
Central	Surprise Basin	G. H. Aylard	New Denver	"
Colonial	Slocan			Lead, silver.
Corinth	"			Silver, lead.
Emily Edith	Silverton	Canadian Metal Co.	Nelson	"
Graphic and Rosebud	Springer Creek	Graphic & Rosebud Mining Co.	Slocan	Silver, lead.
Hampton	"	Hampton Mines Co.	Silverton	Silver.
Hartney Group	New Denver	Hartney Group Mines Co.	New Denver	Silver, lead.
Happy Medium	Twelve-Mile Creek	Chas. Dempster	Rossland, Box 487	Silver, gold, lead.
Hewitt	Four-Mile Creek	M. S. Davys	Nelson	Silver, lead.
Highland Light	Ten-Mile Creek	P. Swan	Slocan	Silver.
Hex	"			Silver, lead.
Idaho-Alamo	Alamo	Idaho-Alamo Cons. Mines, Ltd.	Three Forks	" copper.
Jo-Jo	Three Forks	Thos. Trenery	"	"
Kimberley	Springer Creek	Chas. Dempster	Rossland	Gold, silver.
Last Chance	Sandon	L. Pratt	Sandon	Silver, lead.
Lone Bachelor	Three Forks	Lowe, Cameron & Sloane	Three Forks	"
Lorna Doone	Silverton	M. S. Davys	Nelson	"
Lucky Jim	Bear Lake (Slocan)	G. W. Hughes	Kaslo	Zinc, lead, silver.
Majestic	Payne Mountain	C. A. Bigney (Lessee)	Sandon	Silver, lead.
McAllister	N. Pk. Carpenter Creek	McAllister Group Co.	"	Silver.
Mercury	Sandon	Herbert T. Twigg	New Denver	Silver, lead.
Meteor	Springer Creek	Meteor M. Co., G. H. Aylard	"	Silver, gold.
Midnight Fr	Twelve-Mile Creek			Silver.
Millie Mack	Cariboo Creek	H. E. Forster	Wilmer	Silver, lead.
Molly Hughes	New Denver	Herman Clever	New Denver	Gold, silver.
Monitor and Ajax	Three Forks	Maurice Gintzburger	Three Forks	Silver, lead.
Mountain Boomer	Silverton	H. Brandon	Silverton	"
Mountain Con	Sandon	Howard Thompson	Daysland, Alta	"
Neepawa	Ten-Mile (Slocan)	E. Shannon	New Denver	"
Noonday	Silverton	H. Fisher, B. of Montreal	"	"
Ontario and Slocan	"	Ontario and Slocan Mines, Ltd.	Silverton	"
Ottawa	Springer Creek	R. J. McPhee	Slocan	"
Payne	Sandon	Payne Cons. Mining Co., Ltd.	Sandon	" zinc.
Queen Dominion	Howson Creek	Queen Dominion Mining Co., Ltd.	Kaslo	"
Rambler-Cariboo	McGuigan	Rambler-Cariboo Mines, Ltd.	"	"
Reco	Sandon	Reco Mining & Milling Co., Ltd.	Sandon	"
Red Fox	Surprise Basin	G. H. Aylard	New Denver	"
Reed and Tenderfoot	Silverton	M. S. Davys	Nelson	"
R. E. Lee	Sandon	R. E. Lee Mining Co.	New Denver	"
Ruby Silver	McGuigan	Nick Nickovitch	Sandon	"
Ruth	Sandon	Ruth Mines, Ltd.	Kaslo	" zinc.
Standard	Silverton	Standard Mining Co.	New Denver	"
Silver Bell	Alamo	Harry Lowe	Three Forks	"
Slocan Prince	Springer Creek		Slocan	"
Sovereign	Slocan	Slocan-Sovereign Mines, Ltd.	Sandon	"
Sunset	Cody	G. W. Hughes	Kaslo	"
Sunshine	Sandon	Sunshine Mining Co.	Sandon	"
Swansea	Slocan		"	"
Tamarack	Springer Creek	Geo. Michel	Slocan	"
Vancouver	Silverton	Vancouver Group Mining Co., Ltd.	Nelson	"
Wakefield	Four-Mile Creek	M. S. Davys	"	"
Wonderful	Sandon		"	"

LARDEAU MINING DIVISION.

Eva	Incomapleux Creek	Eva Gold Mines, Ltd.	Camborne	Gold, silver.
Mammoth	"	Edward Baillie Syndicate, Ltd.	Nelson	Silver, lead, gold, zinc.

TROUT LAKE MINING DIVISION.

Broadview	Trout Lake	Broadview Syndicate	Ferguson	Silver, lead, gold, copper.
Silver Cup	Ferguson	Ferguson Mines, Ltd.	Ferguson	Silver, lead, gold.
Lucky Boy	Trout Lake	Jas. McGlone	Phila., Penn.	Silver, lead.

TRAIL CREEK MINING DIVISION.

Centre Star & War	Rossland	Con. M. & S. Co. of Canada, Ltd.	Rossland	Gold, copper, silver.
Crown Point [Eagle	"	" " "	"	" "
Iron Mask	"	" " "	"	" "
Jumbo	"	M. R. Galusha	Spokane, Wash., U.S.	Gold.
LeRoi Mining Co.	"	W. S. Rugh (Acct.)	Rossland	Gold, copper, silver.
LeRoi No. 2, Ltd.	"	Paul A. Couldrey (Mgr.)	"	Gold, silver, copper.
White Bear	"	Con. White Bear M. Co., Ltd.	"	Copper, gold, silver.
O. K.	"		"	Gold, copper, silver.
Mabel	"		"	" "

GREENWOOD MINING DIVISION.

Mine or Group.	Locality.	Owner or Agent.	Address.	Character of Ore.
Boundary Elkhorn	Providence Camp	Boundary-Elkhorn M. Co., Ltd.	Greenwood	Silver, gold, lead.
Carmi	West Fork Kettle River	A. M. Whiteside	"	Gold, silver.
Duncan & Bounty Fr.	Beaverdell	Wallace Mountain Mining Co.	"	Silver, lead.
Dom Pedro	Greenwood	"	"	Silver, gold.
Emma	Summit Camp	B. O. Copper Co., Ltd.	"	Copper, gold, silver.
Oro Denoro	"	"	"	"
Mouther Lode	Deadwood Camp	"	"	"
B. O.	Summit Camp	"	"	Copper, silver, gold.
Helen & Barbara	Greenwood	Alex. Miller	"	Gold, silver.
Mavis	Deadwood Camp	E. T. Wickwire	"	"
Preston	"	Preston Mining Co.	Chicago, Ill., U. S.	Silver, gold, lead.
Providence	Greenwood	Providence Mining Co., Ltd.	Greenwood	"
Prince Henry	Skylark Camp	Prince Henry Mining Co.	"	"
Rambler	West Fork Kettle River	W. J. Nolan (Dev. Co. Ltd.)	"	Silver, lead, gold.
Sally	Beaverdell	Vancouver & Boundary G. M. &	"	Silver, lead.
Skylark	Skylark Camp	Skylark Dev. Co. Ltd., N. P. L.	Phoenix	Silver, gold, lead.
Snowshoe	Phoenix	Con. M. & S. Co. of Canada, Ltd.	"	Copper, gold, silver.
Strathmore	Greenwood	Alex. Miller	Greenwood	Silver, gold, lead.

GRAND FORKS MINING DIVISION.

Brooklyn	Phoenix	Dominion Copper Co., Ltd.	Phoenix	Copper, silver, gold.
Idaho	"	"	"	" " "
Mountain Rose	Summit Camp	"	"	" " "
Rawhide	Phoenix	"	"	Copper, gold, silver.
Stemwinder	"	"	"	" " "
Sunset	"	"	"	" " "
Gold Drop	Wellington Camp	Granby Cons. M. S. & P. Co., Ltd.	"	" " "

OSOYOOS MINING DIVISION.

Nickel Plate	Hedley	Yale Mining Co.	Hedley	Gold.
Sunnyside	"	"	"	"

SIMILKAMEEN AND VERNON MINING DIVISIONS.

British Empire	Vernon	British Empire Gold Mining Co.	Vernon	Gold.
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YALE AND KAMLOOPS MINING DIVISIONS.

Iron Mask	Kamloops	J. Argall	Kamloops	Copper, gold, silver.
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LILLOOET MINING DIVISION.

Lorne	Cadwallader Creek	Daniel Hurley	Lillooet	Gold.
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NANAIMO, ALBERNI, NEW WESTMINSTER AND VICTORIA MINING DIVISIONS.

<i>Alberni—</i>				
Dells	Great Central Lake	Drinkwater & Engeviok	Alberni	Gold.
Southern Cross	Uchucklesat	J. D. Conway	Ladysmith	Copper, silver.
<i>Nanaimo—</i>				
Copper Cliff	Valdes Island	C. W. Carter	Heriot Bay	"
Cornell	Van Anda	Cornell Operating Co.	Van Anda	Copper, gold, silver.
Empress, etc	Gribbel Island	Northern Exploration Co.	Seattle, Wash, U. S.	" " "
Marble Bay	Texada Island	Tacoma Steel Co.	Tacoma, Wash, U. S.	" " "
<i>Victoria—</i>				
Tyee	Duncan	Tyee Copper Co.	Duncan	" " "
<i>New Westminster—</i>				
Britannia	Howe Sound	Britannia Copper Syndicate, Ltd.	Britannia Beach	" " "

SKEENA MINING DIVISION.

Outsiders	Portland Canal	Brown Alaska Co.	Hadley, Alaska	Copper.
Ikeda Bay Mines	Queen Charlotte Islands	Awaya, Ikeda & Co., Ltd.	Vancouver	Copper, gold, silver.

LIST OF CROWN-GRANTED MINERAL CLAIMS.

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CROWN GRANTS ISSUED IN 1906.

CASSIAR.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Bella Coola Chief	Skeena	Oliver Arneson, Oliver T. Kellog and Torger Olson	177, R3	51.43	Aug. 2
Queen	"	"	176, R3	51.85	" "
Red Deer	"	"	178	45.45	" "
Sulphur	"	Hagen B. Christenson	179	51.45	" "

EAST KOOTENAY.

Aurora	Fort Steele	Irwin B. Sanborn, O. J. Johnson and Thomas Rader	7017	46.40	Nov. 27
Black Bear	"	Charles Estmere	4844	48.59	Dec. 12
Bruce	"	Joseph H. Wright	2079	32.25	Aug. 17
Copper Cliff	"	Calvin P. Coon and Joseph H. Wright	6389	44.17	" "
Crescent	"	Frank Williams, Gus Kallman and Walter Van Arsdale	6855	24.36	Sep. 27
Durango	"	Irwin B. Sanborn, Ole J. Johnson and Thos. Rader	7016	51.65	Nov. 23
Etna	"	"	7015	38.71	Nov. 27
Evangeline	"	The Selkirk Copper Mines, Ltd., Non-personal Liability	7315	40.24	Mar. 6
Faller	"	"	7314	39.54	" "
Flying Cloud	"	John C. Drewry and Joseph Trainer	6578	42.95	June 6
Galore	"	Walter C. Burchette, Edwin C. Smith, Robert K. L. T. Galbraith, Judson B. Langley, William J. Langley, Andrew J. Devlin and Charles C. Farrell	4832	43.18	Dec. 4
Horseshoe	"	Irwin B. Sanborn, Ole J. Johnson and Thos. Rader	7022	49.54	Nov. 27
Mabel	"	Charles Estmere	4845	47.58	Dec. 21
Magnet	"	Wm. A. McL. Meacham and Wm. Carlin	7213	51.65	July 30
Mountain Daisy	"	Alex. Polson, Alex. C. Robertson, Willis E. Johnson, William K. Williams and John Y. Costello	6580	51.65	Dec. 31
North Star	"	Joseph H. Wright	6390	45.74	Aug. 17
Notre Dame	"	Neil McLeod Curran	2893	45.61	Mar. 6
Portland	"	Lucinda Ellen Sanborn, Ole J. Johnson and Thomas Rader	7205	45.11	Nov. 27
Standard Fractional	"	Joseph C. Hooker	6391	49.00	Aug. 8
Victoria	"	Calvin P. Coon and Joseph H. Wright	2080	51.07	Aug. 17
Viking	"	Frank Williams, Gus Kallman and Walter Van Arsdale	6854	42.71	Sep. 27
Shamrock	Windermere	Francis C. Gamble, Ritchie S. Gallop and Ada F. Scovil	4344	47.26	Mar. 20

WEST KOOTENAY.

Agness	Nelson	William Connolly and Edward Walshe	6060	25.50	Sep. 28
Bald Mountain	"	John C. McPherson	7233	45.30	Dec. 21
Climax	"	Walter T. Shatford and Beckford A. Shatford	7127	51.65	Oct. 4
Delaware No. 2	"	William N. Rolfe and Chas. P. Hill	7054	51.10	" 4
Dundee	"	Dundee G. M. & M. C.	7241	33.59	" 5
Dundee Fractional	"	Dundee G. M. & M. Co.	7242	6.00	" 5
Montana	"	John C. McPherson	7230	49.10	Dec. 21
Montana Fractional	"	John C. McPherson	7231	6.30	" 31
M. S.	"	Dundee Gold Mining & Milling Co.	7243	10.80	Oct. 8
Ohio	"	Wm. N. Rolfe and Chas. P. Hill	7056	44.20	" 4
Ormonde	"	Thomas Wall and Harry F. Baer	7239	47.70	Dec. 21
Polar	"	Walter T. Shatford and Beckford A. Shatford	7128	46.59	Oct. 4
Polar Star	"	Walter T. Shatford and Beckford A. Shatford	7129	51.65	" 4
Promise	"	John Love and Alex. McDonald	5081	24.07	Nov. 22
Rainbow	"	John Love and Alex. McDonald	5080	43.07	" 22
Umpire	"	Thomas Wall and Henry F. Baer	7240	47.74	Dec. 21
Virginia	"	William N. Rolfe and Charles P. Hill	7055	26.70	Oct. 4
No. 1 Fractional	Trail Creek	Le Roi No. 2, Ltd.	2723	0.22	July 26
Blizzard	Ainsworth	Alexander Dodds	7255	51.33	Oct. 5
Burgess King	"	Wm. Lee McLaren and Peter McLaren	6496	49.72	March 6
Butte	"	Argenta Mines Co.	1038	51.65	May 28
Clinton	"	Argenta Mines Co.	1062	33.26	" 23
Deer Lodge	"	Argenta Mines Co.	1036	41.52	" 28
Edna No. 2	"	James Madison Miller	5698	51.61	Sep. 29
Gooch Fractional	"	Argenta Mines Co.	5909	24.78	May 23
Highhorn	"	Argenta Mines Co.	1042	48.70	" 28
Kaslo	"	Argenta Mines Co.	1034	26.08	" 28

WEST KOOTENAY.—Continued.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Kaslo Fractional	Ainsworth	Argenta Mines Co	1040	1.93	May 28
Lealie	"	Argenta Mines Co	8833	24.48	" 28
Mabel Nora	"	Argenta Mines Co	1033	37.66	" 28
Manhattan	"	John J. Fleuton	4540	46.80	Oct. 12
Matilda P.	"	Argenta Mines Co	1035	51.65	May 23
Mayflower	"	Argenta Mines Co	1037	46.90	" 28
Pond	"	Argenta Mines Co	3834	51.10	" 28
Scranton	"	Thomas Doyle, Neil F. Mackay, Charles W. McAnn and John Henry	7452	42.76	Sept. 29
Silver King	"	Argenta Mines Co	1031	28.90	May 28
Wood	"	Argenta Mines Co	8831	30.98	" 28
Amazon	Slocan	Alex. McKinley, Thos. Jenkins, Robt. Graham, Jas. Galloway	4513	41.03	Mar. 6
Anacortes Fractional	"	James McNaught	6514	29.20	May 30
Anticline No. 3	"	Kenneth John Livingstone Ross	4446	45.62	" 1
Anty Lalla	"	Arlington Mines, Ltd., Non-personal Liability	2368	51.15	Nov. 80
Baldwin	"	Alex. McKinley, Thos. Jenkins, Robt. Graham, Jas. Galloway	4512	21.46	Mar. 6
Belladonna	"	Byron N. White Company	6913	35.80	May 1
Bosphorus	"	The Dardanelles & Okanagan Mining Co., Ltd	3167	33.85	Aug. 8
Cape Fractional	"	Alexander McKinley, Thos. Jenkins, Robt. Graham, Jas. Galloway	2101	22.10	Mar. 6
Consolidated Virginia	"	Oscar V. White and John Peter Wilson	3992	44.14	Dec. 6
Elk	"	Oscar V. White, John Peter Wilson	3993	36.00	" 6
Empress	"	Ricowilabi Mines Ltd., Non-personal Liability	5256	40.60	Nov. 30
Flower	"	Daniel E. Sprague	7305	51.65	June 1
Friday Fractional	"	Monitor and Ajax Frac	5757	18.13	May 29
Gibraltar	"	The Dardanelles & Okanagan Mining Co., Ltd	3166	46.46	Aug. 8
Golden	"	Alfred R. Fingland, Noah F. McNaught, Charles Brand, Paris F. D. Brockman, Maurice Gintzburger	7303	46.00	May 29
Golden Boy	"	Arlington Mines, Limited, Non-personal Liability	5276	10.00	Nov. 30
Golden Fractional	"	Alfred R. Fingland, Noah F. McNaught, Chas. Brand, Paris F. D. Brockman, Maurice Gintzburger	7307	43.85	" 26
Hilltop	"	Ricowilabi Mines, Ltd., N. P. L.	5258	18.75	" 30
Hope	"	Arlington Mines, Ltd., N. P. L.	5274	42.80	" 30
Idler	"	Alfred R. Fingland, Noah F. McNaught, Charles Brand, Paris F. D. Brockman, Maurice Gintzburger	7304	42.33	May 29
Isis	"	Wm. S. Drury, Minna Boucher, Hugh B. Fletcher, John F. McIntosh, Oliver T. Stone, Robert Williams, James Black and Herbert T. Twigg	4873	41.17	April 2
Kaslo Fractional	"	Daniel Emes Sprague	7301	27.26	June 1
Katie Fractional	"	Arlington Mines, Ltd., N. P. L.	5275	38.55	Nov. 30
Kenneth Fractional	"	Ricowilabi Mines, Ltd.	5261	7.93	" 30
Little Daisy	"	Alfred R. Fingland, Noah F. McNaught, Charles Brand, Paris F. D. Brockman and Maurice Gintzburger	7302	43.20	May 29
Little Dorrit Fractional	"	Arlington Mines, Ltd., Non-personal Liability	2869	10.73	Nov. 30
Margaret Fractional	"	Gavin Henry Wright, Martin L. Grimmett	5536	11.52	Sept. 7
May	"	Daniel Emes Sprague	7299	31.86	June 1
Millie	"	Byron N. White Co.	6914	40.76	July 26
Minnesota	"	"	6915	84.07	May 1
Mona Fractional	"	Daniel Emes Sprague	7306	2.68	June 1
Nancy	"	Ricowilabi Mines, Ltd., N. P. L.	5259	37.44	Nov. 30
Pembroke	"	Byron N. White Co.	6912	51.65	May 1
Plumb-bob Fractional	"	Ricowilabi Mines, Ltd., N. P. L.	5262	6.70	Nov. 30
Plumb-line Fractional	"	"	5263	9.34	" 30
Rosedale	"	Daniel Emes Sprague	7306	49.74	June 1
Rugby Fractional	"	Alex. McKinley, Thos. Jenkins, Robt. Graham and James Galloway	3527	44.10	Mar. 6
Rutland Fractional	"	Alex. McKinley, Thos. Jenkins, Robt. Graham and James Galloway	3526	37.97	" 6
Speculator	"	Oscar V. White and John Peter Wilson	3994	42.45	Dec. 6
V. Fractional	"	Alexander McKinley, Thos. Jenkins, Robt. Graham, Jas. Galloway	749	11.60	Mar. 6
West Side	"	Ricowilabi Mines, Ltd., Non-personal Liability	5257	21.92	Nov. 30
Alma	Slocan City	Thomas de la Hunt Tobin	6516	48.29	Aug. 8
Fourth-of-July No. 6	"	Andrew T. R. Blackwood, Albert E. Teeter	7295	34.65	Dec. 18
Jenny Long No. 2	"	"	7296	48.30	" 18
Little Montana	"	"	2889	35.35	" 6
Pulaskie	"	Robert G. McLeod	2890	13.09	" 6
Teuro	"	"	2890	13.09	" 6
Time	"	Andrew T. R. Blackwood and Albert Teeter	7297	44.30	" 18
Black Bear	Revelstoke	Herbert W. Kent, Thomas McNeish	6515	51.24	Oct. 4
Butte Fractional	"	The Prince Mining & Development Company, Ltd. Lby.	6953	49.45	April 2
Commander	"	"	6951	22.62	" 2
Contractor	"	"	6946	51.62	" 2
Criterion	"	"	6948	26.94	" 2
Denver Fractional	"	"	6954	44.01	" 2
Downie Fractional	"	"	6950	4.65	" 2
H. X. L. Fraction	"	"	7485	23.24	" 2
Iron Chest	"	"	7490	2.99	" 2
Iron Hill	"	"	6952	50.20	" 2
Iron Hill Fractional	"	"	6949	51.18	" 2
I. X. L. Fract.	"	"	7483	3.17	" 2
Monitor	"	"	7488	5.31	" 2
Standard	"	"	6945	51.65	" 2
U. X. L. Fractional	"	"	6944	51.65	" 2
Winnabago	"	"	7484	32.82	" 2
Alice	Trout Lake	Charles Abrahamson and John Owen Piper	7440	49.64	" 2
				51.65	Oct. 13

WEST KOOTENAY.—Concluded.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Brer Fox	Trout Lake	Peter McVeigh	7431	26.94	Oct. 5
Copper Queen	"	Clara Grace Westfall, administratrix of the estate of John Wesley Westfall, deceased intestate, Charles Leslie Copp and Charles McNicol	6477	45.00	June 4
Imperial Limited	"	James Z. Hall	5154	39.00	Dec. 4
Louise	"	James Albert Manning Aikins	4740	43.56	Aug. 27
Rambler	"	James Albert Manning Aikins	6470	51.65	Nov. 23
Silver Chief	"	Robert Bryce Young	6476	51.65	Feb. 15
St. Louis	"	Ephraim George Sills	7261	51.65	Aug. 29
Tom Edward	"	Clara Grace Westfall, administratrix of the estate of John Wesley Westfall, deceased intestate	6478	49.00	June 4
Vancouver	"	James Z. Hall	5155	38.22	Dec. 4
Whistler	"	James Z. Hall	5163	51.65	" 4
Black Hock	Lardeau	Barclay Crilly	4497	42.92	Nov. 26
Brunswick	"	James A. Magee	4354	38.41	Dec. 6
Carbonate Hill	"	John A. Darragh	7060	50.19	April 6
" Fractional	"	John A. Darragh	7061	3.32	" 6
Crescent	"	Edward Baillie Syndicate, Ltd.	6472	51.65	" 6
Empire Fractional	"	Edward Baillie Syndicate, Ltd.	6474	18.58	" 6
Frisco	"	Barclay Crilly	4498	51.65	Nov. 26
Iron Dollar	"	John A. Darragh	7059	34.35	April 6
Lakeview	"	Wide West Gold Mining Co., Lardeau, B.C., N.P.L.	6454	48.21	May 3
Little Johnnie	"	John A. Darragh	7062	14.38	April 6
Mammoth	"	Edward Baillie Syndicate, Ltd.	6473	51.65	" 6
Ontario	"	Wide West Gold Mining Co., of Lardeau, B.C., N.P.L.	6454	48.21	May 3
Sirdar	"	Edward Baillie Syndicate, Ltd.	6471	51.65	April 6
Wide West	"	Wide West Gold Mining Co., of Lardeau, B.C., Ltd., N.P.L.	6453	51.65	May 3

YALE.

Annie Lee	Grand Forks	Wm. E. George, Thos. G. Edwards, Edmund T. Wickwire	3339	43.55	Oct. 5
Coronet Fractional	"	Forbes M. Kerby and Charles M. Crouse	677	4.41	Sept. 21
Hanna	"	The McKinley Mines, Limited, N.P.L.	141s	45.16	Dec. 31
Hopewell	"	Dougald McInnes, Thomas Roderick and George W. Kumberger	3291	48.41	Sept. 29
Humphrey Davy	"	Zacheus Colby	3232	28.92	Nov. 23
Iron Glad Fractional	"	John Mulligan	2169	45.00	Oct. 11
Lillie K	"	James S. C. Fraser, Amasa B. Campbell, Peter J. Davis	961	38.72	Sept. 26
McKinley	"	McKinley Mines, Ltd., Non Personal Liability	140s	44.79	Dec.
Mountain Lion	"	Harry Arthur Sheada, Henry Wotlan	144s	36.94	Nov.
North Star	"	Isaac H. Hallett and Isaac H. Hallett, the administrator of the estate and effects of Archibald M. Connor, deceased intestate	2372	14.60	Sept. 26
Reward	"	Mary Turner McMynn	3226	15.61	" 11
Riverside	"	Timothy Townend	429s	51.65	Nov. 23
Twins	"	James S. C. Fraser, Amasa B. Campbell, Peter J. Davis	960	49.85	Sept. 26
War Cloud Fractional	"	Forbes M. Kerby and Charles M. Crouse	1318	18.50	" 21
Abercraig	Greenwood	George A. Rendell, George B. Taylor and Jas. E. Spankie	2635	51.65	Dec. 31
Beaver	"	Edward Maloney	3007	51.52	Sept. 21
Black Warrior	"	Ella J. Archibald	2290	32.14	June 1
Blue Coat	"	Frederic Keffer	2916	50.00	May 2
Bluejay	"	Michael H. Kane, John W. Nelson, Marshall J. Price, Evan Parry and Laurence S. Morrison	1287	49.06	Dec. 4
Boston	"	Vancouver & Boundary Creek Devel. & Mg. Co., Ltd. Lby.	2301	36.35	Sept. 10
Bounty Fractional	"	Isaac Hoyt Hallett and Thomas Trimble Henderson	2962	22.92	" 13
Bulldog	"	Charles Kinney	3253	31.79	May 1
Bulldog Fractional	"	Charles Kinney	3641	46.27	" 1
Cleveland	"	Jacob C. Haas and George E. Foster	2150	39.28	June 28
Crescent Fractional	"	Nicholas Kubnen	2462	12.35	Sept. 26
Delmonte	"	Frederic Keffer	2917	22.80	May 2
Dexter Fractional	"	Thomas Roderick, James McNulty, James Marshall and Daniel Bresnahan	3293	46.51	" 2
Eureka Fractional	"	Herbert Hamlin and George Wellwood	453s	27.91	Aug. 29
First Chance	"	Leon Lontier	444s	44.67	June 1
Four Paw	"	William J. Porter	3550	43.33	Dec. 4
Fremont	"	Elizabeth Galloway and C. Scott Galloway	1217	46.75	Sept. 26
Garnet	"	Isaac Hoyt Hallett	2724	51.65	May 29
Gem Fractional	"	Forbes M. Kerby, Wm. T. Hunter, John McG. Humphrey and Frank Parker	2347	6.00	" 3
Golconda Fractional	"	Jacob C. Haas and George E. Foster	2149	45.35	June 28
Hard Cash	"	William Kintz and George M. Miller	2715	43.00	May 31
Houston	"	Vancouver & Boundary Creek Dev. & Mg. Co., Ltd. Lby.	2302	50.04	Sept. 10
Iva Lenore	"	Isaac Hoyt Hallett	1262	46.15	Nov. 26
J. A. T.	"	Joseph L. Martin	3152	48.66	Sept. 11
Keystone	"	Samuel J. Jensen and Chris. Johnson	2912	46.08	June 6
Keystone Fractional	"	Wm. Haana	2296	42.10	May 1
Kingston	"	Vancouver & Boundary Creek Dev. & Mg. Co., Ltd. Lby.	2300	51.65	Sept. 10
Kingston Fractional	"	" " " "	2339	29.89	" 10
Laccoon	"	Jacob C. Haas and George E. Foster	2147	51.65	June 28
Last Chance Fractional	"	Fred. W. McLaine, Arthur N. Pelby, Marion Atwood, Charles J. Leggatt, John S. Harrison and Albert E. Ashcroft	3247	36.14	Sept. 27
Latour	"	Kenneth C. B. Frith and Charles Elting Merritt	2952	51.18	" 12
Little Dalles	"	William J. Porter	2628	46.71	" 26
Logan	"	Fred. M. Elkins, Thos. Murray and Sydney M. Johnson	2793	50.02	May 1

YALE.—Continued.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Log-cabin Fractional	Greenwood	James McNulty, James Marshall, Daniel Bresnahan and Thomas Roderick	8299	13.74	May 80
London	"	Charles J. McArthur, Evan Parry and Marguerite A. Graham	in 2291 8299	44.08	Sept. 27
Lygia	"	William Hy. Norris and James Beckwith	2655	44.70	" 11
Mame	"	Nils E. Peterson, Samuel T. Larsen and Mary T. McMynn	2864	46.40	" 27
Mayflower	"	Dougald McInnes, Thos. Roderick and Geo. W. Rumberger	8295	37.09	Dec. 31
Mayflower Fractional	"	Chas. Herbert Tye, Duncan McIntosh and Patrick Hickey	8554	11.58	May 80
Monday	"	John W. Frost, Fred. M. Munn, George M. Foster and John Marshall	3335	39.78	Oct. 3
Monte Christo Fractional	"	Joseph L. Martin	3381	2.50	May 3
Morning Glory	"	Charles E. Johnson, John Bergman, Alfred John Lind and Magnus Edglin	3559	51.65	Nov. 23
Nevada	"	Robert Gaede and James Riordan	3447	25.06	May 2
Neverweat Fractional	"	British-American Dev. Co., Ltd., Sydney M. Johnson, Frank T. Ketchum, George R. Naden and Wm. G. Gaunce	2338	18.47	Sept. 27
New Oro Fino	"	Fred. W. McLaine, Arthur N. Felby, Marion Atwood, Chas. J. Leggatt, John S. Harrison and Albert E. Ashcroft	3248	50.76	" 26
" 96 "	"	John T. Bell, Isaac H. Hallett, Duncan McIntosh & Patrick Hickey	2939	47.10	" 26
Old Bird	"	Wm. Lindsey Carnegie Gordon	1524	39.17	Oct. 4
Porto Rico	"	Sydney M. Johnson, Blanche Lander and Jane Russell	1778	27.05	June 1
Preston	"	Livingston Thomas Dickason	698	38.00	Aug. 16
Princess Louise	"	Robert Lee, James Gillis, John M. Campbell, Mark Kay and Lewis Bryant, administrator of estate of David Bryant, deceased	8680	51.65	Nov. 26
Prince of Wales	"	Robert Lee, James Gillis, John M. Campbell, Mark Kay and Lewis Bryant, administrator of estate of David Bryant, deceased	3681	44.90	" 26
Prince Henry	"	George Rendell, George B. Taylor and James E. Spankie	2636	45.17	Dec. 31
Queen	"	William H. Norris and James Beckwith	1635	42.40	Sept. 11
Queen of Sheba	"	John A. Crawford, William Kintz, Joseph P. Kelly and William Olson	3127	6.40	Mar. 20
Rainstorm	"	Charles E. Johnson, John Bergman, Alfred John Lind and Magnus Edgren	3560	51.41	Nov. 23
Red Jacket	"	British-America Dev. Co., Ltd., Sydney M. Johnson, Frank Ketchum, Geo. R. Naden and Wm. G. Gaunce	2332	37.65	Sept. 27
Rex	"	Joseph L. Martin	3300	32.44	" 11
Ruby Fractional	"	George Cook and Mary T. McMynn	3256	39.00	" 18
Sovereign	"	George Rumberger and Harry Nash	1548	48.19	Dec. 21
St. Paul	"	Edward Maloney	3006	48.84	Sept. 21
Sunday	"	John W. Frost, Fred. M. Munn, George M. Foster and John Marshall	3334	32.10	Oct. 3
Surprise Fractional	"	Sydney Mannings Johnson	2384	10.36	June 27
Toothpick Fractional	"	Joseph L. Martin	3171	.08	May 1
Yellowstone Fractional	"	Nicholas Kubnen	2461	9.00	Sept. 12
York Fraction	"	Jacob C. Haas and Geo. E. Foster	2148	45.00	June 28
Alice	Osoyoos	George H. Cahill	852	22.20	Oct. 5
Bullion	"	James A. Schubert and John Greenhill	3272	40.42	May 31
Bullion Fraction Fractnl.	"	Robert Gaede	3450	36.36	" 2
Camp Rest	"	Geo. H. Cahill	3487	51.65	Oct. 5
Climax	"	Yale Mining Co.	2685	40.00	Feb. 15
Copper Head Fracn. Fracnl.	"	Robert Gaede	3451	38.82	May 2
Dividend No. 2	"	"	3432	31.80	Feb. 15
Eclipse	"	Frank Richter, Lucien M. Lyon and James McDougall	2670	51.65	Sept. 20
Elkhorn Fractional	"	Robert Gaede	3453	23.10	May 2
Evening Star	"	John Greenhill and Louis O. Hedlund	3275	18.90	May 31
Good View	"	James Fraser Campbell and Charles E. Oliver	659	40.35	June 28
Gunsite	"	The New Fairview Corporation, Ltd.	258	44.80	Aug. 6
Iron Mask	"	Robert Gaede	3435	34.68	Feb. 15
I. X. L.	"	Yale Mining Co.	2664	20.50	" 15
Mammoth	"	Robert Gaede	3434	46.47	" 15
Mayflower	"	Yale Mining Co. and John Greenhill	3034	45.50	Sept. 26
Norfolk Fractional	"	John Gladden, Fred'k W. Gladden, Jas. M. Patton, Walter E. Hodges, Duncan Woods, Fred. M. Elkins and Clinton A. S. Atwood	3539	29.30	Dec. 3
Olanda Marguerite	"	Antonio Scarpelli	3536	10.82	May 31
Powell	"	Henry A. Whillans, Richard H. Parkinson and Francis A. Devereaux	3102	51.65	Mar. 20
Pride	"	John Greenhill and Louis O. Hedlund	3273	37.85	May 31
Red Eagle	"	Yale Mining Co.	3032	25.00	" 31
Royal Banner	"	Robert Gaede	3452	48.56	" 80
Searchlight	"	Robert Gaede and James Riordan	3443	49.86	" 2
Stag Fractional	"	John Gladden, Frederick W. Gladden, James N. Patton, Walter E. Hodges, Duncan Woods, Fred. M. Elkins and Clinton A. S. Atwood	3538	44.99	Dec. 3
Star of Hope	"	Frank Richter, Lucien M. Lyon and James McDougall	2670	51.65	Sept. 20
Stemset	"	The New Fairview Corporation, Ltd.	218	36.99	Aug. 1
Tower Fractional	"	John Gladden, Fred. W. Gladden, Jas. W. Patton, Walter E. Hodges, Duncan Woods, Fred'k M. Elkins and Clinton A. S. Atwood	378	12.58	Dec. 3
Triangle Fractional	"	Yale Mining Co.	663	5.60	Sept. 28
Two Brothers	"	Antonio Scarpelli and Raphael Scarpelli (½ interest each)	2493	46.28	Mar. 20
Victoria	"	"	2464	49.00	" 20

YALE.—Concluded.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Victor Fraction Fractnl.	Osoyoos.....	John Gladden, Fred. W. Gladden, Jas. N. Paton, Walter E. Hodges, Duncan Woods, Fred. M. Elkins, and Clinton A. S. Atwood.....	35a	7.80	Dec. 3
War Eagle	"	Yale Mining Co.....	8087	34.40	May 31
Amelia	Similkameen	Isaac Eastwood, Chas. J. Christien, John McDonald and Louis J. Bell.....	1404	51.65	" 3
Bachelor	"	Frederick A. House.....	1408	51.65	Aug. 3
Big Kid	"	Frank Mansfield and William Smith.....	1405	50.29	June 6
Blue Bird	"	Mary Agnes Voight.....	4198	41.02	" 1
Boonite	"	Thomas C. Revely.....	280	22.21	Nov. 23
Copper Standard	"	Isaac Eastwood, Price Ellison and John C. Campbell.....	1403	51.65	May 3
Cream of the Camp	"	Daniell Courtney, Stephen Mangott, Lytton W. Shatford.....	8442	51.65	Sept. 12
Daisy	"	John Gladden, Edward A. C. Studd and Charles E. Oliver.....	448	36.43	" 26
Duke of York	"	Mary Agnes Voight.....	638	47.98	June 1
Falum	"	"	4168	51.65	Nov. 27
Garden City	"	"	3556	39.58	" 17
Great Eastern	"	Lytton W. Shatford, Stephen Mangott.....	3437	51.65	Sept. 12
Highland	"	George R. Philp.....	1409	44.33	Aug. 3
Lisey D	"	Richard H. Parkinson, Lytton W. Shatford and Stephen Mangott.....	8441	21.21	Sept. 12
Maple Leaf	"	John Gladden, Edward A. C. Studd and Charles E. Oliver.....	438	51.65	" 28
Martin	"	"	458	29.20	" 23
McKinley	"	Henry Erastus Beach.....	1508	41.09	May 30
Minnehaha	"	John Gladden, Edward A. C. Studd and Charles E. Oliver.....	478	34.93	Sept. 28
Nicola	"	Albert E. Howse.....	1407	51.65	Aug. 3
No. 5	"	Mary Agnes Voight.....	3354	22.59	Mar. 20
No. 18	"	"	3288	51.65	" 20
No. 31	"	"	3566	42.79	" 20
No. 32	"	"	3567	10.37	Feb. 15
No. 50 Fractional	"	"	4178	40.22	Nov. 27
No. 51 Fractional	"	"	4138	52.85	" 27
No. 52	"	"	4148	50.41	" 27
No. 53	"	"	4138	49.05	" 27
No. 70	"	"	628	51.53	" 27
No. 73 Fractional	"	"	4438	17.28	" 27
No. 71	"	"	4158	42.10	" 27
Olympia	"	Joseph Wright and Llewellyn G. Barrow.....	8262	24.58	Sept. 12
Pineknott	"	John Gladden, Edward A. C. Studd and Charles E. Oliver.....	466	24.30	" 23
Red Buck	"	Thomas Charles Revely and George Mortimer Allison.....	279	31.33	Nov. 23
Robert Bryant	"	Mary Agnes Voight.....	3568	27.77	Feb. 15
Silent Friend Fractional	"	Richard H. Parkinson, Lytton W. Shatford and Stephen Mangott.....	3439	51.65	Sept. 12
Triangle Fractional	"	Albert E. Howse.....	1410	41.44	Aug. 3
Valley Hill	"	Mary L. McDougald.....	1827	51.65	Feb. 15
Chance	Vernon.....	Caroline Mary Barclay.....	2825	51.65	Dec. 31
Aberdeen	Kamloops	John William Broomhead.....	960	31.34	Feb. 15
Chamberlain	"	George J. Novak and James Hosking.....	197A	30.90	Aug. 15
Copper Bell	"	William Smith.....	1218	47.40	Feb. 15
Dawson (D. G.)	"	Michael Snee.....	1844	32.02	May 4
Imperial	"	George J. Novak and James Hosking.....	196A	45.65	Aug. 15
King Solomon Dream	"	Reuben M. Woodward.....	1254	25.43	Feb. 15
Ladysmith	"	George J. Novak and James Hosking.....	199A	44.06	Aug. 15
London	"	Charles J. Winney.....	1217	14.46	Feb. 15
Mafeking	"	George J. Novak and James Hosking.....	197A	30.90	Aug. 15
Manchester	"	John Clapperton.....	1216	51.35	Feb. 15
Phoenix	"	John J. Banfield.....	1153	51.65	Dec. 17
Plymouth Queen	"	Rose Clapperton.....	907	34.20	Feb. 15
Pretoria	"	George J. Novak, James Hosking.....	195A	51.65	Aug. 15
Transvaal	"	George J. Novak and James Hosking.....	194A	51.65	" 15

VANCOUVER ISLAND AND COAST.

Barclay	Alberni	William Wilson	29	51.65	Oct. 19
Black Bear	"	"	22	31.96	" 19
British Pacific	"	"	25	38.81	" 19
Charmer	"	"	31	49.39	Dec. 19
Clifton	"	"	33	49.45	" 19
Eureka	"	"	24	28.62	Oct. 19
Jersey Lily	"	William Harrison and Francis B. Gregory, executors for the estate of Sarah M. McDonald, deceased	206	17.11	Feb. 29
Midday	"	William Wilson	26	31.00	Oct. 19
Mountain	"	"	23	51.65	" 19
Pilot Fractional	"	"	34	14.84	" 19
Rainbow	"	"	30	42.30	" 19
Southern Cross	"	"	35	32.50	" 19
Sunbeam	"	"	32	51.20	" 19
United	"	"	36	49.63	" 19
Edison	Quatsino	Joseph W. Murphy, Belle Jolidort Murphy	244	18.90	May 31
Commodore	Nanaimo	W. Thomas Newman	293	51.65	Aug. 29
Escort	"	W. Thos. Newman, James R. Webster	294	48.30	" 29
Lead Bank	"	James R. Webster	291	49.44	" 29
Tory Fractional	"	W. Thomas Newman and James R. Webster	292	5.00	" 29
Vanguard	"	"	295	33.00	" 29
Belcher	Victoria	William Vanstone and Margaret M. Melrose	109	48.00	Dec. 31

VANCOUVER ISLAND AND COAST.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Blue Bell.....	Victoria.....	Vancouver Island Mining and Development Company, Ltd	15e	51.65	Feb. 14
David.....	".....	John Bentley, James Baker, Harry T. Cole and Harry Maynard.....	170	36.97	" 29
Fraction Fractional....	".....	Patrick Hickey, Helen Flewin, Donald A. Robertson.....	170, n5	18.00	June 28
Golconda Fractional....	".....	".....	174, n5	14.81	" 28
W. A. E.....	".....	Koksilah Mining Co., Ltd., Non-personal Liability.....	38a	48.38	Aug. 15
Banner.....	New Westminster	William Barker.....	1821	39.20	Mar. 6
Banner Fractional.....	".....	".....	1988	45.47	" 6
Bell.....	".....	".....	1986	51.60	" 6
Copper Canyon.....	".....	Goldsmith Copper Co., Ltd.....	1889	30.77	" 20
Copper Dyke.....	".....	".....	1981	43.07	" 20
Cracker Jack.....	".....	William Barker.....	1967	51.65	" 6
Eureka.....	".....	Goldsmith Copper Co., Ltd.....	1888	51.06	" 20
Fairplay D. G.....	".....	Stella B. Eldridge.....	2065	30.66	Oct. 3
Fancy.....	".....	William M. Humphreys.....	1877	31.79	Dec. 31
Independent.....	".....	Joseph Donald.....	2097	51.65	Mar. 20
Last Chance Fractional	".....	William M. Humphreys.....	1876	7.82	Dec. 31
Lida K.....	".....	".....	1878	51.65	" 31
Lois.....	".....	Alfred D. Hoessack.....	1881	35.29	May 29
May Belle Fractional....	".....	William M. Humphreys.....	1877	31.79	Dec. 31
Nancy Fractional.....	".....	".....	1997	24.11	" 31
Pearl Fractional.....	".....	".....	2017	22.18	June 28
Queen.....	".....	Stella B. Eldridge.....	2092	47.28	Oct. 3
Summit.....	".....	William M. Humphreys.....	1996	51.66	June 28
Thistle.....	".....	Robert Aitkin.....	1879	51.65	May 29

GOLD COMMISSIONERS AND MINING RECORDERS.

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Atlin District	Atlin.....	J. A. Fraser.....		
Atlin Mining Division..	".....		Herbert Young.....	
Sub-office.....	Telegraph Creek..			Jas. Porter.
".....	Discovery City.....			Owen F. Conley.
".....	Wynnton.....			Hugh A. Butler.
Cassiar District —				
Liard Mining Division..	Telegraph Creek..	Jas. Porter.....	Jas. Porter.....	
Stikine ".....	".....		".....	
Skeena ".....	Port Simpson.....	John Flewin.....	John Flewin.....	H. C. Flewin.
Sub-office.....	Masset, Q. C. I..			C. Harrison.
".....	Skidegate, ".....			W. H. Dempster.
".....	Jedway, ".....			A. Eugene Knapp.
".....	Kitimat.....			Jas. L. Steele.
".....	Prince Rupert.....			W. H. Vickers.
".....	Essington.....			John Collins.
".....	Bear River (Port- land Canal).....			
".....	Unuk River.....			John Conway.
".....	Hartley Bay.....			Burt E. Daily.
Bella Coola Mining Div.	Victoria.....	R. A. Renwick.....	R. A. Renwick.....	Ed. McCoskrie.
Sub-office.....	Bella Coola.....			Chris. Carlson.
Omineca District	Victoria.....	R. A. Renwick.....		
Omineca Mining Division	Fort Grahame.....			Wm. Fox.
Sub-office.....	Fort St. James.....			Alex. C. Murray.
".....	Fort St. John.....			F. W. Beaton.
".....	Manson Creek.....			Ezra Evans.
".....	Aldermere.....		H. Berryman.....	
".....	Lorne Creek.....			F. E. Holt.
".....	Skeena Canyon.....			J. H. Patterson.
".....	Hazelton.....			Jas. Kirby.
Cariboo District	Barkerville.....	Geo. J. Walker.....		
Cariboo Mining Division	".....		R. C. S. Randall.....	
Quesnel ".....	Quesnel Forks.....		W. Stephenson.....	
Sub-office.....	Quesnel.....			David E. Anderson.
Lillooet District —				
Clinton Mining Division	Clinton.....	F. Soues.....	F. Soues.....	
Lillooet ".....	Lillooet.....	C. Phair.....	C. Phair.....	
		A. C. Minty, Dep'ty	A. C. Minty, Dep. }	
Kamloops District	Kamloops.....	G. C. Tunstall.....		
Kamloops Mining Div..	".....		E. T. W. Pearse.....	
Sub-office.....	Nicola.....			Geo. Murray.
Ashcroft Mining Div...	Ashcroft.....		H. P. Christie.....	H. C. Rayson.
Similkameen.....	Princeton.....		Hugh Hunter.....	
Sub-office.....	Hedley.....			F. M. Gillespie.
Nicola Mining Division	Nicola.....		Geo. Murray.....	
Yale ".....	Yale.....		Wm. Dodd.....	
Vernon District	Vernon.....	L. Norris.....		
Vernon Mining Division	".....		H. F. Wilmot.....	
Boundary District —				
Greenwood Mining Div.	Greenwood.....	W. G. McMynn.....	Geo. Cunningham.....	
Sub-office.....	Vernon.....			H. F. Wilmot.
".....	Camp McKinney..			H. Nicholson.
".....	Beaverdell.....			F. F. Ketchum.
Grand Forks Min. Div..	Grand Forks.....	S. R. Almond.....	S. R. Almond.....	
Osoyoos ".....	Fairview.....	J. R. Brown.....	Howard A. Turner.....	
Sub-office.....	Olalla.....			John McDonald.
".....	Hedley.....			F. M. Gillespie.

GOLD COMMISSIONERS AND MINING RECORDERS.—*Concluded.*

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Golden District	Golden	J. E. Griffith		
Golden Mining Division	"		F. H. Bacon	Colin Cameron.
Windermere "	Wilmer		E. J. Scovil	
Fort Steele District	Cranbrook	J. F. Armstrong		
Fort Steele Mining Div.	"			
Sub-office	Steele			Joseph Welsh.
"	Fernie			J. H. McMullin.
"	Moyie			Fred. J. Smyth.
"	Marysville			
Slocan District	Kaslo	E. E. Chipman		
Ainsworth Mining Div.	"		R. J. Stenson	Wm. John Green.
Sub-office	Howser			W. Simpson.
"	Poplar Creek			J. Simpson.
"	Trout Lake			F. C. Campbell.
Slocan Mining Division.	New Denver		Angus McInnes	
Sub-office	Sandon			W. J. Parham.
Slocan City Mining Div.	Slocan City		H. R. Jorand	
Nelson District	Nelson	Harry Wright		
Nelson Mining Division	"		C. D. Blackwood	P. J. Gleazer.
Sub-office	Ymir			P. Wilson.
"	Creston			
Arrow Lake Min. Div.	Nakusp		W. Scott	
Sub-office	Vernon			H. F. Wilmot.
Revelstoke District	Revelstoke	Fred Fraser		
Revelstoke Mining Div.	"		W. E. McLaughlin	Edward Edwards.
Lardeau "	Camborne		B. E. Drew	
Trout Lake "	Trout Lake		F. C. Campbell	
Sub-office	Poplar Creek			J. Simpson.
Rossland District	Rossland	John Kirkup		
Trail Creek Mining Div.	"		J. E. Hooson	
Nanaimo District	Nanaimo	Marshal Bray		
Nanaimo Mining Div.	"		Marshal Bray	
Sub-office	Ladysmith			J. Stewart.
"	Alert Bay			W. Woollacott.
"	Van Anda			Geo. McK. McLeod
Alberni District	Alberni	A. L. Smith		
Alberni Mining Division	"		A. L. Smith	
Clayoquot "	Clayoquot		W. T. Dawley	
Quatsino "	Yreka		O. A. Sherberg	
Victoria District	Victoria	R. A. Renwick		
Victoria Mining Division	"		G. V. Cuppage	
New Westminster "	New Westminster	C. C. Fisher	John Mahony	
Sub-office	Vancouver			R. J. Skinner.
"	Harrison Lake			L. A. Agassiz.
"	Chilliwack			J. Pelly.

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