GEOLOGICAL SURVEY OF CANADA
ALFRED R. C. SELWYN, C.M.G., LL.D., F.R.S., DIRECTOR

DIVISION OF

MINERAL STATISTICS AND MINES

ANNUAL REPORT

FOR

1892

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IN CHARGE

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OTTAWA
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1894

NOTE.

Except for the figures of imports, which refer to the fiscal year, beginning 1st July, the year used throughout this report is the calendar year, and the ton, that of 2,000 pounds, unless otherwise stated.

The figures give throughout the report referring to exports and imports are compiled from data obtained from the books of the Customs Department, and will occasionally show discrepancies, which, however, there are no means of correcting.

The exports and imports, under the heading of each province, do not necessarily represent the production and consumption of the province, *e. g.*, material produced in Ontario is often shipped from Montreal and entered there for export, so falling under the heading, Quebec.

The values of the metallic minerals produced, as per returns to this Department, are calculated on the basis of their metallic contents at the average market price of the metal for 1891. Spot values have been adopted for the figures of production of the non metallic minerals.

Throughout this report any bearings given are magnetic, except where otherwise stated.

N.E.S. = Not elsewhere specified.

To Dr. A. R. C. SELWYN, C.M.G., F.R.S., &c.,
Director and Deputy Head,
Geological Survey Department.

SIR,—I beg herewith to hand you the report of this division on mining and mineral production throughout the Dominion during 1892.

As in past years, it will be found to represent as complete a review of the mineral activities of the country and of their commercial results as it is possible to obtain with the means at command. These include the personal investigations of the officers of the division, supplemented by the issue of circulars asking the production direct from the operators themselves. Information selected from official provincial reports and various other sources is also incorporated with a view to giving all the authentic information available.

The labour of collecting, comparing and collating these very varied materials so as to ensure accurate results and secure a complete and uniform presentment of them is very great, but it is hoped that the result will prove satisfactory.

As in the past, care is still taken to avoid injury to private interests in the manner of publishing results. The confidence of the mining community thus gained has resulted in an increasingly hearty response to our circulars, although, to complete our data, personal application is yet necessitated with a small number of people and a yet more prompt response on the part of all applied to will help still further towards an earlier publication of the material.

The preliminary summary of the mineral production in 1892, was issued April 13th, 1893, a revision of which will be found in the table on page 5.

The delay in issuing the report for 1891, from causes explained in that volume, has also caused the present report to be late, but the retardation of the work of the division is in a fair way to be made up, the report for 1893 being well on towards completion. However, in the interim a revised statement of the mineral production of Canada for 1886 to 1891, inclusive, was issued on 7th March, 1893, and a preliminary statement of the mineral production for the year 1893 on 5th of April, 1894.

Apart from the preparation of the annual report, the other functions of the division have been performed as heretofore.

Numerous inquiries have been received and answered respecting the mining and mineral resources of the country, often involving considerable research to give the details asked for.

A system of classification of the mining records in the possession of the division has been inaugurated which when completed will ensure easy and rapid access to all the available data regarding any mineral deposits in the Dominion and enable all further data obtained to be properly filed away. As this has to be done, however, in the intervals of the current work, its progress is necessarily slow and the recent appointment of Mr. James White to the topographical staff leaves our staff one short.

During the summer season the field work of the officers of the division was as follows : The writer was all the summer engaged in a study of the gold and silver mining districts at West Kootenay, B.C., whilst after returning time was found for hurried visits to the cinnabar deposit near Kamloops, B.C., and the collieries of the Cascade Basin and Lethbridge in the North-west Territories. Mr. H. P. Brumell made a tour through various mining districts in Nova Scotia, New Brunswick, Quebec and Ontario. Mr. James White continued the mining survey of the phosphate, iron and mica district traversed by the Kingston and Pembroke Railway.

It is desired to gratefully acknowledge the aid received from various sources. Thanks are due to those who, although too numerous to specify here, have, by answering our circulars or letters, provided much valuable material for the compilation of this report. Thanks are also due for aid received from field officers of the Survey in making inquiries for us. Special mention must be made of the services rendered by my colleague, Mr. H. P. H. Brumell, assistant to the division, for his very important and efficient aid in every branch of the work.

Our acknowledgments are also due the provincial departments of mines of Nova Scotia and British Columbia and to the Dominion customs department for aid received.

I have the honour to be, sir,

Your obedient servant,

ELFRIC DREW INGALL,

July 5th, 1894.

SUMMARY OF THE MINERAL PRODUCTION OF CANADA IN 1891 AND 1892.

PRODUCT.	1891.		1892.	
	Quantity.	Value.	Quant ty.	Value.
Metallic.				
Copper (fine, in ore, etc.).. lbs.	8,928,921	$1,160,760	7,087,275	$ 826,849
Gold ..... oz.	51,303	930,614	50,350	907,601
Iron ore ... . tons.	68,979	142,005	103,248	263,866
Lead (fine, in ore, etc.).. . lbs.	588,665	25,607	1,768,420	72,505
Nickle (fine, in ore, etc.).. "	4,626,627	2,775,976	2,413,717	1,399,956
Platinum	.....	10,000	.....	3,500
Silver (fine, in ore, etc.).... oz.	414,523	406,233	310,651	269,489
Total metallic.....	....	$5,451,195	.....	$3,743,766
Non-metallic.				
Antimony .... tons.	10	$ 60	.....	.....
Arsenic..... "	20	1,000	.....	.....
Asbestus..... "	9,279	999,878	6,082	$ 390,462
Coal ..... "	3,623,076	8,144,247	3,292,547	7,184,510
Coke..... "	57,084	175,592	56,135	160,249
Feldspar..... "	685	3,425	175	525
Fire clay and mfrs. of..... "	.....	750	.....	9,567
Graphite..... "	260	1,560	167	3,763
Grindstones..... "	4,479	42,587	5,283	51,187
Gypsum ... . "	203,605	206,251	241,048	241,127
Limestone for flux. . . .. "	11,376	11,547	22,967	21,492
Manganese ore..... "	255	6,694	115	10,250
Mica ..... lbs.	.. ..	71,510	.....	104,745
Mineral pigments—				
Baryta ... . tons.	....	.....	315	1,260
Ochres .... "	900	17,750	390	5,800
Mineral water..... ... . galls.	427,485	54,268	640,380	75,348
Moulding sand ..... . tons.	230	1,000	345	1,380
Natural gas.....	. .....	.....	. . ...	150,000
Petroleum..... brls.	755,298	1,004,546	779,753	982,489
Phosphate.. .... tons.	23,588	241,603	11,932	157,424
Precious stones.....	. ....	1,000	... .	1,000
Pyrites . ..... tons.	67,731	203,193	59,770	179,310
Salt..... "	45,021	161,179	45,486	162,041
Soapstone .... "	.....	....	1,374	6,240
Structural materials a n d clay products—				
*Bricks .... M.	176,533	1,061,536	202,147	1,251,934
*Building stone .....c. yds.	187,685	708,736	219,747	609,827
Cement, natural.... .... brls.	} 93,473	108,561	{ 88,187	94,912
do Portland..... "			{ 29,221	52,751
Flagstones..... ..sq. ft.	27,300	2,721	13,700	1,869
Granite..... tons.	13,637	70,056	24,302	89,326
*Lime... ..... bush.	1,829,894	251,215	2,260,640	411,270
Marble. .... tons.	240	1,752	340	3,600
Pottery	.....	258,844	.....	265,811
Roofing cement..... tons.	1,020	4,810	800	12,000
Sands and gravels, exports "	243,724	59,501	297,878	85,329
Sewer pipe..... .. .	.....	227,300	.....	367,660
Slate..... tons.	....	(a)	5,180	69,070
Terra cotta.....	.....	113,103	.. ..	97,239
*Tiles .... M.	11,839	141,399	15,689	190,857
Total non-metallic.....	.....	$14,359,174	....	$13,503,624
do metallic	....	5,451,195	....	3,743,766
Estimated value of mineral products not returned (principally structural materials).....	.. ..	689,631	....	752,610
Total	.....	$20,500,000	... ...	$18,000,000

* Incomplete. (a) Owing to there being only one producer the return being confidential is not given here, but is included in the last item, viz. :—Estimated values.

EXPORTS.

EXPORTS.

MINERALS AND MINERAL PRODUCTS MINED OR MANUFACTURED IN CANADA DURING 1892.

Product.	Value.	Product.	Value.
Asbestus, first class	$ 113,595	Nickel	$293,149
" second class	228,133	Oil, crude and refined	13,045
" third class	31,375	Ore, iron	52,720
Brick	12,192	" lead	2,509
Cement	938	" manganese	8,205
Clay, and manufactures of	37	" silver	56,688
Coal	2,806,770	Phosphate	153,764
Copper	277,632	Plumbago	4,150
Gold	277,825	Salt	504
Grindstones	23,567	Sand and gravel	85,329
Gypsum, crude	201,086	Slate	2,088
" ground	20,255	Stone, unwrought	47,424
Iron and steel, about	275,000	" wrought	7,698
Lime	121,535	Other articles	26,225
Mica, crude and cut	79,845		
" ground	6,717	Total	$5,229,950

EXPORTS

OF PRODUCTS OF THE MINE, WITH DESTINATIONS, DURING FISCAL YEAR 1892.

Exported to	Value.	Exported to	Value.
United States	$4,806,483	British Guiana	$8,679
Great Britain	683,094	British Possessions in Pacific Ocean	5,616
Newfoundland	202,840	Russia	4,724
Hong Kong	37,170	Japan	4,571
St. Pierre	30,413	Australia	4,408
Germany	27,675	China	3,834
France	22,547	Belgium	800
British West Indies	18,533		
Sandwich Islands	16,888		
Holland	15,505	Total	$5,906,471
Spanish West Indies	12,691		

IMPORTS.

IMPORTS.

MINERALS AND MINERAL PRODUCTS FOR FISCAL YEAR 1892.

Products.	Value.	Products.	Value.
Alum and aluminous cake.	$ 22,849	Lead and mfrs. of	$ 309,388
Antimony	17,680	Lime	4,241
Arsenic	9,365	Litharge	34,343
Asbestus and mfrs. of	14,090	Lithographic stone	5,047
Ashes, pot, pearl and soda.	3,377	Manganese oxide	3,530
Asphaltum	152,136	Marble	106,268
Borax	29,678	Mercury	15,038
Brass and mfrs. of	537,771	Mineral water	55,763
Bricks	5,075	Nickel	50
" bath	2,402	Ochres	22,908
" fire, and tiles	122,031	Paraffine wax	50,728
Buhrstones	1,464	Petroleum and mfrs. of	492,361
Building stone	95,550	Plaster of Paris	5,595
Cement	6,176	Platinum	1,952
" Portland	281,553	Potash salts	40,822
Chalk	9,558	Precious stones	63,738
Clay, China	41,787	Pumice	3,282
" fire	29,049	Salt	380,958
" all other, N.E.S.	11,783	Sand and gravel	27,890
Coal, anthracite	5,640,346	Silex	1,244
" bituminous	4,099,221	Slate	50,441
" dust, &c	39,840	Soda salts	445,370
" tar and pitch	34,471	Stone or granite, N.E.S.	39,479
Coke (oven)	194,429	Spelter	62,550
Copper and mfrs. of	437,764	Sulphur	67,095
Earthenware	748,810	Tiles, sewer pipes, &c	59,537
Emery	17,782	Tin and mfrs. of	1,594,205
Fertilizers	19,539	Tufa	1,025
Flagstones	15,048	Whiting	26,867
Fuller's earth	2,453	Yellow metal	73,534
Graphite	39,633	Zinc and mfrs. of	134,865
Grindstones	19,761		
Gypsum	3,331	Total	$27,362,006
Iron and steel	10,476,090		

ABRASIVE MATERIALS.

ABRASIVE MATERIALS.

PRODUCTION.

The only material coming properly under this heading produced during 1892 was grindstones and of which the following data only are available.

Grindstones.—The quantity of grindstones produced during the year was 5,283 tons, valued at $51,187, the production according to provinces being as follows :— Grindstones.

New Brunswick	2,821 tons,	valued at	$23,577
Nova Scotia	2,462 "	"	27,610
	5,283 "	"	$51,187

Abrasive Materials. Grindstones.

The production during 1886 to 1892 inclusive was as follows; and was the result of operations in New Brunswick and Nova Scotia only:—

1886—4,000	tons,	valued at	$46,545
1887—5,292	"	"	64,008
1888—5,764	"	"	51,129
1889—3,404	"	"	30,863
1890—4,884	"	"	42,340
1891—4,479	"	"	42,587
1892—5,283	"	"	51,187

Tripoli.

Tripoli.—A small deposit of tripoli was noted by Mr. N. J. Giroux, of the Geological Survey, near a small lake a few miles north of Chertsey village in Montcalm county, Que., from which the inhabitants obtain small quantities which they use locally. No production of the material has, however, been reported.

Exports and Imports.

The following tables give the exports and imports as obtained from the Customs Department, and explain themselves:—

Abrasive Materials.

Exports and Imports.

Table 1.

Imports of "Silex."

Fiscal Year.	Cwts.	Value.
1880	5,252	$2,290
1881	3,251	1,659
1882	3,283	1,678
1883	3,543	2,058
1884	3,259	1,709
1885	3,527	1,443
1886	2,520	1,313
1887	14,533	5,073
1888	4,808	2,385
1889	5,130	1,211
1890	1,768	2,617
1891	3,674	1,929
1892	1,429	1,244

ABRASIVE MATERIALS.

Exports and Imports.

ABRASIVE MATERIALS.

TABLE 2.

IMPORTS OF PUMICE STONE AND EMERY.

Fiscal Year.	Value.
1880	$ 7,854
1881	11,179
1882	15,762
1883	17,823
1884	16,518
1885	14,450
1886	14,458
1887	15,617
1888	18,564
1889	16,888
1890	19,925
1891	19,875
1892	21,064

ABRASIVE MATERIALS.

TABLE 3.

IMPORTS OF BUHRSTONES.

Fiscal Year.	Value.
1880	$12,049
1881	6,337
1882	15,143
1883	13,242
1884	5,365
1885	4,517
1886	4,062
1887	3,545
1888	4,753
1889	5,465
1890	2,506
1891	2,089
1892	1,464

ABRASIVE MATERIALS.

TABLE 4.

EXPORTS OF GRINDSTONES.

Provinces.	1889.	1890.	1891.	1892.
Quebec	$ 1,387	$ 12		
Nova Scotia	7,150	8,536	$12,3[illegible]7	$10,575
New Brunswick	21,437	10,016	16,046	12,992
Manitoba	8			
Totals	$ 29,982	$ 18,564	$ 28,433	$ 23,567

ABRASIVE MATERIALS.

Exports and Imports.

ABRASIVE MATERIALS.

TABLE 5.

EXPORTS OF GRINDSTONES.

Year.	Value.
1884	$28,186
1885	22,606
1886	24,185
1887	28,769
1888	28,176
1889	29,982
1890	18,564
1891	2 ,433
1892	23,567

ABRASIVE MATERIALS.

TABLE 6.

IMPORTS OF GRINDSTONES.

Fiscal Year.	Tons.	Value.
1880	1,044	$11,714
1881	1,359	16,895
1882	2,098	30,654
1883	2,108	31,456
1884	2,074	30,471
1885	1,148	16,065
1886	964	12,803
1887	1,309	14,815
1888	1,721	18,263
1889	2,116	25 564
1890	1,567	20,569
1891	1,381	16,991
1892	1,484	19,761

ANTIMONY

ANTIMONY.

Statistics.

STATISTICS.

There is no production to report for the year 1892, the West Gore mines which, for many years, afforded the only supply, having closed down.

The industry through various causes has gradually fallen off since 1887 when the production was of considerable importance. What the causes of this falling off may have been are not known, though it has certainly not been from any deterioration of the Canadian ore which has always been of good quality.

ANTIMONY. Statistics.

The production during the past few years was as follows, and is the result of operations in the province of Nova Scotia :—

1887,	584	tons,	valued at.....	$10,860
1888,	345	"	"	3,696
1889,	55	"	"	1,100
1890,	26½	"	"	625
1891,	10	"	"	60

EXPORTS AND IMPORTS.

Exports and Imports.

The following tables of exports and imports are taken from the books of the Customs Department and explain themselves :—

ANTIMONY.

TABLE 1.

EXPORTS.

Year.	Tons.	Value.	Year.	Tons.	Value.
1880.....	40	$ 1,948	1887.....	229	$9,720
1881.....	34	3,308	1888.....	352½	6,894
1882.....	323	11,673	1889.....	30	695
1883.....	165	4,200	1890.....	38	1,000
1884.....	483	17,875	1891.....	3½	60
1885.....	758	36,250	1892.....	.....	.....
1886.....	665	31,490			

ANTIMONY.

TABLE 2.

IMPORTS.

Fiscal Year.	Pounds.	Value.
1880	42,247	$ 5,903
1881	.....	7,060
1882	183,597	15,044
1883.....	105,346	10 355
1884	445,600	15,564
1885	82, 12	8,182
1886	89,787	6,951
1887.....	87,827	7,122
1888.....	120,125	12,242
1889	119,034	11,206
1890.....	117,066	17,439
1891.....	114,084	17,483
1892.....	180,308	17,680

ANTIMONY.

Discovery and development.

DISCOVERY AND DEVELOPMENT.

NOVA SCOTIA.

Rawdon.—The most important deposit in Canada is undoubtedly that at West Gore, Rawdon, Hants county, N.S., regarding which Mr. H. P. Brumell makes the following statement from information received from the owner Mr. R. MacNaughton, Truro, N.S. As the works were abandoned and filled with water he did not make a personal visit.

West Gore Mines.

West Gore Mine, Rawdon, N.S.—" This property is situated about one mile and a half east of South Rawdon Gold Mines and was for many years in successful operation. It has, however, been idle during the past year. While the mine was in operation the ore was hauled to and shipped from Enfield station on the Intercolonial Railway, thence by rail to Halifax en route to England where most of it was marketed.

" The deposit consists of a vein about six feet wide of which about twenty inches is pay-ore consisting of stibnite, kermesite, valentinite, galena and a small amount of gold in a gangue of calcite. The vein has a course about north-west and south-east dipping at an angle of eighty degrees to the south-west and cuts gray talcose slates which strike east and west and dip S. $<45°$. The first-class ore assays from fifty to eighty per cent of antimony, a second grade being concentrated from dump stuff to about fifty-four per cent. The entire vein carries about three pennyweights of gold to the ton.

" The underground operations consist of three shafts on the vein about 100 feet apart, the most southerly, No. 1, being sunk to a depth of 200 feet, the next, No. 2, to 80 feet and No. 3, the most northerly, to 30 feet. From the mouth of No. 3 a drift or stope 30 feet in height is run following the upper pay-streak to No. 1 shaft, which it intersects at 115 feet from the surface."

ASBESTUS.

ASBESTUS.

Statistics.

STATISTICS.

The production of this mineral during 1892 was 6,082 tons, valued at $390,462. This shows a decrease in comparison with the previous year of 3,197 tons and $609,416.

As observed also the returns show a great drop in values, which is due to the shipment for 1892 having consisted mostly of the lower priced grades of the mineral.

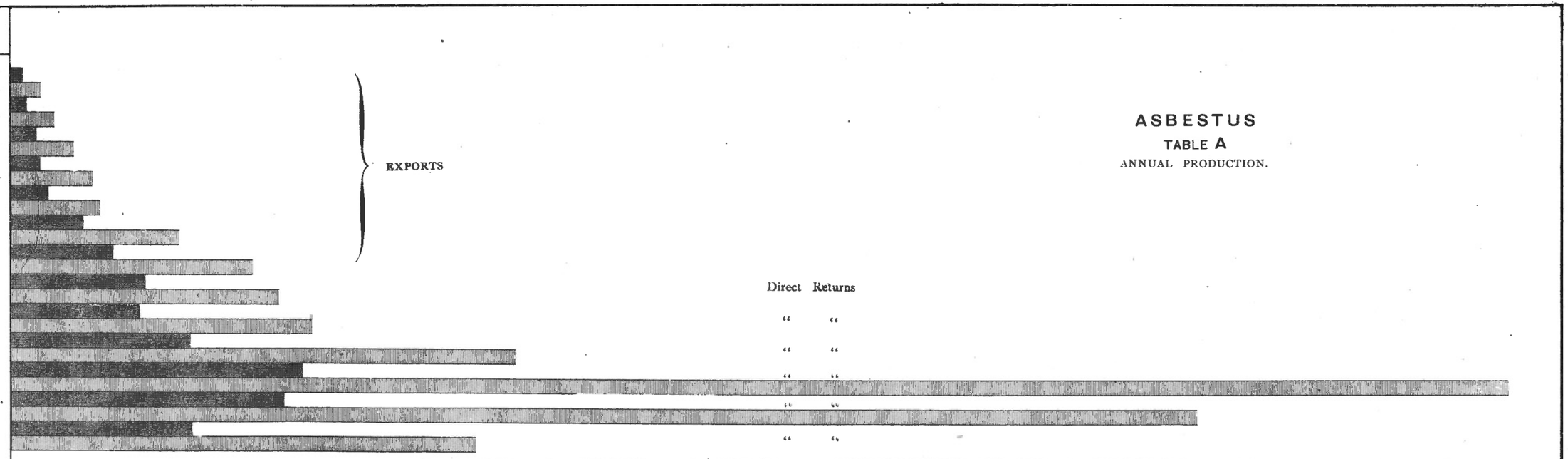
This production resulted from the operations of the mines working at Thetford, Black Lake and Coleraine in the Eastern Townships of

ASBESTUS

TABLE A

ANNUAL PRODUCTION.

Year.	Tons.	Value.
1880	380	.....
.....	.....	$24,700
1881	540	.....
.....	.....	35,100
1882	810	.....
.....	.....	52,650
1883	955	.....
.....	.....	68,750
1884	1,141	.....
.....	.....	75,097
1885	2,440	.....
.....	.....	142,441
1886	3,458	.....
.....	.....	206,251
1887	4,619	.....
.....	.....	226,976
1888	4,404	.....
.....	.....	255,097
1889	6,113	.....
.....	.....	426,554
1890	9,860	.....
.....	.....	1,260,240
1891	9,279	.....
.....	.....	999,878
1892	6,082	.....
.....	.....	390,462



Quebec, together with a small amount from the asbestus deposits occurring in the Laurentian rocks of Templeton township, Ottawa county, in the same province. ASBESTUS. Statistics.

ASBESTUS.

TABLE 1.

EXPORTS. Exports and Imports.

Quality.	1889.		1890.		1891.		1892.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
1st class	4,579	$319,461	5,453	$453,704	4,530	$338,072	1,447	$113,595
2nd "	593	27,308	1,172	58,973	3,186	209,833	3,185	228,133
3rd "	416	13,375	373	15,853	298	13,636	748	31,375
Totals...	5,588	$360,144	6,998	$528,530	8,014	$561,541	5,380	$373,103

ASBESTUS.

TABLE 2.

IMPORTS.

Fiscal Year.	Value.
1885.....	$ 674
1886.....	6,831
1887.....	7,836
1888.....	8,793
1889.....	9,943
1890.....	13,250
1891.....	13,298
1892.....	14,090

DISCOVERY AND DEVELOPMENT. Discovery and development.

With regard to the conditions of occurrence of the deposits in the Eastern Townships and the mode of mining adopted there, full details have been given in previous reports which need not be repeated here, and details of the same nature regarding the deposit worked in Templeton are to be found in Vol. V., Annual Report of the Geological Survey Deparment, p. 298.

The accompanying graphic table A shows the fluctuations in production of this mineral for the past eleven years.

The amount exported (see table 1) shows that nearly all the production found a market outside of Canada. In fact there are but two firms manufacturing asbestus goods in Canada.

ASBESTUS.

List of operators.

The Customs returns show a small importation under the heading Asbestus, probably all manufactured articles.

The following is a list of the chief operators during the year:

The Bell's Asbestus Company.
The H. W. Johns Manufacturing Company.
Messrs. Johnson & Company.
Messrs. King Brothers.
The American Asbestus Company.
The Beaver Asbestus Company.
Messrs. Frechette & Poirier.
The St. Cyr Asbestus Company.
Messrs. Ward Bros.
The Thetford Asbestus Mining Company.
The Brompton Lake Asbestus Company.
The Lambly Mining Company.
The Anglo-Canadian Asbestus Company.
The United Asbestus Company.
Messrs. W. H. Jeffrey & Company.
Messrs. J. C. Bedard & Company.
The Jas. Reed Company.
The Glasgow & Montreal Asbestus Company.
The Templeton Asbestus Company.

Besides the above mentioned there were a number of other operators who did more or less development work.

COAL.

COAL.

Statistics.

STATISTICS.

As may be seen on reference to the accompanying graphic table A there has been a very material falling off in production during 1892, amounting to 330,529 tons, whilst the decrease in the value of the production reached the sum of $959,737, or very nearly ten per cent of the value of the coal produced in 1891. This decrease is attributed altogether to Nova Scotia and British Columbia, while in the production of both New Brunswick and the North-west Territories there was a slight increase.

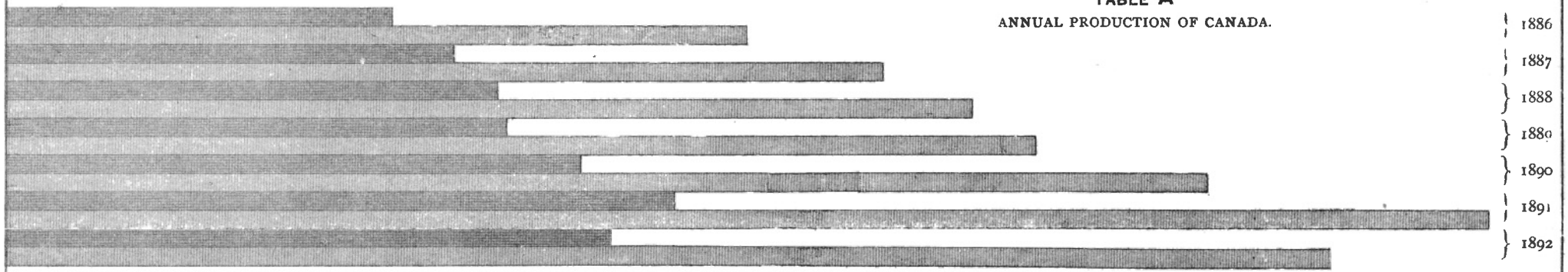
It will be seen on reference to graphic table B that Nova Scotia still continues to be the largest producer, though but slightly ahead of British Columbia as to the value of the output.

The figures of production in the various provinces during past years are given in graphic tables C and D and table 1 following.

COAL

TABLE A

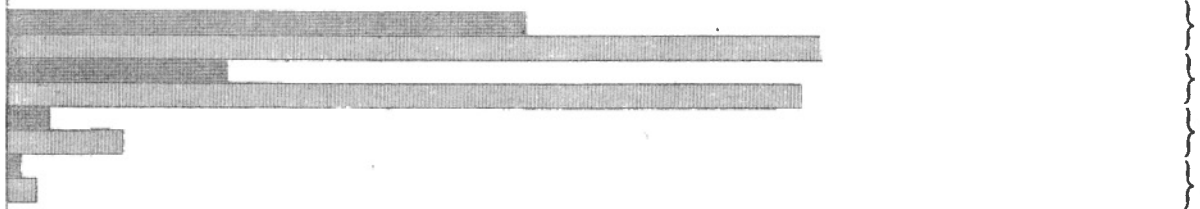
ANNUAL PRODUCTION OF CANADA.



Value.	Tons.	
.....	2,091,976	1886
$4,017,225	.....	
.....	2,418,494	1887
4,758,590	.....	
.....	2,658,134	1888
5,259,832	.....	
.....	2,719,478	1889
5,584,182	.....	
.....	3,117,661	1890
6,496,110	.....	
.....	3,623,076	1891
8,144,247	.....	
.....	3,292,547	1892
7,184,510	.....	

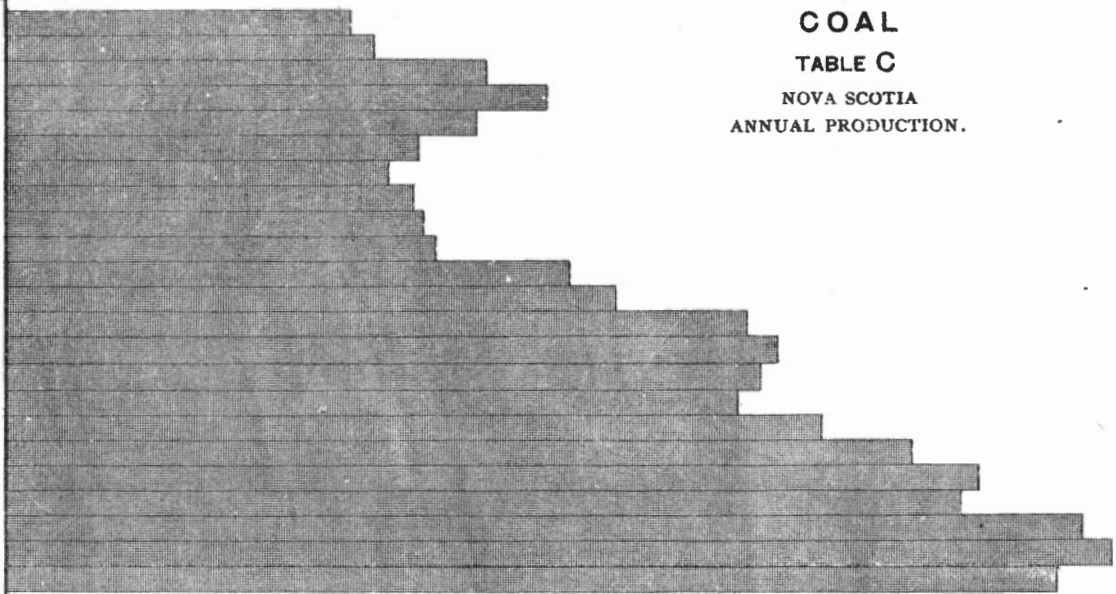
PRODUCTION BY PROVINCES
1892.

TABLE B



Value.	Tons	
.....	2,175,914	Nova Scotia
$3,399,865	.....	
.....	925,495	British Columbia
3,305,340	.....	
.....	184,370	N. W. Territories
469,930	.....	
.....	6,768	New Brunswick
9,375	.....	

Year	Tons
1870	700,861
1871	754,031
1872	984,664
1873	1,117,643
1874	977,446
1875	848,395
1876	794,803
1877	848,395
1878	863,081
1879	882,863
1880	1,156,635
1881	1,259,182
1882	1,529,708
1883	1,593,259
1884	1,556,010
1885	1,514,470
1886	1,682,924
1887	1,871,338
1888	1,989,263
1889	1,967,032
1890	2,222,081
1891	2,290,935
1892	2,175,914

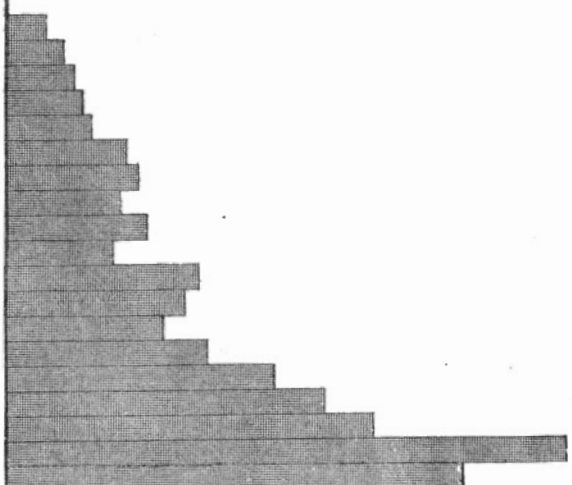


COAL

TABLE C

NOVA SCOTIA
ANNUAL PRODUCTION.

Year	Tons
1874	81,574
1875	110,145
1876	131,192
1877	154,052
1878	170,846
1879	241,301
1880	267,595
1881	228,357
1882	282,139
1883	213,299
1884	394,070
1885	365,596
1886	326,636
1887	413,360
1888	548,017
1889	649,409
1890	759,517
1891	1,152,588
1892	925,495



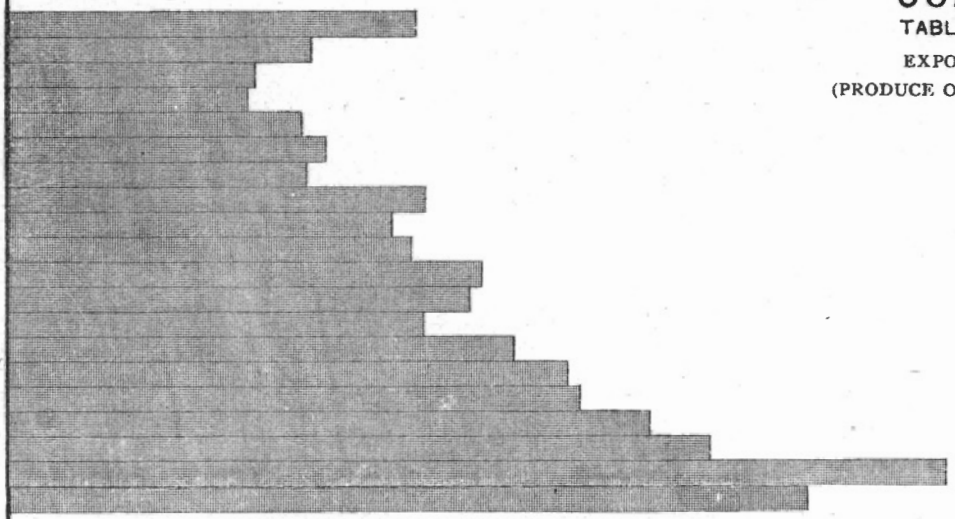
COAL

TABLE D

BRITISH COLUMBIA
ANNUAL PRODUCTION.

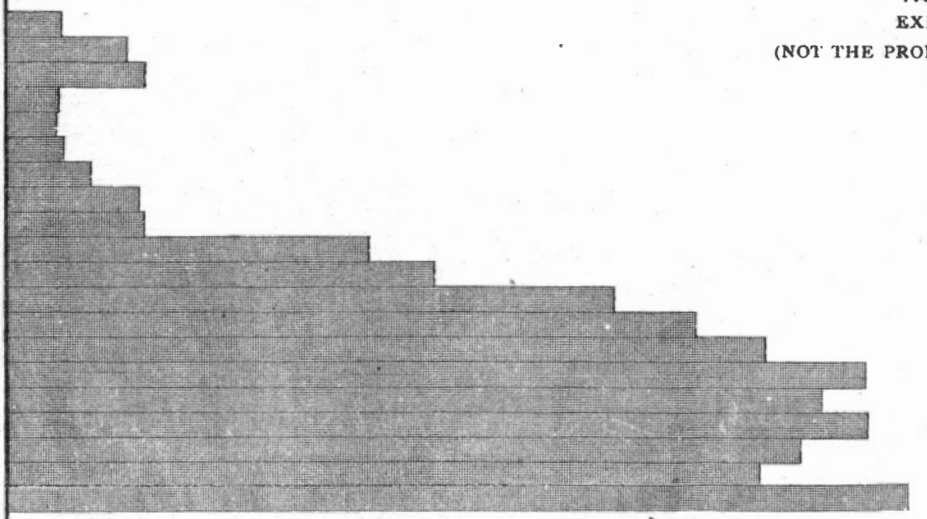
COAL
TABLE E
EXPORTS
(PRODUCE OF CANADA)

Year	Tons
1873	420,683
1874	310,988
1875	250,348
1876	243,638
1877	301,317
1878	327,959
1879	306,648
1880	432,188
1881	395,382
1882	412,682
1883	486,811
1884	474,405
1885	427,937
1886	520,703
1887	580,965
1888	588,627
1889	665,315
1890	724,486
1891	971,259
1892	823,733



COAL
TABLE F
EXPORTS
(NOT THE PRODUCE OF CANADA)

Year	Tons
1873	5,403
1874	12,859
1875	14,026
1876	4,995
1877	4,829
1878	5,468
1879	8,468
1880	14,217
1881	14,245
1882	37,576
1883	44,388
1884	62,665
1885	71,003
1886	78,443
1887	89,098
1888	84,316
1889	89,294
1890	82,534
1891	77,827
1892	93,988



COAL.

Coal. Statistics.

TABLE 1.

PRODUCTION IN NEW BRUNSWICK AND NORTH-WEST TERRITORIES.

Year.	New Brunswick.		North-west Territories.	
	Tons.	Value.	Tons.	Value.
1887.....	10,040	$23,607	74,152	$157,577
1888.....	5,730	11,050	115,124	183,354
1889.....	5,673	11,133	97,364	179,640
1890.....	7,110	13.850	128,953	198,498
1891.....	5,422	11,030	174,131	437,243
1892.....	6,768	9, 75	184,370	469,930

EXPORTS AND IMPORTS.

Exports and Imports.

The figures of exports and imports are as in the past taken from the books of the Customs Department and are shown in the following tables, all of which explain themselves. Numbers 2, 3 and 4 and the graphic tables E and F refer to exports only, while in tables 5, 6 and 7 will be found the figures of imports which are for the fiscal year ending 30th June :—

COAL.

TABLE 2.

EXPORTS : THE PRODUCE OF CANADA.

Provinces.	1891.		1892.	
	Tons.	Value.	Tons.	Value.
Ontario	.....	.....	55	$ 248
Quebec	4,644	$ 7,304	4,138	6,262
Nova Scotia.....	194,867	417,816	181,547	407,980
New Brunswick.....	1,747	5,194	1,905	6,639
Prince Edward Island.	35	109	50	150
Manitoba	2,232	4,655	31	74
North-west Territories.	.....	.....	36,291	67,683
British Columbia.....	767,734	2,958,695	599,716	2,317,734
Totals	971,259	$3,393,773	823,733	$2,806,770

Coal.

Exports and Imports.

Coal.

Table 3.

Exports: Not the Produce of Canada.

Provinces.	1891.		1892.	
	Tons.	Value.	Tons.	Value.
Ontario	63,777	$158,416	81,557	$204,867
Quebec	11,565	25,953	8,060	16,247
Nova Scotia	2,319	6,217	2,752	6,811
New Brunswick	165	432	1,618	6,128
Manitoba	1	15	.....	.....
British Columbia	.....	.....	1	10
Totals	77,827	$191,033	93,988	$234,063

Coal.

Table 4.

Exports: Nova Scotia and British Columbia.

Year.	Nova Scotia.		British Columbia.	
	Tons.	Value.	Tons.	Value.
1874	252,124	$647,539	51,001	$ 278,180
1875	179,626	404,351	65,842	356,018
1876	126,520	263,543	116,910	627,754
1877	173,389	352,453	118,252	590,263
1878	154,114	293,795	165,734	698,870
1879	113,742	203,407	186,094	608,845
1880	199,552	344,148	219,878	775,008
1881	193,081	311,721	187,791	622,965
1882	216,954	390,121	179,552	628,437
1883	192,795	336,088	271,214	946,271
1884	222.709	430,330	245,478	901,440
1885	176,287	349,650	250,191	1,000,764
1886	240,459	441,693	274,466	960,649
1887	207,941	390,738	356,657	1,262,552
1888	165,863	330,115	405,071	1,605,650
1889	186,608	396,830	470,683	1,918,263
1890	202,387	426,070	508,882	1,977,191
1891	194,867	417,816	767,734	2,958,695
1892	181,547	407,980	599,716	2,317,734

Coal.

Table 5.

Imports of Bituminous Coal.

Fiscal Year.	Tons.	Value.
1880	457,049	$1,220,761
1881	587,024	1,741,568
1882	636,374	1,992,081
1883	911,629	2,995,198
1884	1,118,615	3,613,470
1885	1,011,875	3,197,539
1886	930,949	2,591,554
1887	1,149,792	3,126,225
1888	1,231,234	3,451,661
1889	1,248,540	3,255,171
1890	1,409,282	3,528,959
1891	1,598,855	4,060,896
1892	1,615,220	4,099,221

Coal.

Table 6.

Imports of Anthracite Coal.

Fiscal Year.	Tons.	Value.
1880	516,729	$1,509,960
1881	572,092	2,325,937
1882	638,273	2,666,356
1883	754,891	3,344,936
1884	868,000	3,831,283
1885	910,324	3,909,844
1886	995,425	4,028,050
1887	1,100,165	4,423,062
1888	2,138,627	5,291,875
1889	1,291,705	5,199,481
1890	1,201,335	4,595,727
1891	1,399,067	5,224,452
1892	1,479,106	5,640,346

Coal.

Exports and Imports.

Coal.

Table 7.

Imports of Coal Dust.

Fiscal Year.	Tons.	Value.
1880..	3,565	$ 8,877
1881..	337	666
1882..	471	900
1883..	8,154	10,082
1884..	12,782	14,600
1885..	20,185	20,412
1886..	36,230	36,996
1887..	31,401	33,178
1888..	28,808	34,730
1889..	39,980	47,139
1890..	53,104	29,818
1891..	60,127	36,130
1892..	82,091	39,840

Consumption.

The approximate quantity of coal consumed in Canada during 1892, assuming that the imports for the fiscal are the same as for the calendar year, was as follows :—

	Tons.
Production	3,293,547
Imports	3,176,417
	6,469,964
Less exports	917,721
	5,552,243

This shows a decrease from figures obtained in the same way for 1891 of 80,796 tons, induced probably by the greater entry into the market of natural gas in certain parts of Ontario and the use in place of coal-gas of electric light generated by water power.

Markets.

Of the coal produced in Nova Scotia during the year 7½ per cent only was exported, the greater part going to Newfoundland, the exportation to the United States having fallen off about one-half, while a slightly smaller quantity than usual was sent to the West Indies.

As in the past years the United States is the principal foreign market for the coal produced in British Columbia, the port of San Francisco alone during the year receiving 425,170 tons. Small quantities also were exported to China, Japan, and other Pacific markets.

Nova Scotia.

In Nova Scotia there were nineteen collieries producing during the year, the production of each being shown in the following table 8, which with tables 9, 10 and 11 are compiled from information afforded us by the Department of Mines in that province. Coal. Nova Scotia.

Coal.

Table 8.

Nova Scotia.

Production by Collieries.

Colliery.	Tons.	Colliery.	Tons.
Chignecto	202	Glace Bay	118,291
Joggins	71,126	Gowrie	173,426
Minudie	2,065	International	125,279
Springhill	439,851	Ontario	31
Maccan	269	Reserve	173,365
Acadia	280,949	Victoria	136,234
East River	2,212	Sydney	212,793
Intercolonial	220,531	Rankine	1,398
Bridgeport	36,098	Sea coal	504
Caledonia	134,658		
Gardener	46,632	Total	2,175,914

Coal.

Table 9.

Nova Scotia.

Production, Sales and Colliery Consumption.

Period.	Production.	Sales.	Colliery Consumption.
1892, first quarter ... Tons.	355,605	209,222	39,737
1892, second " ... "	609,258	563,164	55,737
1892, third " ... "	667,097	685,538	54,859
1892, fourth " ... "	543,954	505,362	45,770
Total. ... "	2,175,914	1,963,286	196,103
1891 ... "	2,290,935	2,071,938	195,981
1890 ... "	2,222,081	2,000,444	180,589
1889 ... "	1,967,032	1,741,720	177,106
1888 ... "	1,989,263	1,765,895	176,336
1887 ... "	1,871,338	1,702,046	156,550
1886 ... "	1,682,924	1,538,504	159,512
1885 ... "	1,514,470	1,405,051	142,939

Coal.
Nova Scotia.

Coal.

Table 10.

Nova Scotia.

Coal Trade by Counties.

Year 1892.	Cumberland.		Pictou.		Cape Breton.		Other Counties.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
First quarter	133,129	123,786	84,301	68,162	137,382	17,030	793	244
Second "	120,089	109,800	138,172	125,759	350,755	327,467	242	138
Third "	117,093	108,220	149,090	140,229	400,047	436,395	867	694
Fourth "	143,201	131,559	132,129	119,962	268,624	253,841	....	....
Total, 1892.	513,512	473,365	503,692	454,112	1,156,808	1,034,733	1,902	1,076
" 1891.	583,688	517,739	500,829	453,707	1,206,064	1,100,279	354	213

Coal.

Table 11.

Nova Scotia.

Distribution of Coal Sold.

Market.	1891.	1892
	Tons.	Tons.
Nova Scotia, transported by land..	404,031	391,023
" " " sea..	312,474	307,832
Total.....	716,505	698,855
New Brunswick.....	256,833	240,296
Prince Edward Island.....	75,570	63,435
Quebec.....	868,320	835,561
Newfoundland.	121,651	106,399
West Indies.....	4,576	3,191
United States	28,483	15,549
Total	2,071,938	1,963,286

Discovery and development in Nova Scotia.

The following details are taken from the report of the Department of Mines of Nova Scotia, and will show the state of the industry during 1892*.

"The returns show a sale during the past year of 1,752,934 tons against 1,849,945 tons during the preceding year.

*The tons mentioned in the following extracts are of 2,240 lbs.

"As compared with the sales of the year 1891 the most noticeable points are :— COAL.

Discovery and development in Nova Scotia.

"The home sales are 623,978 tons compared with 639,737 tons in 1891.

"The province of Quebec took 746,037 tons against 775,286 tons in 1891.

"The sales to the United States were 13,883 tons as compared with 25,431 tons in 1891.

"The sales to Newfoundland, New Brunswick, Prince Edward Island and other points show little difference.

Cumberland County.

"The sales of the county were 422,641 tons against 462,267 tons in 1891.

"The production of the collieries of the Cumberland Railway and Coal Company was 392,724 against 459,395 tons in 1891. Since the date of the last report a complete set of underground haulage has been put in, and the surface works further improved. Safety lamps alone are used underground and no explosives.

"The Chignecto mine has remained closed, and no returns of a satisfactory character have been received of the results of the prospecting carried on for other seams.

"At the Joggins mines the system of long wall has been continued, and improvements made to the railway and wharf. The output was 63,505.

"During the past season an American company took over a number of coal leases including the Joggins and other areas in the river Hebert and Macan districts, and will, it is expected, shortly develop them on a large scale.

Spring Hill Mines, No. 1 Slope.—"This slope is now down a distance of 2,609 feet by the new lift lately finished, and the levels are extended and balances driven up to the 1,900 feet lift. The west levels are being advanced, and the coal between them and the "Stony" level is worked long-wall. The lodgment at 1,300 feet lift has been repaired and a dam four feet thick, built with lime and cement, 200 feet inside the pump, allowing them to extract the 200 feet barrier which was formerly left to prevent the waters from flowing down into the lower lift. The principal work done on the east side of the back seam has been drawing pillars; on the west side, the level has been advanced and balances driven up to the lift above. The new sinking has been opened up with travelling slope and pipe slope and

COAL.

Discovery and development in Nova Scotia.

levels turned away. The new lift is 1,000 deep. In the month of September work was begun to introduce the system of haulage by tail-rope in this mine. The engine-house is finished and other branches of the work progressing. The following are the lengths of haul in different sections: On 1,900 feet lift, west side east seam, 4,000 feet; east side, same seam, 1,000 feet; west side, back seam, 4,400 feet; east side, back seam, 2,500; and on the 2,600 feet lift, west side, 1,500 feet, east side 1,000 feet. The pipe head has been widened to 8 feet and retimbered with iron booms, and the mine board in west side has been stripped and retimbered with heavy timber. A large amount of extra work had to be done in this mine during the past year, caused by a fault which had to be cut through both on old lift and new lift, and the turn-outs had to be lengthened (which was chiefly stone work) to render them suitable for the tail-rope system.

No. 2 Slope.—"The bulk of the work done in this mine for the past season was drawing pillars, principally on the 1,300 feet lift, and so far they have been won very clean. There is still a large amount of this work before the standing work will all be let down; to the rise of the Stony level it is worked long-wall successfully. On account of the presence of black damp, some trouble was experienced in drawing some of these pillars, but little or no fire damp has been met with in this mine. They began working the pillars from inside, and working back towards the bottom. In the month of June, preparations were made to introduce the tail-rope system of haulage, the engine is placed and the engine-room finished, and the other work is nearing completion. Following are the lengths of haul in the different sections:—Stony level, 4,000 feet; east side west slope seam. 4,000 feet; Jig-wheel, 400 feet; New seam, 1,000 feet. The levels will be extended on the west side of the mine, both in the new seam, so called, and Stony level. The principal work in east side on this lift will be pillar working. It is not likely that the new lift will be worked to any extent for the next year.

No. 3 Slope.—"This slope has, I think, the largest daily output of any mine in my district, there being daily drawn up from 1,000 to 1,200 boxes. The seam varies in thickness, and different systems of work are carried on to suit this. On the east side at 1,300 feet lift it is worked long-wall. On the west side, same lift, the levels are being extended and back balances driven up to next lift with the bords advancing, and there are sets of men coming behind drawing the pillars; in the lower lift the work is the same long-wall on the east side, and bord and pillar on west side. They are sinking the slope for another lift. In the month of April, preparation was being made to introduce

Discovery and development in Nova Scotia.

the tail-rope system of haulage and completed in the early part of October, and on the 10th of October began to work on both sides of 1,300 feet lift.

" The length of haul, on west side of 1,300 feet lift, is 5,000 feet; in east side, same lift, 2,500 feet; on the 1900 feet lift, west side, 3,000 feet; and on east side, same lift, 2,000 feet.

" Nos. 1 and 2 slopes have been connected overground by a trestle-work 597 feet long, an average height 50 feet, on which are one full road and two empty ones. An engine is placed in position to run an endless chain conveying full boxes up the grade, and also an endless rope on the empty roads.

" A double revolving screen 33′ x 42″ has been erected at No. 2 slope for screening coal for both slopes. Connected with this screen are two sets of elevators and one set of conveyors, also 5 coal bins which hold from 300 to 400 tons of coal. These bins are all lined inside with iron. There will be 3 engines in use at the Springhill Mines for tail-rope haulage of the following dimensions :

" Size of cylinder, 16″x20″; Drum barrel, 5 feet diameter; face, 2 feet; depth of flange, 6″; 4 drums, 2 for hauling and 2 for tail-rope; engines geared 3 to 1 of the drums; average steam pressure 70 lbs.

" *Minudie Mine.*—Not much work has been done at this mine for the past 5 or 6 years, excepting for a few months in winter season, and then the work was done along the crop, there being a water level giving them nearly 100 feet of coal. The slope has been sunk 200 feet below this water level, and the owners have decided to work the mine, and engaged Frank Burrows as manager, and at my visit in December 19th the water was nearly out. I understand it is the intention to work this mine on the long-wall system, for which it is well adapted, as there is about 4 feet of coal with 9 inches of fire-clay in the middle of the seam.

Crookshank's Mine.—" This mine is sunk some 200 feet on a seam of coal from two feet thick upwards, and partially worked long-wall. There are only from 15 to 20 men employed as yet. The arrangement for ventilation is very good, two air returns being driven to the surface. Mr. Burbine is under manager, and James Baird, Esq., is general manager of this mine as well as the Joggins.

Saltsprings.—" Some little work has been done in this mine during the summer. About eight men were employed, and they sank down in the seam 100 feet or more. The coal lays at an angle of from 75° to 80°. The work is stopped at present. They have erected an engine and pump, and are in a fair condition to develop the mine.

COAL.

Discovery and development in Nova Scotia.

Joggins Mines.—"This mine has been worked very successfully, long-wall, during the past year. A new lift of 420 feet has been sunk in the long-wall system. The sinking was started on the east side, about 200 feet from the slope. The landing place was 30 feet wide, and cogs or buts were carried down on one side and sets of men started on the other side and worked until the pipe-head was reached. Then the cogs were made somewhat larger and the pipe-head won out. Then the main slope was next won out and so on until the lift was put down 420 feet with pipe-head, main slope and travelling way. The coal has all been taken out in this lift and the entire section resting on packs.

"A place is now being driven to the surface for an airway for the east side, and a place is being repaired up through the old works for an airway for the west side, and the present airway will be for the new lift. During the year the second track has been laid in the slope. This, with the new lift, will give the management an opportunity to increase the output. Two new boilers have been put in, a new engine house, 42 x 24 feet, and the engine moved into it. A new office has been built, 36 x 32 feet, of latest designs.

Lawson Mine.—"This mine was abandoned last June, very little work having been done in it for the preceding part of the year.

Chignecto.—"This mine worked for two or three months in the winter, about six men being employed, and has remained idle ever since.

Pictou County.

"The sales were 405,457 tons as compared with 405,096 tons in 1891.

"The home sales were 256,545 against 265,098 tons in 1891.

"The province of Quebec took 97,334 tons compared with 63,219 tons in 1891.

"The output of the Acadia Company was 250,847 tons, and of the Intercolonial Company 196,903.

"The operations of the Acadia Coal Company in reopening the Foord pit were being continued with favourable prospects until near the close of the year, when fire was discovered in close proximity to the new workings. As a precautionary measure, the men and horses were withdrawn and the pits sealed. As the indications of fire increased, water was admitted from the river, and at present the work of reopening this valuable seam is suspended.

McGregor Pit, Stellarton.—"This mine was worked up until the 24th August, but was idle from that date to the 1st December. The new

balances spoken of in last year's report have been completed, and one almost worked out. The work being done at present is principally on the south side of the mine. This pit has the largest volume of air in circulation in any one mine in my district, and is to all appearances, now safe and comfortable. The present grasp of the coal is getting somewhat circumscribed, and cannot well be enlarged unless they sink, which may not be advisable until some more pillars be taken out, a proceeding which will be attended with grave responsibility both to life and property, as this is the lowest seam worked in this basin, and the overlying seams are all more or less on fire.

COAL. Discovery and development in Nova Scotia.

Third Seam Slopes.—" The balance on north side mentioned in last year's report is still being worked and the levels extended for other balances, which is all the work being done in this seam. The south side has been worked very little this year. The cage pit seam is being worked by way of the tunnel from third seam, and the levels extended north and south considerable distance and balances driven up. As the old works of the cage pit are to the rise, the balances are at the first short, but now the level on south side is advanced sufficiently far to where the balances may be driven up hill several hundred feet more. This will increase output and lessen expenses. The four-foot seam which is cut by the same tunnel is being worked long-wall, and under this system a most magnificent percentage of coal is being won. It is a beautiful coal and a mine easily ventilated. There is a connection from this seam into the drift leading from the cage pit into the Foord pit. The work in those three seams has been very fortunate.

English Slopes, Stellarton.—" At the English Slopes they began sinking in February, and in May it was found necessary to increase the ventilation, the means previously employed being a steam jet. A small blow-down fan was then erected, which gave from 7,000 to 8,000 feet of air per minute, and as but 2 places were sinking, this would seem to be sufficient, but during the summer months it was found necessary to stop sinking. The water for generating steam became scarce and the gas on indicator read from 1 to 3 per cent. They remained idle for two or three months. It is intended (or was), to connect these slopes with the Foord pit. The tunnel from the Foord pit being very fiery during the summer months it became necessary to suspend operations for a while. If it had not been for those drawbacks, the connection would in all probability have been accomplished. These slopes are now down 2,800 feet, their estimated distance, and the tunnel from Foord pit, is within 100 feet by estimation.

Foord Pit.—" The slants I have previously reported as being down a distance of 400 feet, were continued down to a distance of about 1,000

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feet, where a fault was struck. Several bords were turned off and some very good coal extracted. During the season there were signs of fire at the bottom of the old fan shaft. It was at once damped down and work on the south side of the mine stopped and the men put to work on the north side. Several places have been driven through into the old workings, and in one of them, in August last, at a point 300 or 400 feet to the rise, the temperature was from 95° to 98°. Operations continued on fairly well until the 11th of November, when some of the men discovered very high temperature at a point 300 feet from the bottom of the shaft, about 240 feet to the rise, and on the 12th November, when I visited the mine, I considered the fire was overhead in the old workings, and the management talked over the advisability of putting boreholes through the umbrella roof to ascertain if the fire was local or if it was the old fire coming down hill. However, on the 23rd of same month, smoke was observed coming through the cribbing of the shaft, and not knowing how near the shaft the fire might be, all the men were sent up out of the mine, also the horses, boxes and tools, and at my visit on the 24th, I found the mine damped down. A few days subsequently, a consultation was held between E. Gilpin, Esq., Inspector of Mines; H. S. Poole, Esq., General agent; Mr. Wills, manager, and it was agreed that it would be best to let the pit stand damped down as it then was, until the water would fill in to the top of the arches at pit bottom. I visited this mine twice shortly afterwards, and the manager informed me that gas would fire at the top of the pit. On the 7th of December it exploded slightly. I saw Mr. Wills, who then told me he decided to let the water from East River run into the pit, which was done, and the water allowed to rise about 30 feet in the shaft.

Six Foot Seam, Thorburn.—"This mine worked on in its usual way until March, when Mr. Joseph Dakers resigned the management and was succeeded by Mr. J. W. Sutherland, of Westville, who began improvements by enlarging the intake airway from the 700 feet level to the 1,100 feet level and retimbering it, and also retimbering it from the 1,100 feet level to 1,800 feet level. He also had a new overcast made at 1,800 feet level to carry the air over the main level to mine bord. He then began sinking the slope, and on December 5th it was down 600 feet and still sinking at this point. However, there is quite a change in the angle of the seam, it would almost appear as if the basin of the coal seam had been attained, as the angle of the coal seam is inclined to rise 2° or 3° instead of dipping 14° or 15°. The coal has improved in appearance to the dip. The long-wall system has been stopped altogether, the management having reverted to the bord

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and pillar system with back balances, and are now engaged driving up a balance on the west side from the 1,800 feet level to the 1,100 feet level, which, when accomplished, will shorten the return airway considerably. There have been two balances driven up on the east side making now three balances working on east side. The levels on the east side were driven up to a fault and stopped. It is very probable they will prove this fault during this winter. On the west side the coal thinned down to about three feet in the levels, which were then stopped. The main slope, from the 1,100 feet lift, has been laid with two tracks instead of one as previous, and otherwise has been put in good shape with new timber and new sills. The mine is in very good condition and been very clear of accidents, one of which, however, was fatal. No attempt has as yet been made to open up the McBain seam.

Intercolonial Coal Mining Company.—"A very large amount of coal, during the past season, has been extracted from the large block of coal referred to in last year's report. Some of it is still there however. The pillar working has been very successful during the past year. There was another lift sunk some 400 feet, making the total length of slope now 4,100 feet on the north side at the 3,600 feet lift. The levels are driven to the boundary line and back balances driven up to the 3,000 feet lift. On the south side the levels are in 2,500 feet and are being still driven. Two back balances are driven up to the 3,000 feet lift on this side. The coal appears to improve as they go to the dip. Near the crop on the north side there was a considerable area of pillars standing, a large proportion of which were successfully drawn during the summer.

Scott Pit.—"There were nine or ten sets of men working in the Scott pit, but in October it was stopped and they started sinking the slants, but only drove a few yards when they met a downthrow of four or five feet. The coal then came in regularly and of extra quality for a few more yards when another downthrow of four or five yards was encountered. This is one of the reasons why the coal was not more quickly obtained in the drift. And also when the angle was taken at 3,000 feet, main seam, it was 20°, but as they advanced toward the second seam, the angle flattened, so that before the coal was struck it was only 15°.

"On the 8th December, the coal in the tunnel was fired by a shot of roburite, and it took considerable trouble before it could be put out, as there were present some very strong feeders of gas.

Acadia.—"During the past year this mine has been worked steadily. All the work on north side is long-wall, and a large percentage of the

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coal has been won. On the south side it has been worked, bord and pillar, and here, in mining the coal, they met with considerable trouble on account of the enormous pressure. The management have decided to try long-wall in this side for the balance of the work on this lift. I have previously reported on the nature of the roof they had to contend with, and I can only add now it is no better, whatever, worse. They have sunk another lift of 350 feet, making a total depth of 3,910 feet in the angle and about 1,700 perpendicular height. This, with bad roof and tender coal, will give some idea of what there is to contend with. This lift was sunk 9 by 7¼ feet, and before the lift was sunk it was found necessary to lift some bottom to permit the boxes to pass up and down. After the sinking was finished they were obliged to strip the top and lift the bottom and put on wooden packs to keep it open. This lift will all be worked long-wall. It is a very difficult matter to keep the return airways open, and on account of the great depth the temperature is very high. Gas is issuing as free as ever. Still with all these drawbacks, it is, and has been, almost free from accidents of any kind.

East River Area—John Muir and Son.—"During the year a portion of the block of coal in east side of slope was taken out, but sufficient left to support the slope. He has now resumed work on the west side of slope as usual. Some two or three men are about all that have been at work here.

Cape Breton County

'The total sales for this county were 923,869 tons, against 982,392 tons in 1891.

"The production and sales of the Collieries for the year 1893 were :—

Colliers.	Raised Tons.	Sold Tons.
Bridgeport	32,230	31,328
Caledonia	120,230	107,200
Gardner	41,636	39,485
Glace Bay	154,845	138,413
International	111,856	105,479
Ontario	28	28
Reserve	154,790	135,836
Sydney	189,994	164,078
Victoria	121,638	108,332

"Some prospecting work was done at various points, but no details have been received by the department.

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Sydney Mines.—"Extensive repairs have been made at this colliery during the year. In the main pumping shaft, 300 feet of cast-iron tubing have been put in place; in the cage slides, pump and pump frames have been renewed and 400 feet of pump rod put in place

"The pulley frame of the main hoisting shaft has been strengthened by placing in position with the present frame string pieces of pitch pine timber. A speaking tube has been placed in the main shaft.

"The Queen pit upcast has been repaired from top to bottom, the old wood taken out and new wood put in. In the pit, the north side workings have been concentrated towards the dip, and all the coal hauled up the pump deep, from the lowest landing, which is 1,760 yards from the shaft, or 1,500 yards below the bank head.

"A slant road has been driven to the old Skinner's Section, by which the coal from there and old No. 2, will be run down self-acting. Below old No. 3, the submerged district, a branch has been started and working since last June; 200 yards below there a fine section of coal is won, and now in good working order with a very fine landing there. Also a double road is being laid from the bank head, 1,000 yards down this deep; in order to facilitate the haulage of the coal from the increased depth, a pair of 15-inch cylinders, a pair of 26-inch cylinder engines, are being built to supersede those now in use.

"On the south side of the pit the main deeps have been extended 300 yards below the large trouble, and a new landing made there which is now in operation; this will be the finest section in the pit, nearest the shaft total distance being 1,140 yards.

"Mr. John Greener has sunk a small shaft on his area through what is called the No. 3 seam, and has had a few men getting coal out of it during last winter, which was sold I presume for local purposes. I understand that work is resumed again there this winter.

Victoria Mines.—"Work has been very actively prosecuted at this mine during the present year. The west main slant has been extended and another lift of 600 feet gained, and a pair of both east and west levels are in course of being driven.

"The west levels are in about 350 feet, but no balance commenced yet.

"The management thought to abandon the 1,200 feet lift going west where they were taking out the pillars owing to the subsidence of the overlying strata interfering with their railroad.

"The east level in the 1,200 feet lift in the east slope is now about 4,200 feet in from the engine landing. One balance having been driven during the year, and 20 rooms won out; and another balance

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commenced near the face of the levels, which will in all probability be the last one in this section, as the cover thins out in this direction and would most likely admit water into the mine if continued much further.

"The east levels in the 1,800 feet, lift in the same slope are in some 3,000 feet and rising at an angle of 5°, this is driven so as the tubs will self act (on incline,) and thus do away with horses.

"Three balances are at present working in this district. I am informed by the management that it is their intention to bring all the coal out on the centre slope in the near future, for which preparations are being made, and three separate roads are being driven, one being intended for the haulage road with two tracks of rails, so that the engine will be assisted when bringing a full trip up the slope by the empty trip going down at the same time.

"On the east side of the centre slope a separate road has been driven for the steam and water pipe from the pumps, and on the west side of the centre slope a road is made, to be used as a separate way for the workmen travelling to and from their work.

"I might state that stoping has been successfully carried on during the shipping season and hardly any coal lost.

"The eight feet diameter 'Murphy Fan,' mentioned in my last report has been erected and is doing its work satisfactorily.

"The heapstead is being all covered in order to keep the banksmen dry during wet or stormy weather, and also keep the rain and snow from drifting into the mouths of the slopes during the winter season.

Lingan Mines.—"Two or three men have been working in this pit part of the summer, and raised about 160 tons of coal, which has been shipped to Sydney mines.

Gardner Mines.—"Work has been going on steady during the past year. Mining coal has been chiefly confined to the south side of the pit.

"The levels have been extended 400 feet and the headways about 300 feet. At the time of my last report the one level was used for haulage, drainage and return airway. Since, a lower level has been driven, and used for drainage and return airway, making a remarkable improvement. The water lodgment has been considerably enlarged.

"An incline road has been laid from the pit bottom to about 600 feet towards the rise where a breast of about 250 feet has been opened out and worked successfully by the Jeffrey electric coal cutting machine. A second incline is in course of construction which will be 1,000 feet in length, striking the face of the workings on the south side at a point about 600 feet to the rise of the level and will take the coal

direct to the pit bottom, relieving haulage by horse and largely increasing facilities for getting coal.

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"On the surface many improvements are visible. A smoke-stack 60 feet long by 3 feet dia. made out of $\frac{3}{8}$-inch iron has replaced the two smaller ones previously used. A tubular boiler 14 feet long by 4 feet with 6-inch dia. flues has been put in service. An engine of 10-horse power has been fitted and used for hauling coal from bank. A hot well has been sunk, from which boilers are being supplied.

"The old dwelling houses which were in a dilapidated condition have been all thoroughly repaired and tenanted by miners and their families.

Old Bridgeport.—"Mining has been confined to the south and rise of the south levels during the season. The incline road has been extended further to the rise and a new section of rooms opened out there.

International.—"There have been no new features of work in this mine during the year. No. 9, south levels have been extended seven chains, ventilation was good, and rooms and roadways well timbered. On the bank a slack bunk was built, 100 feet long by 28 feet wide, capable of holding 700 tons, from which the slack coal can be run into the waggons with very little shovelling.

"The bank frame and part of the heapstead have also been raised.

Little Glace Bay.—"During last winter a pair of deeps were started on the south side of the pit, and driven to the dip 866 feet, and levels broken off north and south and driven about 600 feet each.

"Rooms have also been opened up there, at the time of driving those deeps and levels it was found very difficult to keep up the roof, it would come down without giving any warning, a thickness of six feet in places and cutting along the pillar, and breaking close to the face. However, after the rooms were opened out, the pressure on the narrow places were relieved and the trouble ceased.

"An engine with a pair of cylinders 12 x 24 inches, is placed to the rise of the pit on the south side, by which the coal is hauled from the deeps, and then run back to the pit bottom.

"On the 1,800 foot headway where the coal used to be hauled by horses, it is now run by an incline road self-acting.

"A new hoisting engine has been put in place of the old one, with a pair of cylinders 18 x 24 inches, and drum 7-foot diameter, which gives good satisfaction.

Caledonia.—"Work has been going on in about the usual way. A section of pillars have been split on the high side of the east level. The

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new east deep has been driven 300 feet. No. 4 east levels extended about 280 feet, all the coal mined here this season was chiefly taken from the deep with the exception of the above mentioned pillar.

"An Ingersoll air compressor has been added to the plant size 20 x 30 inch cylinder, driving three coal cutting machines, one in the east deep, distance from engine 1,410 feet, two in the west deep 2,900 feet, they are giving good satisfaction.

"In addition to the improvements on bunk, a new smokestack has been erected, size 66 feet long, 3 feet 1½-inch diameter, steel plate. A new engine-house has been built, walls and floor concrete; also the boiler house and foundation has been rebuilt.

"A forge 100 x 28 feet has been built.

Gowrie Mines.—"The east side bank head heading was lengthened to give more room for a longer trip, nine boxes put on now instead of six as formerly. The east side has been driven 360 yards, at 250 yards below No. 2 east side levels. Three levels have been turned off south, and driven 150 yards, and rooms opened out there, and a fine landing made.

"The old levels above this on the east and west, have been extended as usual. A section is being opened up on the west side of the east deeps, north of the stone trouble, also on the west side of the pit.

"This section mentioned in my last report, north of the stone trouble, is still being worked, and about the same width of coal between that and the anticlinal.

"On surface, an Ingersoll air compressor has been added to the plant, size 16 steam and 20 inch air cylinder. A new pump, 12 x 12 steam cylinder and 5½-inch water end were placed in the new deeps. All the pumps are now driven by compressed air.

"The coal on the new lease was successfully prospected to the north-west of the down-throw fault with a Bullock diamond drill, and the seam 6 feet thick, proved and traced to the north-west boundary.

Caribou Coal.—"I did not notice much improvement at this mine since I visited it last season. It was at a standstill when I was there on the 1st of September last. There were only three men at work around the mine, two of them I presume attending the engine and pump, keeping the water out of the pit.

"A new Dean pump has been placed in the pit, 10-inch cylinder, 7-inch, and 5-inch plungers 18-inch stroke, double acting.

"The shaft was sunk about thirty feet deeper, and cage slides and buntings put in. A very good bank and pully frame has also been erected. COAL. Discovery and development in Nova Scotia.

"I notice a great number of wharf logs and timber, at the shore for the purpose of being put into the building of a wharf. I was told by the manager there, Mr. Wilson, that the site was not yet settled, and was in dispute, owing to the parties who owned the water lots, and this was the cause of the mines being idle, but he hoped that the wharf would shortly be built and work resumed.

Reserve Mines.—"The heapstead has been covered and boarded in down to the slope mouth. The east deeps 300 feet, the south low levels extended about 200 feet. No work has been done in the west main slope since last report.

"A new pump has been placed in the drift, size 30 inches, stroke 9 inches, water 14 inches, steam cylinder. I am informed by the manager that the east drifts are to be driven to the boundary line, in this way a large area of coal can be won towards the south end of the reserve lease, as the crop of the coal extends south of the southern boundary line.

Emery Mines.—"Extensive improvements have been made at this mine during the year. An Ingersoll air compressor cylinder 20 x 30 inch, 2 boilers and 8 coal cutting machines, 1 new pump which pumps from the deeps, and an engine which hauls the coal from the deep workings, are added to the plant. Also, a boiler and engine-house have been built. The engine is placed in the pit to the rise of the shaft bottom, and hauls the coal up the deep, and it is there let back to the pit bottom.

"All the levels and deeps are driven by the machines except the two high west levels; the greatest distance that any of the machines are from the surface is 1,540 feet. Those coal cutting machines have given great satisfaction. The deeps have been driven 250 feet, the upper north levels 640 feet and the low deep about 700 feet.

"Prospecting has been going on pretty extensively during the last season in Cow Bay Basin, by Mr. Archibald and Mr. Landrie. Mr. Archibald succeeded in tracing the Gowrie, or an underlaying seam 6 feet thick out to Morrison's lakes. I did not hear if Mr. Landrie struck the Tracy seam or not, but it is doubtful, as no reports of a workable seam has been made. Also, west of this considerable prospecting has been done on Mr. Murray's area, but it appears that the seams of coal there opened are small.

"It is reported within the last few days that a seam on the Louisburg Railroad, west of the Lorway seam, on Mr. Mossely's area has

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been opened. It is said to be 4 feet 11½ inches thick, also it is opened west of the Gardner Mines, western boundary line; it is said to be 5 feet thick there. I have no doubt but this is the equivalent of the seam that Mr. McVey showed me a year ago west of the Lorway, on the southern line of the McColl area. At this point the seam was found to be 4 feet, 6 inches at the crop. Also prospecting has been prosecuted west of the Lingan Low Point Basin, by the Messrs. Routleges, with a diamond drill, driven by steam, but I have not learned that they struck any seam worth notice."

Mr. Hugh Fletcher of the Geological Survey was during 1892 engaged in field work in Cumberland County, and in his summary report of work done that season (p. 43) he mentions the occurrence of thin seams of coal on a brook near Salt Springs as follows:—

"Through the kindness of Mr. J. R. Cowans, we obtained plans of the levels, slopes and faults of the working on the three coal seams at present mined at Springhill, to supplement investigations made by Mr. Scott Barlow and Dr. Ells in former years. In this extension, north and south, the workings have not passed beyond the ground proved by Mr. Barlow, but interesting questions have been suggested by the workings to the deep. Records of deep borings in this field, furnished by Mr. R. P. Fraser, Mr. James Baird and Mr. Wm. Hall, will also prove of value in the determination of the structure. In the little brook that flows past the station at Saltsprings and about 1,000 feet from the Intercolonial railway, a small seam of coal has been opened by a shaft or slope more than 150 feet deep, the inclination at the surface being vertical but flattening to 66° and the direction being 305°; while nearer the railway, the dip varies from 55° to 39°. At a depth of forty-five feet an adit connects the shaft with the brook and lower down a level has been driven north-eastward a considerable distance. The coal is irregular in thickness, being in one place, it is said, seven feet.

"The section on the brook is as follows:—

	Ft.	In.		
1. Red argillaceous shale with bands of gray sandstone.	.	.		
2. Coaly shale with a streak of coal	3	0		
3. Greenish, crumbly argillaceous shale, of considerable thickness	.	.		
4. Soft argillaceous shale with rootlets	1	10		
5. Coaly shale and clay in thin layers	0	6		
6. Good coal	2	0	4	9
7. Clay with rootlets	0	7		
8. Coal, somewhat impure	1	8		
9. Soft argillaceous underclay.				

"This seam is supposed by some to be the 2 feet 6 inch seam worked at Sand Run mine, and on the Springhill and Oxford railway and shown on Mr. Barlow's map. The thickness, however, is greater and the roof is different. Coal. Discovery and development in Nova Scotia.

"In the small brook about a mile east of the Styles mine and 100 yards west of the Economy road, two seams of coal ten feet apart, very irregular in thickness and impure in quality, according to Mr. McCarthy, but containing ten inches of good coal, have been lately opened, at what is called the Stanley mine, in several small shafts, the measures dipping at an angle of 45°."

NEW BRUNSWICK.

The production of coal in this province amounted to 6,768 tons valued at $9,375, and was as in the past the result of operations in the vicinity of Grand Lake in Queen's and Sunbury counties. These operations are of a desultory character, the work being largely done by the farmers between their more busy seasons. Discovery and development in New Brunswick.

Mr. Robert Chalmers, of the Geological Survey, in the Summary Report for 1892, (p. 37) writes as follows of a recent discovery of coal in Gloucester County :—

"The discovery and opening up of a coal seam in the eastern part of Gloucester County, N. B., on the south side of the Baie des Chaleurs, having been reported, I visited it late in the season. The coal crops out in the bank of a small brook on a road leading south from Upper Caraquet, and about four miles and a half distant from that place. A trench cut into the bank exposes the coal seam, which is sixteen inches thick, and has another thin seam overlying it, with a parting of fire-clay between them. A short distance farther east a shaft has been sunk, but was partly filled with water on the occasion of my visit, and I did not see the coal seam there. The workmen, however, informed me that it was somewhat thicker than where I measured it; and in the heap of coal on the bank taken from this opening, the quality seemed better, that is, the coal was harder and came out in larger pieces. The dip of the seam corresponds with that of the sandstone strata, being 5° to 10° eastward, and consequently the thickness of rock overlying it becomes greater in that direction."

NORTH-WEST TERRITORIES AND MANITOBA.

The production of coal in the North-west Territories during the year amounted to 184,370 tons, valued at $469,930, an increase over the previous year of 10,239 tons and in value of $32,687. Regarding the Discovery and development in North-west Territories.

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operators little need be said beyond the fact that the industry was carried on as in previous years at Lethbridge, Canmore, Anthracite and Edmonton, and at several other points of less importance.

In the Summary Report of the Geological Survey Department for the year 1892, (p. 7) the director writes as follows of two visits made by him to coal deposits in southern Manitoba :—

"On the 20th July I visited section 11, township 2, range 23, on the flank of the Turtle Mountains, south of Deloraine. On the north-west quarter of this section, the owner, Mr. Duncan McArthur, has sunk several shallow pits, and a shaft 23 feet deep, in which he states three seams of lignite coal were found with intervening clay strata.

1st seam at 17 feet..	2′ 6″
2nd seam at (?)	2′ 6″
3rd seam at 23 feet, thickness not ascertained.	

"All the workings were full of water at the date of my visit.

"From the specimens of the lignite shown me by Mr. McArthur, it appears to be of similar quality to that now being mined at Estevan, and would certainly be a valuable fuel for local use if mined and sold at a reasonable figure.

"These are doubtless the same seams as those described in the Geological Survey Summary Report for 1890, page 10, as having been opened in range 24, township 1. It was then stated the seam would probably be found from range 19 to range 34, in township 1. It is now proved that they extend in places at least a mile into township 3, or thirteen miles north of the international boundary."

* * * * * * * *

"At the Hassard mine, fourteen miles from Estevan, a very fine seam of lignite has been opened, and above it at the same point, there are three seams as under :

1—4 feet.....	12 feet	below	prairie level
2—2 feet	40	do	do
3—1 feet...	50	do	do
4—8 feet	80	do	do

"This eight-foot seam is only a few feet above the level of the Souris River, and being covered by debris and superficial deposits, was not seen either by Dr. Dawson, in 1874, or by myself in 1880. The Hassard mine is on the left bank of the Souris river, section 4, township 2, range 6, west of second meridian. The seam presents a solid tough lignite eight feet thick and of excellent quality. It is somewhat difficult to correlate the above section with that at the Estevan

mine, but it seems quite unlikely that the eight-foot seam at Hassard's is, though thought to be so, the same seam as that now being worked at Estevan, and, as the latter is only 28 to 30 feet below the prairie level, it seems much more probable that it is the same seam as the six foot seam shown in the figure, page 7 A, of the report 1880, above cited, and also as the seam in the old Sutherland mine, page 5 A of same report, in which case the Hassard seam would be below the bed of Long Creek at Estevan. In any case, there is an enormous quantity of available fuel in this field. In estimating the quantity in 1880 it was stated":—

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'"It may be assumed that there are in this region above the level of the Souris river at least eight feet of available lignite coal, over an area of not less than 120 square miles. This estimate would give 7,136,864 tons to the square mile, calculating the cubic foot at only 64 lbs."'

British Columbia.

We have unfortunately to report a falling off in the coal industry in British Columbia during 1892, the decrease in production compared with that for 1891 being 227,093 tons, as may be seen on reference to the following tables 12 and 13, which are compiled from figures afforded us by the Provincial Department of Mines:—

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Table 12.

Producton, Sales, etc. for 1892.

Name of Colliery.	Coal Raised.	Sold for Home Consumption.	Sold for Exportation.	On hand Jan. 1st 1892.	On hand Jan. 1st 1893.	Number of men employed.
	Tons.	Tons.	Tons.	Tons.	Tons.	
Nanaimo	485,392	145,632	344,538	9,949	5,171	1,367
Wellington.....	325,216	62,789	267,008	11,760	7,177	815
E. Wellington ..	37,688	5,992	31,360	.....	336	152
Union....	77,199	5,356	74,542	15,523	12,824	520
Total	925,495	219,769	717,448	37,232	25,508	2,854

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TABLE 13.

PRODUCTION, SALES, ETC. FOR 1891.

Name of Colliery.	Coal Raised.	Sold for Home Consumption.	Sold for Exportation.	On hand Jan. 1st 1891.	On hand Jan. 1st 1892.	Number of men employed.
	Tons.	Tons.	Tons.	Tons.	Tons.	
Nanaimo	590,751	157,652	429,952	6,802	9,949	1,464
Wellington.....	386,604	61,291	316,346	2,794	11,760	957
E. Wellington...	46,666	7,748	40,523	1,605	.. ....	188
Union.....	128,567	329	116,435	3,720	15,523	585
Total ...	1,152,588	227,020	903,256	14,921	37,232	3,194

The following details, also taken from the report of the Minister of Mines will afford a very fair idea of the development and present condition of the industry during 1892 :—

"The exports of coal by the same collieries in 1892 were 640,579 tons, as follows :—

Namaimo Colliery,	export	307,623	tons.
Wellington Colliery,	do	238,400	do
East Wellington Colliery,	do	28,000	do
Union Colliery,	do	66,556	do
Total coal exported in 1892.....		640,579	do
Add home consumption in 1892. ..		196,224	do 5 cwt.
Add on hand 1st January, 1893 ..		22,755	do 15 do
		859,579	do

"The ports of shipment are Nanaimo, Departure Bay, and Union, near Comox; and the foreign shipments were exported chiefly to San Francisco, and lower ports in California, United States. Coal was also shipped to Alaska, Petropavloski, China (per C.P.R. steamers), and to the Hawaiian Islands. H. M. navy and United States war vessels have been supplied with coal for fuel, and, as usual, ocean mail steamers and vessels calling for fuel have received supplies at the several shipping wharfs.

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"Owing to an over supply of cheaply produced coal, from countries recklessly competing with the collieries of the Pacific Coast (commonly called the Coast collieries—including Vancouver Island and the Puget Sound coal mines—the natural sources of supply), in the California market, the coal proprietors here wisely restricted their output of coal during the year 1892, and lessened the exports to that State by about one-fifth of last (1891) year's production and shipment, so that the main totals are correspondingly less in amount for 1892. This apparent falling off in trade should not be regarded as retrogressive, but, as it really was, viz., the result of prudent and far-seeing policy on the part of the managers of the coal industry of this province, and at the same time an evidence of their stability and financial strength in commercial emergency. Foreign trade has revived, and the output of coal is regaining its former volume and activity.

"In the year 1892, the coal which entered the port of San Francisco and lower ports in California was supplied from the following sources :—

British Columbia	425,170	tons.
Puget Sound	362,160	do
Oregon	24,170	do
Alaska	1,450	do
Eastern	34,260	do
Australian	240,542	do
English	146,909	do
Scotch	21,700	do
Welsh	50,575	do
Japan	3,530	do
Mount Diablo	42,000	do
Total at San Francisco in 1892	1,352,466	do
Amount of coal received at lower ports, viz., San Diego and Wilmington	158,600	do
Total of coal received in California in 1892 by water routes	1,511,066	do

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Nanaimo Collery.—No. 1 Pit, Esplande, in Nanaimo.—"This mine, being part of the large works known as Nanaimo colliery, belongs to the New Vancouver Coal Mining and Land Company, Limited, and has now proved to be a most valuable mining property, and at present no estimate can be made of the extent of the field of coal yet to be worked. This shaft is 650 feet deep, and as in previous years, the workings are what is called No. 1 North Level. About 50 yards in this level, from the shaft, there is a slope driven eastwardly for about 1,000 yards, and at 600 yards down this slope, there is the No. 3 North Level, which, as its name implies, is worked in a northerly direction. All the workings are under the water of Nanaimo Harbour, with a rock and débris between, varying in thickness from 600 to 700 feet, so that the workings are quite safe from any influx of water, considering that the rock is mostly hard. The workings are on the pillar and stall system, and the pillars (coal) are large.

"The workings of No. 1 North Level extend under the Nanaimo Harbour and Protection (or Douglas) Island, and this level, with its windings, over two miles in, is the longest underground hauling road of any colliery in this district. For the long stretch of about 2,000 yards, the coal has been regular and very good, with an average of about six feet thick, overlaid mostly with a good hard roof. For the distance above referred to, all the workings have been to the west side, and much of this is not started away from the level. On the east side, it is all solid for the distance mentioned, excepting the slope run down to connect with Protection Island shaft, described in a former report.

"No. 3 Level is also in good coal, although they have had considerable trouble with faults, yet there has been a large amount of coal got from this district of the mine during the past year. This level is now in the same area of their field that they have been, for the last three years, working in the No. 1 north level, but a great distance to the east of No. 1 level. The coal is eight feet thick, the quality and appearance being the same as in No. 1 level.

"Ventilation is good. When I was down in December, 78,000 cubic feet of air were passing per minute, for the use of 170 men and 23 mules. The ventilation is conducted on the separate split method. The No. 1 level being ventilated from Protection Island shaft, from which comes a current of 45,250 cubic feet per minute—23,250 going to one division, where there are 57 men, and 22,000 to 59 men.

"No. 3 level is ventilated from No. 1 shaft, thence down the main slope to the level. By this way 32,750 cubic feet pass per minute for

use of 54 men, and the mules that may be at work in the different districts.

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"The motive power is a large Guibal fan, erected during the past year. It is 36 feet by 12 feet, giving the above result with 34 revolutions per minute,—water guage, $1\frac{5}{10}$ inches. It can be safely worked up to 60 revolutions per minute, if required. This is a great relief to both the manager and the men. The former knowing that he can give when required, and the men being satisfied that they can have, all the fresh air needed, as there is a considerable quantity of powder used in the mine. The shots are fired at regular times, and at those times, with all the air, it is smoky for a while. Very little gas is now found in this mine, and the mine is also free from dust.

"Up to last year the mode of hauling in the levels was by mules; now we have got a new motor, for this out-of-the-way country, namely, electricity. The New Vancouver Coal Company, being the first in this province to try this mode of hauling coal in their extensive mines, made arrangements with the Edison General Electric Company to supply them with steam engines, and all the electric plant, to haul the coal from the No. 1 and No. 3 levels in this mine. The dynamo is fixed on the surface, driven by a steam engine built for that special purpose—this is about 100 feet from the pit's mouth. The engine, or power house, is an imposing building. From the dynamo the current is conveyed to the switchboard, when it thence passes through the different instruments for measuring the current, and cut-off—to protect the plant against danger, if the current should become accidentally too great; thence the current leaves the power house to go under the ground. There are two copper wires strung up; one of these is insulated, and the other uncovered—this latter is the one for the trolleys to run on, and supply the power to the locomotive; the insulated wire supplies the power in case of a break in the other, and also works in connection with the other at all times. These wires are strung in No. 1 level for 2,600 yards—this being the distance that the locomotive goes, travelling at the rate of six miles per hour; and it is no unusual thing for one locomotive to take along 60 tons at a time.

"There are three locomotives; two of them are of 30-horse power, and are of eight tons each; the other is not so large, being of 15-horse power—this was the first to be used, in the No. 3 level. The electric locomotives appear to work very well, although I think it would improve their working qualities if they had a straight road to travel.

"The bottom of the shaft and about the sidings are lighted up by the electric spark, making it almost as light as day, and a great improvement on the oil lamps.

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"Strangers coming to Nanaimo by steamboats or ships may not know, when they are entering the harbour, that from 600 to 700 feet below them there is one of the busiest workshops in British Columbia. On all the shifts there are nearly 400 men and about 40 mules, besides steam engines, pump (worked by compressed air), and three electric locomotives—all in motion; and much of these works lighted by electricity.

No. 3 Pit (Chase River), Nanaimo Colliery.—"This mine of the New Vancouver Coal Company has, with the exception of about two months in the summer, not been operated; only the pumping being done. Not for want of coal in the mine, but owing to the over-stocked state of the coal market.

Southfield Mine, No. 1 and No. 2.—"This once great producing mine of the Nanaimo Colliery has had much idle time during the past year, owing to the want of demand for coal at prices that would justify the company to put their coal from this mine on the market. The output of coal per day is much reduced here: all the coal taken out being from the pillars (coal).

"Ventilation is very good; the last time I was down, in December, there was a volume of 81,220 cubic feet of air passing per minute, for the use of 40 men and four mules. This was travelling well around the pillars and old work. There is no gas found here; the mine is also free from dust.

No. 5 Pit, Southfield.—"This mine also belongs to the New Vancouver Coal Company. The shaft is to the dip of Southfield (Nos. 1, 2, and 4) mine. Coal here is of a very good quality, but not so regular as might have been expected; at some places it will be twelve feet thick, and in other places quite thin: although there is plenty of coal on an average to make a good seam. It is improving that way, and it is to be hoped it will continue so.

"Ventilation is good; motive power, a fan, worked by a steam engine. When I was last down, there were 24,000 cubic feet of air passing per minute: this in two divisions at the bottom of the shaft—one to the east, and the other to the west side, and for the use of forty-two men. This mine gives off some gas at times, but with ordinary care there is no danger of accidents.

"At this mine they have got good, substantial pit head gear, and all appliances for the same, together with railway sidings; all in connection with their system of railways having access to the company's shipping wharfs—everything complete to handle a large output of coal. There

is quite a large tonnage coming out at present, and at no distant day the tonnage and prospects of this mine may far exceed the No. 2 Southfield mine when in its best days.

This (No. 5) mine is in connection with what is mentioned in a previous report as No. 4 slope, and which is now an out-way for No. 5 pit. There is no mining being done in No. 4.

Protection Island Shaft.—"This is also the property of the New Vancouver Coal Company, and is put down in South Point of Protection Island. It was finished to the coal on the 12th January, 1892, at the depth of 670 feet, this being where they found the continuation of the coal worked in No. 1 pit. As they anticipated, it was found to be five feet thick, clean and good. Without stopping to make the necessary fittings required at this stage of the work, such as permanent large engine (which they had on the ground), pit head gear, etc., they went to work at the coal to get connection with the slope that had been put down 300 yards below the No. 1 level of No. 1 pit, on the 22nd January. Only ten days after they had finished sinking they holed through on the slope mentioned. Now they were able to travel under the harbour of Nanaimo for nearly two miles, coming out to daylight in the city of Nanaimo.

"All the works being in order, the company knowing that the lower seam, which is about seventy feet below the Douglas seam (worked in No. 1 pit), had been good in some places where it had been worked, and the Protection Island shaft not being near any large known faults, it was settled that they would deepen the shaft to the lower seam. The rock was hard, but they were successful in reaching the coal on the 13th April: the rock between the two coals being sixty-two feet, with the coal underneath four feet thick, very hard; and having burned some in my house, and paying particular attention to it, I am not afraid to say that it will prove itself, by those that will use it, as a first class household coal. The company is now driving a slope to the dip, and I am pleased to be able to say that it is somewhat improving in thickness.

"This is a valuable discovery for the province, to the people about Nanaimo in general, and to the New Vancouver Coal Mining and Land Company, Limited, in particular, as it is to their energy and perseverance that this has been achieved; and it is the general wish that the reward of the company will be great. There is not a great deal of this new seam opened out yet, but doubtless there will be a good account of it given at the end of the year.

"In reference to the Douglas or upper seam, they are opening out this fast, although not sending out anything like the quantity of coal they could do, as they would have to dump it on the ground. The

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company is, however, building a very large wharf near the south point of Protection Island, and about 400 feet from the mouth of the shaft. At this wharf the largest ships will be able to tie up and get their load. To all appearances they will be able to take ships here before the middle of February; then they will increase the output, and I hope they will have plenty to send out for many years to come.

Northfield Mine, Nanaimo Colliery.—"This mine is mentioned in previous reports and belongs to the New Vancouver Coal Mining and Land Company. This mine is entered by a shaft, as are all the mines of the Nanaimo Colliery, except the No. 2, Southfield. The workings from Northfield Shaft are by levels, from the north and south sides, with a slope on the north side. It is from this slope that the greatest amount of coal is taken. The mine is worked on the long-wall system; the coal having a varied thickness of from two to four feet. As in all the mines in this district there has been much idle time, owing to the market being overstocked; but where the article that takes best is mined, there they have generally the most work, in such times, and this has applied to Northfield Mine during the past year.

"The coal, being hard and of a good quality, commands the highest price both in Victoria, B.C., and in the California market, and in any other place where it may have been introduced."

"Ventilation is good. Motive power is a fan driven by a steam engine.

"There was a current of 40,560 cubic feet of air passing per minute, for 112 men and twelve mules. The separate split system is used in this mine. The current is divided into two divisions at the bottom of the shaft—one to the north and the other to the south side—that to the north goes down the slope, and from the slope, where it is again divided, one current to the west, the other to the east side, getting at the lowest point, where it ascends, taking the face of the coal as it goes along. As there is quite a large quantity of powder used, shot firing comes at stated times. The firing causes it to be quite thick, but is soon goes past. The three divisions of air do not all join until they get to the fan or upcast shaft.

"Little or no gas has been found in this mine. It is also free from dust.

"In each of the mines of the Nanaimo Colliery there is a monthly examination by a deputation of the workmen, who are thus able to see the condition of the mine. The result of their finding is recorded in a book, and also posted up in some conspicuous place, where all may read it.

Harewood Estate, Nanaimo Colliery.—"As mentioned in my former report, this large estate, now the property of The New Vancouver Coal Mining and Land Company, is being explored for its coal beds. The shaft that was referred to as sinking did not turn out as well as the bore hole had indicated, although the coal that was got is very good and hard; for the present it is at a stand-still, but the company continued the prospecting in another place. At this new place the crop out of the coal is found, showing some very good coal. When I was out there lately they had got a slope in 100 yards, and at the face the coal was three feet thick; in driving this slope, in some places it was found to be much thicker. The coal lying at the slope head looks very well, and when burned leaves a small percentage of fine reddish brown ash. The company is doing considerable work to prove this property—to find out an estimate of the value of its coal-bearing area, and its consequent prospect as a coal field. Although at some distance from their railway, yet when it is decided that the coal available will justify them, railway connection can soon be made, and it looks as if the coal now being worked would justify the opening of works at Harewood.

Wellington Colliery—No. 1 Pit.—"This shaft is near Departure Bay, and was referred to in a previous report as having been put down fifteen years ago. Excepting a little coal got out of an upper seam (corresponding with a thin seam now being worked at East Wellington), no work was done.

"This shaft of early days being small, it has lately been enlarged to the usual size of shafts owned by Messrs. Dunsmuir & Sons, viz., eight by eighteen feet, timbered throughout with 4-inch plank, excepting about sixty feet at the top, which has got walls of twenty inches of timber and six inches of cement to keep out the surface water. Before they could sink this shaft they had to erect a large engine, and put up the permanent head gear, then they were able to accomplish the work of putting this shaft down 300 feet, which is the required depth of the Wellington coal. They have started mining at the upper seam of coal, leaving the lower seam for another time.

"This upper coal is about three feet thick and of good quality. Close on the top and between the coal and the hard rock there is a bed of fire-clay, five feet six inches thick; then below the coal they have four feet of soft black dirt, and next comes a solid bed of fire-clay, twenty-eight feet thick, making altogether thirty-three feet of most valuable fire-clay, an article that has been much sought after in this country. The Messrs. Dunsmuir & Sons, although not manufacturing it themselves, have sent a quantity of this fire-clay to the

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British Columbia Pottery and Terra Cotta Company, some of which has been made into brick for use in Her Majesty's war-ships on this coast, which brick has given great satisfaction, and compares favourably with any that is imported from England. The proprietors of this shaft are working with all haste to get the railroad from the shaft connected with the Wellington Railway. This will be done in about two weeks, and then the British Columbia Pottery Company will be able to obtain all of this fire-clay that they may require.

No. 3 Pit, Wellington Colliery.—"There has not been any mining done here during the past year, yet there is a large quantity of coal to be got out from this pit.

No. 4 Pit, Wellington Colliery.—"This pit is about 1,000 yards east of No. 3 pit, and is connected by a good way with the same when the water is out. Here, as in all the mines of this colliery up to the 13th September, there has been much idle time, owing to so many shipments of cheap coal coming from Australia and England to California, our principal market. This mine was working up to the above date whenever there were ships to take the coal, and everything was in the usual good order at that time, when the fireman in travelling in the airway near the up-cast shaft discovered a strong smell of something distilling or burning (heating). The fireman reported directly, and on tracing it out it was found that the smell came from the place where they had been taking out pillars (coal). All the time while the pillars had been worked no fire had been seen; but Mr. Bryden, the manager, with his usual caution, gave orders for all the men to take their tools out, and the mine cars and mules were sent up. Some men were kept to put in extra timbers where they thought it necessary. This was done in case they had to flood the mine. There was also a large force working in the vicinity where the heating was going on, until on the 18th September, when active fire was first discovered; then Mr. Bryden gave orders for all the men to get out of the mine, and the No. 4 pit and its fan-shaft were sealed taut, excepting a small 4-inch pipe-test hole. Mr. Bryden not wishing to run any risk of an accident to the men by working in the mine to endeavour to subdue the fire, decided to flood the mine, so a connection was made by a drain from the Millstone River, and the water run from there into the mine, and in the early days of December both No. 3 and No. 4 mines were filled with water, and it was left that way until January of this year, after which it will take a long time to take the water out of the mine.

"Through the fire and the flooding of this extensive mine 200 men were thrown out of places, but the manager did his best to give as

many as possible work in the other pits, where with considerable inconvenience they found most of the men work. Now the coal trade has somewhat revived, the output from No. 4 pit is greatly missed, as it was the most extensive mine of the Wellington Colliery. In a short time, however, it will again be in full operation.

No. 5 Pit, Wellington Colliery.—"This mine is yet the only mine of the Wellington colliery that has connection with the Esquimalt and Nanaimo Railway. The cars of the railway company run to the mine chutes, receive the coal and carry it to Victoria, saving handling and breakage. To this mine Messrs. Dunsmuir & Sons have extended their own railway system, connecting with their shipping wharves at Departure Bay. In this pit there has also been a lot of idle time during the past year. The same cause applies here as at the other works, viz., the California market being filled with cheap coal from other countries, but at the close of the year trade was somewhat improved.

"This is the largest mine, excepting No. 4, in the Wellington colliery, but it will yet be the most extensive. The coal is brought to the bottom of the shaft by a steam engine from a slope, from the south and west by a self-acting incline, and on the east by mules, by what is known as the east level, but at present they are erecting a large engine to haul the coal out of this level on the endless rope system.

"In the slope the coal is very good, and is worked on the long-wall plan, for which it is well adapted, for here they have a face of coal about 1,000 yards long, and from four to seven feet thick. This is along one side. The opposite side is nearly all solid. All this is without a fault of the smallest kind.

"In the east level all the work has been, and is, on the pillar and stall principle, the coal varying in thickness from four to ten feet and hard. In this level there is also a great deal of work being done at the pillars (coal), and these pillars being nearly two-thirds of the whole seam, it takes longer to mine out the pillars than the stalls, although one man can put more coal a day out of the pillars.

"In the south and west sides all the mining is at the pillars, of which there is a great extent.

"Ventilation is very good. Motive power is a fan on the up-cast shaft driven by a large steam engine. When I was down in December I found 108,000 cubic feet of air passing per minute for the use of 202 men and twenty-six mules; fan making 100 revolutions per minute; water gauge one inch. This mine is ventilated by separate splits, the three main divisions being at the bottom of the shaft—to the east level 28,000 cubic feet per minute for the use of sixty-four men and eleven

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mules. There were 34,000 cubic feet going down the slope. This is again split into two currents, to be used by seventy-five men and two mules. To the west level, south incline and part of east side, 46,000 feet were in circulation for forty-four men and five mules. The above-mentioned currents of air never come in contact until they come to the bottom of the up-cast shaft. There is now very little gas seen in this mine, but occasionally it is found in the long-wall workings, where the roof breaks or falls out, leaving a hole. There is always a strong air blowing along the face. This mine is also free from dust.

"In addition to the overman and fireman, there is a staff of shot-lighters and examiners to each district of the mine. These men are always on the move from one place to another, and as shot firing is at stated times during the shift, the smallest change in any part of their particular district, or any fall from the roof in the airway, is sure to be found out and reported to the overman, if they cannot stay themselves to attend to it.

"This pit is connected with No. 6 pit, to which there is a good travelling way, with boards put up pointing the way.

"In addition to the steam engine and air compressors, Messrs. Dunsmuir & Sons are now erecting an electric plant, manufactured by Messrs. W. T. Godden & Co., London, England. It will be seen that electricity is getting to be quite generally used in and about the mines in this district; it being used for cutting coal, pumping, and, as the power in electric locomotives, to haul the coal in the mine.

No. 6 Pit, Wellington Colliery.—"This pit is mentioned in a previous report as being about 900 yards east of No. 4 pit, only being separated by a narrow strip of solid coal of forty yards thick. Just now this strip is serving the purpose for which it was left—in case of any fire in the mine and having to put water in to quench the fire. As the fire last September in No. 4 pit caused that mine to be filled with water so that strip of coal barrier has been the means of saving both this No. 6 and No. 5 mine from having to be flooded, and also from putting nearly 1,000 men out of work for a long time. As I have already said this pit is connected under ground with No. 5.

"In this pit, as in the other mines, there has been a great deal of idle time during the past year, owing to the flooding of the California market with coal from other countries.

"No. 6 pit is getting to be quite an extensive mine; the coal is being brought to the shaft from the south and east by a level and self-acting incline, and to the west side by a slope and incline. Most of the mining on the south and east side is on the long-wall system, while

that on the north and west side is pillar and stall, and at the pillars (coal) coal is very hard, from four to eight feet thick and of the usual good quality, and the roof is somewhat stronger than it is generally over the top of this coal. When the coal is down to five feet in thickness, long-wall is the favourite method of working, as the coal is got out in better condition and in larger pieces, and there is not so much waste.

"Ventilation is good; the motive power is a fan on the Murphy principle, worked by a steam engine. The last time I was down in December there was a current of 72,500 cubic feet of air passing per minute, for use by 144 men and 26 mules. There are five separate divisions in the air, all of the divisions being near to the bottom of the shaft; three of them are on the east side and two of them on the west side of the shaft. Two of these splits are one to each division of long-wall work, and the other three are to the divisions of the pillar and stall workings; and when they are taking out pillar coal the air is well conducted into the long-wall, and also to the other places, by brattice or otherwise. In the long-wall the air goes in the level, and what escapes at the different roads is caught at the face, then passes along to the return. The motive power or fan is on the same shaft as the coal is hoisted from, there being a tight partition in the shaft, one side being the intake and the other upcast. Although this mine is connected with No. 5 pit, it is ventilated independently of No. 5, the connection only being in one place, where there are strong doors; at the same time there is a good travelling way by means of No. 5. No. 6 pit is free from dust.

No. 2 Slope, Wellington Colliery.—"There has not been anything done here during the past year.

Alexandra Mine.—"This mine belongs to Messrs. Dunsmuir & Sons, and is about one mile south of the Southfield mine, of the Nanaimo Colliery, and only a few yards from the Esquimalt and Nanaimo Railway. There has not been any work done here during the past year, but the company renewed operations at the beginning of the new year, and it is hoped there will be a good account of this mine at the close of 1893.

East Wellington Colliery.—"This colliery belongs to the East Wellington Coal Company. There are two shafts.

"*No. 1 Pit.*—There has been no mining done here since February. This pit is the return or up-cast shaft for No. 2 pit, which is about 800 yards further up the valley of the Millstone River.

No. 2 Pit, East Wellington.—"In this they have been working steadily all the year, but not full handed, owing to the slackness of trade at San Francisco, where all the coal from this colliery goes.

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"Previous to this year all the coal was mined from what is known as the Wellington seam, varying in thickness from four to seven and a half feet. In this they have been much troubled with faults in the coal of one kind and another, which made it expensive to get out. This causes the superintendent to use greater skill and economy in getting the article to the market. There is a large body of this coal in sight. In addition to this they have at one of the faults run a tunnel through the rock to an upper seam of coal, which is two feet thick and of very good quality—very hard. This is the principal place where they are taking coal at present. This coal is well sought after in the San Francisco market, and the company command the highest price for all that they can produce. We may also expect to see some of the other coal companies going into this once despised but now acknowledged to be valuable upper seam, which is about fifty feet above what is in this district called the Wellington coal.

"The workings are on the long-wall system, aud the seam is well adapted for it.

"Ventilation is good. Motive power, a fan, driven by a steam engine at the top of No. 1 shaft. When I was last down in December, I found 22,000 cubic feet of air passing per minute for the use of forty-four men and four mules. The air is split at the bottom of No. 2 shaft—9,500 feet going to the west side, and 12,500 feet to the east side. In the long-wall the air travels along the face, there not being much chance for it to escape, except a little at the roadway, and so the workings are kept clear. It is the intention of Mr. Chandler, the manager, to connect the workings of this upper seam with the shaft, which is not many yards away, and when done it will be a great relief to the ventilation of this place, and also facilitate the getting out of the coal.

"There is now very little gas found in the mine, there not being much chance for it to collect in the old works, as they are filled in as close as possible, and the roof settling behind makes it almost solid again. And every other precaution is taken to prevent accidents of any kind. In addition to the manager and overman, there is the regular staff of firemen—one on each shaft, who also acts as shot-lighter. As there are not any old waste works to go into in long-wall, the fireman can see all the working places frequently during the day, as well as the overman.

Union Colliery, Comox.—"This colliery is the property of the Union Colliery Company. A first-class article of coal is produced at the mines of this colliery, which makes excellent coke. This coke has

taken the market in this province, and is also highly spoken of by those that now use it in San Francisco. COAL.

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"Work in this company's mines was at a standstill for about six months of the past year. In two of the mines work has recently been resumed.

No. 1 Shaft, Union Colliery.—"There has been nothing done here during the past year.

No. 1 Slope, Union Colliery.—"In this slope the miners worked most of the time from January to June, when it was stopped, and has not yet started. In many places the coal is very good. At the time of its stoppage this was the chief producing mine of this colliery.

"Ventilation, machinery, and everything is in its usual prime condition. There is a prospect of work being resumed here soon.

No. 4 Slope, Union Colliery.—"Excepting in the main slope, this mine was also at a stand for five months. In November, work was resumed; the coal market being somewhat improved, or as may be said, the cheap coal from other countries has slackened off. This mine is being pushed so that the company may have their fair share of what is being exported to California. This is now the producing mine of the colliery, and close upon 600 tons per day are put out. For steam purposes, those that have used it say that the coal is the best article produced upon the coast. H. M. S. warships have used a considerable quantity of the coal, and the Naval Officers report it as equal to any coal that they have got from Cardiff, in Wales. The seam varies in thickness from three to ten feet, with a gentle pitch, so that the mine cars can be taken around when required. The slope is now down 800 yards—the coal keeping good. Ventilation good. Motive power, a Guibal Fan; running slow, yet passes 50,000 cubic feet of air per minute. This mine is ventilated on the separate split method. The last time I was down, the above volume of air was passing per minute for the use of forty-four men and four mules.

"I may remark that there are five levels off the east side of the slope, while the west side is nearly all solid, very little of it being yet worked. Coal looking well, for a valuable and extensive mine.

"Everything about this mine is got up on the best plan for labour saving. There is a large coal washing machine by Shepherd, of Cardiff, Wales, of the most recent improvement in construction, capable of cleaning 350 tons per day; it is said to be able to save the finest coal, this fine coal being what they are now making into coke so successfully. The demand for the coke is large and active.

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No. I and No. 2 Tunnels, Union Colliery.—"These tunnels or adit levels were also at a stand for about six months, and were almost closed up at the entrances by board fences, so that no persons could reach the levels and get into any danger.

"This mine has again started to work—in December. The coal is from two to three feet thick, of good quality, and very hard.

"When I was in this mine, in December, the ventilation was good. Gas has been found in this mine, but there is no gas at present noticeable.

"The workings are long-wall; the air going in the level, and coming out from under a height where the coal is worked out to daylight. An air furnace is used here.

Prospecting.—"A series of boreholes has been put down in this coal field during the past year, and these bores show indications of great productiveness of coal.

"It is the intention of the company to build a number of coke ovens, so that the fine coal not used in the furnaces of the colliery may be turned into coke.

Tumbo Island Coal Mining Company.—"This Company having made considerable exploring and boring on this Island, are continuing to energetically prospect their seam.

"In the borehole put down on the south side of the Island, at about 320 feet, coal was struck, of a thickness to justify them in sinking a shaft. This they started on 21st January, 1892: size ten by twelve feet, having sandstone and conglomerate rock for the first eighty-five feet, when dark shale was struck of six feet thick; then they got a good seam of coal six inches thick, and underneath was six more feet of dark shale, then sandstone was met with containing pieces of coal, and they have now got down 114 feet; timbered from top to bottom, and very little water to contend with. In addition to the ordinary hoisting machinery there is a ladder from the top to the bottom of the shaft.

"I am indebted to the Manager for information as to this mine, and hope that the company will continue to be successful in their development of their valuable property until they have opened a seam of good coal of commercial value. The mine is in the way of steamboats going between Victoria and the Mainland, and the China steamers go close by.

The Kamloops Coal Company Limited.—"The colliery of this Company is known as the North Thompson Coal Mines.

"The mine is as yet little more than a prospect, but it is very promising. From the report of the Company received by me, I gather that

the work consists of a level driven on the strike about N. 10° E. 45 feet, and slope on the dip about E. 10° S. 55 feet: this slope to be opened towards the surface. The seam opened is the top of a series of four, and at present face shows about thirty-seven inches of coal, which assays very favourably, and the seam is said to be thickening gradually. The lower seams have not yet been opened, but are reported to be considerably thicker than the one being worked, as indicated by the croppings. COAL. Discovery and development in British Columbia.

In the summary report of the Geological Survey Department for 1892 Mr. James McEvoy writes as follows of two points visited by him in the southern interior of British Columbia:—

"While in the neighbourhood an opportunity was afforded of visiting the coal mine on the North Thompson Indian Reserve. A tunnel running northward from the creek bed showed the following section:—

Coal	6 inches.
Sandstone	2 feet (variable.)
Coal	9 inches.
Sandstone	6 "
Coal	18 "

"Besides these an underlying seam of coal is reported."

* * * * * *

"A visit was paid to the Coal Hill mine, three miles south of Kamloops. An incline was being sunk along the dip of the seams, and in it the following section was seen:—

Coal	3 inches.
Shale	5 "
Coal	12 "
Clay	4 "
Coal	2 "
Shale	6 "
Coal	3 "
Shale and clay	5 "
Coal	5 "
Shale and sandstone	12 "
Coal	2½ "
Sandstone	8 "
Coal	3 "

"The quantity of clay is variable and some of the shale partings are not continuous."

Coke.

Coke.

There was a slight falling off in 1892 in the production of coke, the quantity produced being 56,135 tons valued at $160,249, while in 1891 the production was 57,084 tons. The production is altogether that of Nova Scotia where it is principally used in the manufacture of pig-iron at Londonderry. No returns have been received from British Columbia.

The production of coke during the past seven years is as follows :—

1886.....	35,396 tons,	valued at	$101,940
1887.....	40,428	"	135,951
1888.....	45,373	"	134,181
1889.....	54,539	"	155,043
1890.....	56,450	"	166,298
1891.....	57,084	"	175,592
1892.....	56,135	"	160,249

The following table 1 gives the quantity and value of oven coke imported during the fiscal years from 1880. The quantity of gas coke imported during the year was 589 tons valued at $1,755. This would represent a home consumption of coke of all kinds of 56,724 tons, not including the large quantities annually sold by the various gas companies throughout the Dominion.

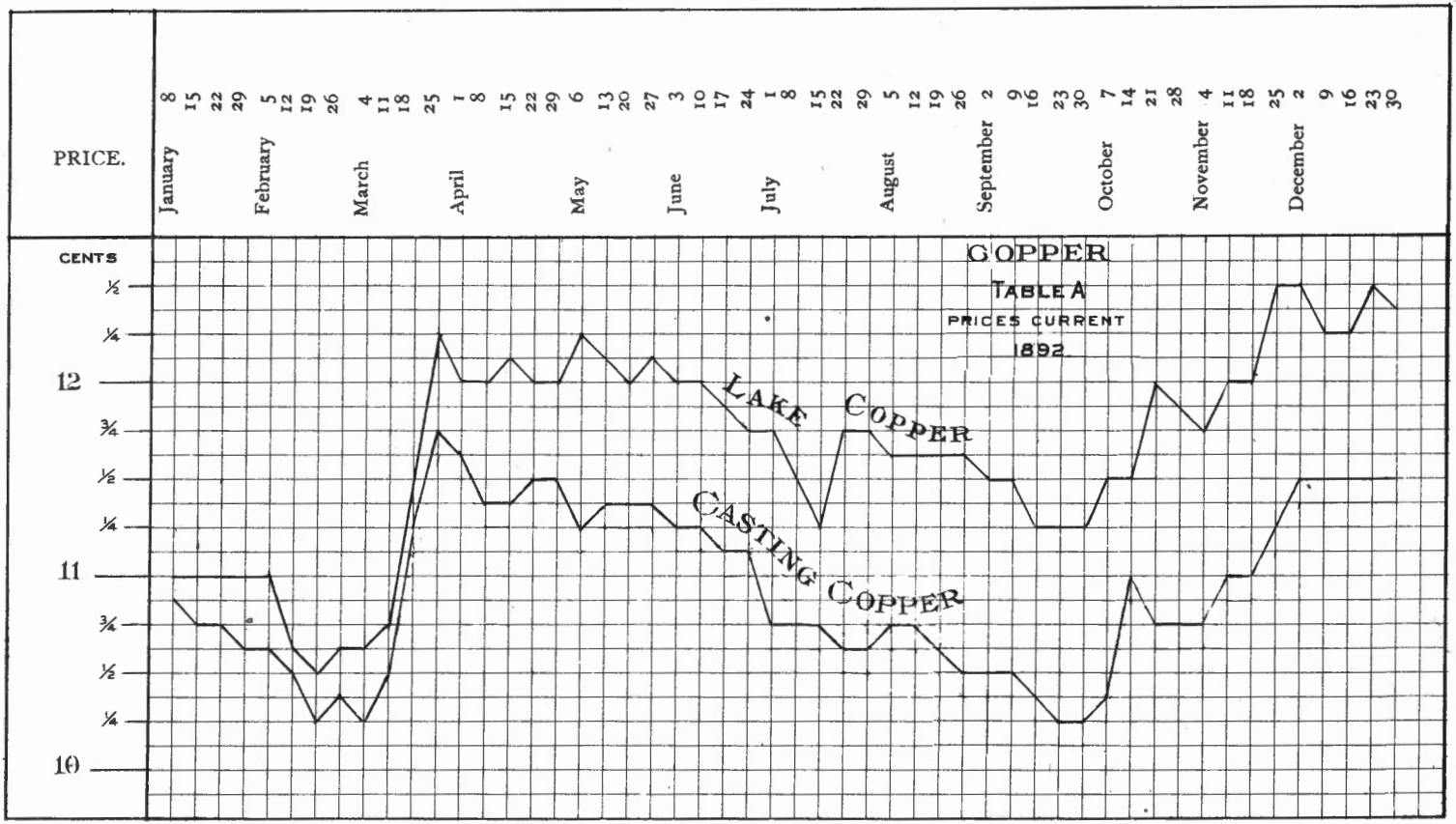
Imports of coke.

Coke.

Table 1.

Imports of Oven Coke.

Fiscal Year.	Tons.	Value.
1880.....	3,837	$ 19,353
1881.....	5,492	26,123
1882.....	8,157	36,670
1883.....	8,943	38,588
1884.....	11,207	44,518
1885.....	11,564	41,391
1886.....	11,858	39,756
1887.....	15,110	56,222
1888.....	25,487	102,334
1889.....	29,557	91,902
1890.....	36,564	133,344
1891.....	38,533	177,605
1892.....	43,499	194,429


PRICE.
January 8 15 22 29
February 5 12 19 26
March 4 11 18 25
April 1 8 15 22 29
May 6 13 20 27
June 3 10 17 24
July 1 8 15 22 29
August 5 12 19 26
September 2 9 16 23 30
October 7 14 21 28
November 4 11 18 25
December 2 9 16 23 30
CENTS
12
11
10
COPPER
TABLE A
PRICES CURRENT
1892
LAKE COPPER
CASTING COPPER

COPPER.

STATISTICS.

Statistics.

The amount of copper produced during 1892 was 7,087,275 pounds, whose whole value at the average market price for the year, viz., 11⅔ cents, would come to $826,849. For 1891 the figures were 8,929,921 pounds valued at $1,160,760, so that there is a falling off of 1,842,646 pounds and $333,911.

This falling off is mostly due to the much smaller shipments of copper-nickle matte, etc., from Sudbury, the shipments of cupriferous pyrite from the eastern townships of Quebec, showing a falling off also but to a less extent. The lessened value of Canada's production of copper for the year is further aggravated by the fall in the average price of the metal from 13 cents per pound for 1891 to 11⅔ as given above for 1892.

The above given figures represent as in past years the total number of pounds of copper contained in the ores and matte shipped from the mines in the vicinity of Sherbrooke in Quebec, and Sudbury in Ontario. The spot value of these ores will, of course, fall very far below the values realized by the operators who sell their products in very varying conditions of concentration. Taking this into account the spot values of the copper in the ore, matte, etc., as compared with their full value would not come to more than about 50 per cent of the figures above given.

DISCOVERY AND DEVELOPMENT.

Discovery and development in Nova Scotia.

NOVA SCOTIA.

Regarding operations in the provinces of Nova Scotia and New Brunswick, Mr. H. P. Brumell, reports as follows :—

The Eastern Development Company.—"This company has done a considerable amount of exploratory and underground work on their properties, consisting of two large areas and comprising the Argyle and Coxheath grants covering in all 1,280 acres. These are adjoining, and are situated on the north side of the Coxheath Hills and opposite the French Vale, a distance of about ten miles south west of Sydney, Cape Breton county.

"At the time of my visit the mines were idle and the workings full of water. Evidence of a large amount of both underground and surface work was, however, plainly visible, the dumps containing about 3,000 tons of ore, some of which had been hand picked and a large proportion crushed and jigged; no shipments have been made excepting a few tons for test purposes. The buildings and plant in connec-

COPPER.

Discovery and development in Nova Scotia.

tion with the mine are of first class quality and in excellent condition and consist of :—

"Buildings.—At working shaft No. 2: Shaft-house, dry-house, boiler, engine and compressor-houses, ore dressing, crushing and screening shed, machine shops, saw-mill, carpenter and blacksmith shops, magazine and office and laboratory.

"At shaft No. 1.—Shaft-house, store-house, boiler-house, dry-house and stables, and some distance to the north manager's house, stable, boarding-house, foreman's house and mine's store.

"Plant.—One fifteen-horse power boiler; one Knowles sinking pump; one hoisting engine, forty-inch drum; three fifty-horse power, and three twenty-horse power economiser boilers; two Rand double compressors ten by sixteen-inch cylinders; twelve Rand slugger drills complete; two single acting pumps, seven-inch stroke, three-inch suction; one Blake fire pump; one hand pump; one Blake crusher (ten by seven), screens, etc.; one saw-mill, engine and saws complete; screw-cutting lathe complete; piping, tools, screens, cars, etc.

"It is the intention of the company at no very distant date to erect large smelting works near the mouth of Watson's creek on the north-west arm of Sydney harbour, about six miles from the mines, with which there will be a tram connection. The intention is to erect a battery of eight reverberatory furnaces of about twenty tons capacity each, in all 150 tons per day. If it be found necessary they will erect calcining furnaces.

"Traversing the country in a north-easterly direction and constituting the greater mass of the Coxheath hills is a large body of felsitic rocks very much broken and fissured, carrying large and small masses and veins of copper and iron pyrites containing small quantities of gold and silver and, it is said, entirely free from antimony, arsenic or any other refractory materials. A small quantity only of quartz and calcite is noticeable in the ore in the dumps. The belt of cupriferous felsite is about 1,500 feet wide following the general trend of the hills, about north-east and south-west. Six distinct veins from two to twenty feet wide are said to have been located and exploited, work having been carried on to a depth of 176 feet in No. 1 shaft and 320 feet in No. 2, and a considerable extent of ground opened up by means of cross-cuts, levels, winzes, etc.

COPPER.

Discovery and development in Nova Scotia.

"The following analyses of the ore are available :

I. By C. Tennant Lee, Boston.
II. By Maletra Works, Rouen, France.
III. By F. Claudet, London, England.
IV. By H. O. Hofman, Inst. Technology, Boston.
V. do do (Surface ore from new vein.)

—	I.	II.	III.	IV.	V.
Copper	12·97	11·5	8·99	7·95	6·79
Iron	14·47	14·1	12·83	14·93	15·79
Sulphur	17·26	18·5	13·40	8·98	8·10
Siliceous rock	53·14	54·9	61·63	48·48	47·47
Arsenic	None.	·011	·05	09	·012
Antimony	do	None.	Traces.	None.	None.
Cobalt	.....	.....	·06	.....	.....
Lime	2·14	.....	1·05	Trace.	Trace.
Magnesia	.....	.....	·32	3·45	3·88
Alumina	.....	.....	·94	7·94	8·02
Oxygen and loss	.....	.....	·73	.....	.....
			oz. dts. grs.	Oz.	Oz.
Silver	Traces.	Traces.	0· 5· 0	1·5	1·3
Gold	Trace.	.....	0· 10· 0	Trace.	Trace.

NEW BRUNSWICK.

New Brunswick.

Albert County.—"At Alma the New Brunswick Mineral Developing Company have leased the old McKinley lot, block 10, lot 6, parish of Alma, about two miles north of Herring Cove, and have carried on active prospecting work in search of a body of chalcocite (copper glance) supposed to exist in the neighbourhood. The operations have so far proved unsuccessful; small veins and stringers of chalcocite only having been noted, as well as several large veins and masses of quartz stained with and carrying small proportions of chalcocite and copper carbonates. Large masses of "float" chalcocite have been found at many points in the neighbourhood, and it had been hoped the exploratory work undertaken here would result in the discovery of large workable deposits. The field of operations is near the junction of the lower Carboniferous rocks with the pre-Cambrian and the rocks as exposed by trenching, etc., have proven to be dioritic and pre-Cambrian in age, the whole being cut up by a reticulation of large and small quartz veins carrying, as far as seen, small quantities of chalcocite and copper carbonates.

Vernon Mine.—"This old property situated in St. Martin's parish St. John county, on the shores of the Bay of Fundy and about eight miles west of Herring Cove, has, it is said, been taken up by Messrs.

COPPER.

Van Meter of Moncton and Gue of Halifax, who have cleaned out the old workings and intend prospecting and developing.

Discovery and development in New Brunswick.

Quiddy River.—"Mr, J. F. Fraser of St. John, has taken out a lease covering the old copper property at the mouth of the Quiddy river near Martin's Head, parish of St. Martin's, St John county, and intends having the property opened up and throughly prospected."

Quebec.

QUEBEC.

The Nichols Company continued to operate their mines, acid and superphosphate works at Capelton near Sherbrooke. Of the sulphuretted ores extracted from their mines the larger proportion was shipped raw to the chemical works of the company at Laurel Hill in New Jersey. The remainder was burnt at the Capelton works to supply the necessary sulphurous gases for the manufacture of sulphuric acid, whilst the residue from the process was treated in a small water jacket furnace and shipped as matte.

At the Eustis mines near Capelton, ore was mined and all shipped in the raw state to the United States.

The Moulton Hill and Howard Mines Company were engaged mostly in developing their mines.

The value of the ores produced in this district lies chiefly in their sulphur contents, of which element they carry from 25 to 30 per cent. Besides the above they carry some three to four per cent of copper and a few ounces of silver per ton.

Some further development work was done at the Harvey Hill mines near Broughton on the Quebec Central Railroad.

The report of the Department of Crown Lands for Quebec draws attention to a discovery of some interest in the River Matane district, Rimouski county. This consists of the occurrence over a large area of numerous boulders of trappean rock, often weighing over a ton, in which are found numerous particles of native copper, weighing in some cases as much as a pound or a pound and a half. The main value of these boulders lies, of course, in their pointing to the occurrence of native copper bearing rocks in the vicinity, which might be located by further search and possibly at places be found to carry the metal in paying quantities.

Ontario.

ONTARIO.

In this province the only copper ore mined was the chalcopyrite occurring in connection with the nickeliferous pyrrhotite deposits of Sudbury.

The chief contributors to the output of this district as formerly were the Canadian Copper Company, the Dominion Copper Company and Messrs. H. H. Vivian and Co. The mode of operating these

mines has been fully described in previous reports and need not, therefore, be repeated here. COPPER.

Discovery and development in Ontario.

The shipments from this district consist altogether of matte containing about twenty-seven to twenty-eight per cent of copper.

Beside the above mentioned operators the Emmons Metal Company carried on development work at the Gersdorffite mine and a little prospecting work was done by a few others.

The industry in Quebec and Ontario employed about 1,100 men exclusive of those engaged in actual prospecting.

An interesting feature in Ontario is to be found in the work which has been prosecuted for the past two years at Cape Mamainse on Lake Superior on the copper bearing veins and beds of the Keewenawan series. Small areas of these rocks occur at several places along the north shore of Lake Superior, forming the edge of the formation which is found in its largest development at Keewena Point on the south shore, where the Calumet and Hecla and other famons copper mines are located.

These rocks constitute the shore at Cape Mamainse extending back probably from five to seven miles from the extremity of the point. Here several mineral properties were taken up some fifty years ago, chief amongst which are the Pan-cake Bay and Sand Bay locations with the adjoining one of the Lake Superior Native Copper Company, which latter was worked extensively from 1880 to 1884, since when nothing has been done there.

The work at present in progress is confined to the two first mentioned properties, which cover an area of from fifteen to twenty square miles. This work was carried on during the entire year with a force of about twelve men with steam hoisting plant and pump and compressed air drills. A Sullivan diamond drill was used in testing the property supplementing the information gained through the test shafts and openings made on the outcroppings of the veins, etc.

The local character of the formation is that of a number of trappean beds, often amygdaloidal, interbedded with coarse boulder conglomerates. The strike of the formation is north-west, dipping at 25° to 30° westerly or lakewards.

Native copper is found scattered all through the volcanic rocks in shot and leaf form, etc., whilst the small fissures are apt to carry plates, leaves, etc., of the metal. A number of larger and more persistent fissure veins have also been located carrying shot, leaf and mass copper and also rich sulphuretted ores of the chalcocite type. These seem generally to hold a considerable proportion of silver, some assays

COPPER.

showing 25 to 30 oz. of that metal and run high in copper contents (69 per cent and thereabouts).

Discovery and development in Ontario.

Both the fissure veins and bedded deposits have received attention in past years and of late. The reports of the results of these later efforts would seem to have yielded very favourable and hopeful returns and indeed it would seem strange if with such widespread indications of copper no workable deposits were to be found.

British Columbia.

BRITISH COLUMBIA.

Prospecting and developement was fairly active in the districts of East and West Kootenay on deposits carrying copper sulphurets in conjunction with argentiferous galena. Although these are worked more particularly with a view to the silver, which is carried both by the galena and the copper sulphurets, yet when they come to be worked on a large scale much copper will necessarily be produced in the district.

During the visit of Mr. E. D. Ingall to the province to study its mining districts, some copper claims were visited in the Illecillewaet district at which he made the following notes :—

"Proceeding from Illecillewaet station on the Canadian Pacific Railway a trail of about ten miles through the mountains brings one to Copper Mountain. Here some veins have been located, carrying copper ores in the shape of the yellow sulphuret or chalcopyrite and bornite. The owners of the claims are Messrs. Ryckman, M.P., of Hamilton, Ont., and Scott, of Illecillewaet. The former has had assays of the ores made which were said to run 61 per cent copper, $20 in gold and $8 in silver.

"The chief vein on the Silver Bow claim shows in the face of a lofty cliff of talcose and chloritic schistose rocks on whose face it is visible for a distance of 300 to 400 feet, the cliff forming one face of a sharp V shaped spur of the mountain. It dips westerly at an angle of about 45° thus cutting the spur in such a way as to pass both above and below over on to its other face.

"The vein is from one to three feet wide and carries the ores in irregular masses and ribs in a gangue, sometimes dolomitic and rusty weathering from the presence of much iron and sometimes consisting of white opaque or translucent quartz. Amongst the ore extracted were seen many lumps of several pounds weight of almost solid sulphuret and in many cases the attached quartz was found to be crystallized and interpenetrating or leaving the imprint of its pyramidal terminations in the ore.

"The country rocks at the place examined were a pale talcose schist above the vein and a darker green, probably chloritic, schist below it.

Discovery and development in British Columbia.

This relationship would not, however, be found to persist as the vein is seen to cut across the rocks lower down the mountain side. At this place the rocks strike about N. 60° W. and dip E. <55°.

"The rocks constitute part of a belt running in a southerly direction crossing the Canadian Pacific Railway some distance east of Illecillewaet station.

"At places they show numerous small veinlets, carrying hematite in quartz gangue and showing stains of malachite, probably due to the weathering of a certain amount of disseminated copper sulphurets which are to be found at places. These are flanked on the west by the black shale series which enclose most of the galena veins proper of the district.

"Several other claims visited in Illecillewaet district showed sulphurets of copper occurring in conjunction with galena."

Exports and imports.

EXPORTS AND IMPORTS.

The accompanying tables Nos. 1, 2 and 3 give the figures of exports and imports of this metal and its ores, etc. :

The details of the exports are as follows :—

Copper Ore.

From Quebec.....46 tons, valued at $3,750
" Nova Scotia.....24 " " 100

Copper Matte, etc,

From Ontario, 1,040,000 lbs., valued at $79,141 to the United States.
" Quebec 45,022 " " 2,701 " "
" " 336,000 " " 17,430 " Great Britain.
" " 12,000 " " 600 " Germany.

Fine Copper.

From Quebec, 3,476,519 lbs., valued at $173,910 to the United States.

COPPER.
TABLE 1.
EXPORTS.

Year.	Nova Scotia.	Ontario.	Quebec.	Total.
1885.			$262,600	$262,600
1886.		$16,404	232,855	249,259
1887.		3,416	134,550	137,966
1888.			257,260	257,260
1889.			168,457	168,457
1890.		2,219	396,278	398,497
1891.		64,719	283,385	348,104
1892.	$100	79,141	198,391	277,632

COPPER.

Exports and Imports.

COPPER.

TABLE 2.

IMPORTS: PIGS, OLD AND SCRAP.

Fiscal Year.	Pounds.	Value.
1880	31,900	$ 2,130
1881	9,800	1,157
1882	20,200	1,984
1883	124,500	20,273
1884	40,200	3,180
1885	28,600	2,016
1886	82,000	6,969
1887	40,100	2,507
1888	32,300	2,322
1889	32,300	3,288
1890	112,200	11,521
1891	107,800	10,452
1892	343,600	14,894

COPPER.

TABLE 3.

IMPORTS: MANUFACTURES.

Fiscal Year.	Value.
1880	$123,061
1881	159,163
1882	220,235
1883	247,141
1884	134,534
1885	181,469
1886	219,420
1887	325,365
1888	303,459
1889	402,216
1890	472,668
1891	563,522
1892	422,870

GRAPHITE.

GRAPHITE.

The production of this mineral for 1892 was less than for the previous year as shown below:

1891.....260 tons, valued at $1,560
1892 .....167 " " 3,763

The above amounts resulted, as in former years, from working the graphitic deposits in the Laurentian rocks of Quebec.

DISCOVERY AND DEVELOPMENT.

GRAPHITE.

Discovery and development in New Brunswick.

NEW BRUNSWICK.

During his visit to the province Mr. H. P. Brumell learned the following facts regarding graphite mining in the province :—

"*Split Rock, St. John, N.B.*—At the Best mine, St. John, a small force of men were employed until the fall, when operations ceased owing to the prevailing low price of graphite in the United States where most of the ore was marketed. While shipments were being made the ore was milled at the mine and a finer quality than usual shipped.

"It is to be regretted that this property which had lately been so thoroughly equipped and showed such excellent material should be idle, but it is confidently expected that during the coming season operations will again be undertaken. The property is owned and operated by Messrs. W. F. Best *et al.*, of St. John, N.B."

QUEBEC.

Quebec.

In this province some little work was done on some of the deposits of the mineral which occur in the Laurentian rocks of the county of Ottawa which have been described in previous reports of the division.

Claxton Mine.—Mr. John Claxton of Inverary, Ont., had a force of five men at work on lots 12 and 14, range X., of Buckingham township. He made a trial shipment to England of mineral containing about 20 per cent of graphite at a cost of transport from Buckingham to Liverpool of $4.50 per ton. According to Dr. Ells, who visited the place, the graphite, the quantity of which is quite extensive, is disseminated through a gray rusty gneiss.

Weart Mine.—This property with the plant erected there was described in the report for last year. The workings are situated on lot 26 in range VI., Buckingham. Several hundred tons of ore were mined, and a small quantity was treated in the mill, the result being shipped. The force employed consisted of twenty men. The cost of shipment to the Canadian Pacific Railway at Buckingham is given as $3 per ton.

Walker's Mine —This property was not in operation during 1892, other than to complete the enlargement and improvements on the mill.

Bowie's Mine.—Some development work was done by Captain Bowie of Ottawa, on lot 47, range, XIV., Hinks township.

Lewis Mine.—Dr. Ells reports that a deposit is being opened up at the south-east end of Donaldson's Lake by Mr. Lewis, where the graphite occurs in veins up to the two inches thick in hard felspathic rock.

GRAPHITE.

EXPORTS AND IMPORTS.

Exports and imports.

Tables 1, 2 and 3 following give the data obtainable regarding exports and imports, and are self-explanatory :

GRAPHITE.

TABLE 1.

EXPORTS.

Year.	New Brunswick.		Ontario.		Quebec.	
	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.
1886	8,142	$3,586	.....	.....	.....	.....
1887	6,294	3,017	.....	.....	.....	.....
1888	2,700	1,080	.....	.....	.....	.....
1889	660	422	22	$116	.....	.....
1890	400	160	329	1,369	.....	.....
1891	464	72	.....	.....	.....	.....
1892	1,224	449	15	60	4,590	$3,443

GRAPHITE.

TABLE 2.

IMPORTS OF RAW AND MANUFACTURED PLUMBAGO.

Fiscal Year.	Plumbago.	Manufactures of Plumbago.
1880	$1,677	$2,738
1881	2,479	1,202
1882	1,028	2,181
1883	3,147	2,141
1884	2,891	2,152
1885	3,729	2,805
1886	5,522	1,408
1887	4,020	2,830
1888	3,802	22,604
1889	3,546	21,789
1890	3,441	26,605
1891	7,217	26,201
1892	2,988	23,085

GRAPHITE.

TABLE 3.

IMPORTS OF BLACK-LEAD.

GRAPHITE.
Exports and Imports.

Fiscal Year.	Value.
1880	$18,055
1881	26,544
1882	25,132
1883	21,151
1884	24,002
1885	24,487
1886	23,211
1887	25,766
1888	7,824
1889	11,852
1890	10,276
1891	8,292
1892	13,560

GYPSUM.

GYPSUM.

PRODUCTION.

Production.

The quantity of gypsum mined and marketed during 1892 was 241,048 tons valued at $241,127 which shows a marked increase over that of the previous year, the gain being 37,443 tons and in value $34,876. The following table illustrates the production by provinces.

GYPSUM.

TABLE 1.

PRODUCTION BY PROVINCES.

Province.	Tons.	Value.
Ontario	4,320	$ 5,399
Nova Scotia	197,019	170,021
New Brunswick	39,709	65,707
Totals	241,048	$241,127

GYPSUM.

Production.

Practically the whole of the production of Nova Scotia and New Brunswick was exported, the greater part going to the United States, whereas the production of the Ontario mines was used locally.

The amount of rock ground and sold in Canada as land plaster was 3,523 tons valued at $13,743, while of Plaster of Paris there were 11,387 tons sold valued at $51,244, a large increase in quantity over the previous year though in point of value the production showed a decrease of $3,795. There was also a considerable quantity of "Alabastine" and "Adamant" manufactured by the Alabastine Co. of Paris and the Adamant Manufacturing Co. of Toronto respectively.

The production during past years was as follows:—

1886.....	162,000 tons,	valued at	$178,742
1887.....	154,008	"	157,277
1888.....	175,887	"	179,393
1889.....	213,273	"	205,108
1890.....	226,509	"	194,033
1891.....	203,605	"	206,251
1892.....	241,048	"	241,127

There are no new developments to report, the industry being carried on in the same districts and very much in the same quarries and mines as in previous years. Regarding operations in the vicinity of Minas Basin, N.S., Mr. H. P. Brumell reports as follows:—

Minas Basin, N.S.

"During the year a visit was made to the quarry operated by the Wentworth Gypsum Quarrying Co., at Wentworth, near Windsor, where quarrying is done on a large scale and large quantities of gypsum annually produced. The rock quarried here is all exported, most of it going to the United States, where on account of its purity, it is in great demand. All the gypsum occurrences of the district are very similar in character and the quality of the rock invariably good.

"The mode of occurrence and extent of gypsiferous territory has been so often referred to that comment here is unnecessary.

"During the year many of the larger gypsum quarries of both Nova Scotia and New Brunswick were visited, the operators in all cases reporting the industry to be in a good condition."

EXPORTS AND IMPORTS.

Exports and imports.

The following tables of exports and imports explain themselves :—

GYPSUM.

TABLE 2.

EXPORTS OF CRUDE GYPSUM,

Years	ONTARIO.		NOVA SCOTIA.		NEW BRUNSWICK.		TOTAL.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
1874	.....	.....	67,830	$ 68,164	.....	.....	67,830	$ 68,164
1875	.....	.....	86,065	86,193	5,420	$ 5,420	91,485	91,613
1876	120	$ 180	87,720	87,590	4,925	6,616	92,765	94,386
1877	.....	.....	106,950	93,867	5,030	5,030	111,980	98,897
1878	489	675	88,631	76,695	16,335	16,435	105,455	93,805
1879	579	720	95,623	71,353	8,791	8,791	104.993	80,864
1880	875	1,240	125,685	111,833	10,375	10,987	136,935	124,060
1881	657	1,040	110,303	100,284	10,310	15,025	121,270	116,349
1882	1,249	1,946	133,426	121,070	15,597	24,581	150,272	147,597
1883	462	837	145,448	132,834	20,242	35,557	166,152	169,228
1884	688	1,254	107,653	100,446	21,800	32,,51	130,141	134,451
1885	525	787	81,887	77,898	15,140	27,730	97,552	106,415
1886	350	538	118,985	114,116	23,498	40,559	142,833	155,213
1887	225	337	112,557	106,910	19,942	39,295	132,724	146,542
1888	670	910	124,818	120,429	20	50	125,508	121,389
1889	483	692	146,204	142,850	31,495	50,862	178,182	194,404
1890	205	256	145,452	139,707	30,034	52,291	175,691	192,254
1891	5	7	143,770	140,438	27,536	41,350	171,311	181,795
1892	.....	.....	162,372	157,463	27,488	43,623	189,860	201,086

In addition to the above there was an exportation of ground gypsum to the value of $20,255 of which $17,977 was from New Brunswick and $2,278 from Nova Scotia.

GYPSUM.

TABLE 3.

IMPORTS OF CRUDE GYPSUM.

Fiscal Year.	Tons.	Value.
1880	1,854	$3,203
1881	1,731	3,442
1882	2,132	3,761
1883	1,384	3,001
1884	.....	3,416
1885	1,353	2,354
1886	1,870	2,429
1887	1,557	2,492
1888	1,236	2,193
1889	1,360	2,472
1890	1,050	1,928
1891	376	640
1892	626	1,182

Gypsum.

Exports and imports.

Gypsum.

Table 4.

Imports of Ground Gypsum.

Fiscal Year.	Pounds.	Value.
1880	1,606,578	$ 5,948
1881	1,514,714	4,676
1882	759,460	2,576
1883	1,017,905	2,579
1884	687,432	1,936
1885	461,400	1,177
1886	224,119	675
1887	13,266	73
1888	106,068	558
1889	74,390	372
1890	434,400	2,136
1891	36,500	215
1892	310,250	2,149

Gypsum.

Table 5.

Imports of Plaster of Paris.

Fiscal Year.	Pounds.	Value.
1880	667,676	$ 2,376
1881	574,006	2,864
1882	751,147	4,184
1883	1,448,650	7,867
1884	782,920	5,226
1885	689,521	4,809
1886	820,273	5,463
1887	594,146	4,342
1888	942,338	6,662
1889	1,173,996	8,513
1890	693,435	6,004
1891	1,035,605	8,412
1892	1,166,200	5,595

Iron.

IRON.

Production.

Production.

The below given figures show the production of iron ore for the Dominion by provinces :—

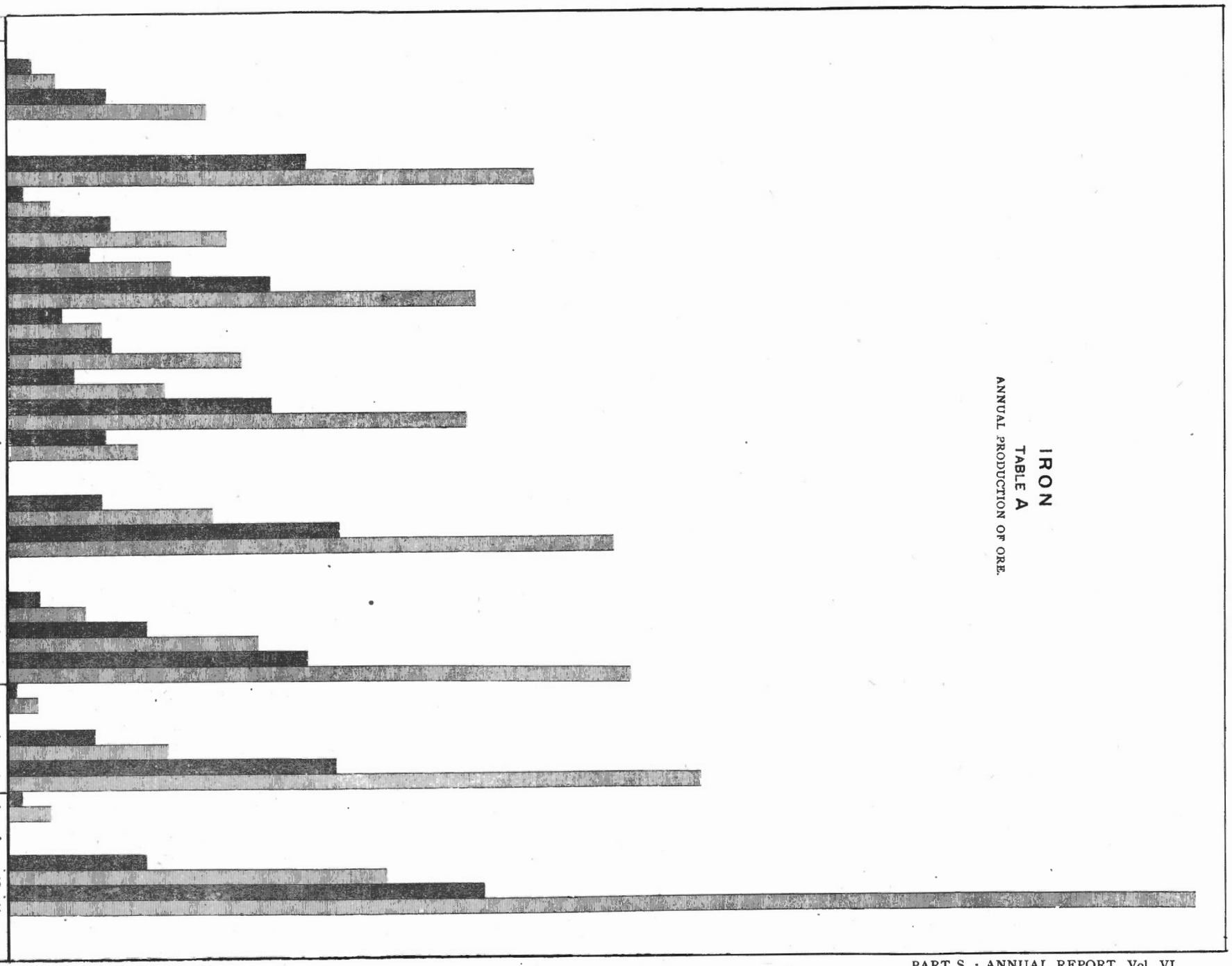
Nova Scotia	78,258	tons	valued at	$194,581
Quebec	22,690	"	"	62,385
British Columbia	2,300	"	"	6,900
	103,248			$263,866

IRON

TABLE A

ANNUAL PRODUCTION OF ORE.

Year	Province	Quantity	Value
		TONS	$
1886	B. C.	3,941	.....
	ONT.	.....	7,882
	QUE.	16,032	.....
	N. S.	.....	32,064
		.....	.....
		49,735	.....
		.....	87,036
1887	B. C.	2,796	.....
	ONT.	.....	6,990
	QUE.	16,598	.....
	N. S.	.....	36,218
		13,404	.....
		.....	26,808
		43,532	.....
		.....	76,181
1888	B. C.	8,372	.....
	ONT.	.....	14,950
	QUE.	16,894	.....
	N. S.	.....	37,710
		10,710	.....
		.....	74,509
		42,611	.....
		.....	74,500
1889	B. C.	15,487	.....
	ONT.	.....	20,742
	QUE.	.....	.....
	N. S.	.....	.....
		14,533	.....
		.....	33,091
		54,161	.....
		.....	97,807
1890	B. C.	.....	.....
	ONT.	.....	.....
	QUE.	5,000	.....
	N. S.	.....	12,500
		22,305	.....
		.....	41,196
		49,206	.....
		.....	101,684
1891	B. C	950	.....
	ONT.	.....	4,750
	QUE.	.....	.....
	N. S	14,380	.....
		.....	24,510
		53,649	.....
		.....	112,745
1892	B. C.	2,300	.....
	ONT.	.....	6,900
	QUE.	.....	.....
	N. S.	22,690	.....
		.....	62,385
		78,258	.....
		.....	194,581



These figures show a very noticeable increase over those for 1891 of about 50 per cent in the totals of both quantity and value. The returns give also an increased value per ton for the ores of Quebec and Nova Scotia. Ontario contributed nothing to the production last year. Iron. Production.

Graphic table A and table No. 1 give the figures for 1892 in comparison with previous years :—

IRON.

TABLE 1.

NOVA SCOTIA: ANNUAL PRODUCTION OF ORE.

	Tons.
1876	15,274
1877	16,879
1878	36,600
1879	29,889
1880	51,193
1881	39,843
1882	42,135
1883	52,410
1884	54,885
1885	48,129
1886	44,388
1887	43,532
1888	42,611
1889	54,161
1890	49,206
1891	53,649
1892	78,258

EXPORTS AND IMPORTS. Exports and imports.

The figures of the below given table No. 2, show a considerable increase in the exports of ore :—

IRON.

TABLE 2.

EXPORTS OF ORE.

Province.	1889.		1890.		1891.		1892.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
Ontario	4,108	$10,407	18,601	$38,967	2,259	$ 3,932	*10,938	$39,954
Quebec		2,700	120	1,640	191	2,683	203	2,324
Nova Scotia		100						
British Columbia	13,335	26,680	33	83	359	4,958	1,986	10,802
Totals		$39,887	18,754	$40,690	2,809	$11,573	13,127	$52,720

* Probably the product of the Province of Quebec, shipped *via* Ontario.

As in past years there are no imports to report.

IRON. DISCOVERY AND DEVELOPMENT.

Discovery and development, Nova Scotia.

NOVA SCOTIA.

The iron mines of Pictou county were visited by Mr. H. P. Brumell, who supplies the following notes of the information he gleaned from the operators and from his own observations :—

"On the East Branch of East River, Pictou county, extensive operations were carried on both in the development of iron deposits there and in the construction of the necessary works for the production of both common and charcoal pig-iron. Of the geology, character and mode of occurrence of the ore, Dr. E. Gilpin, jr., Commissioner of Mines, Nova Scotia, writes as follows :—*

"'The ores next to be noticed are the limonites of the East River valley. From Springville to Sunny Brae the Lower Carboniferous marine limestones rest on the Upper Silurian and lower strata, the points of junction presenting at several places interesting sections of the deposition of the limestone on the clay-slates and other pre-Carboniferous rocks. The line of junction is at many points occupied by deposits of limonite, varying in thickness from three to twenty feet. At some points the ore-bearing ground appears from surface indications to be several hundred yards broad. At several openings the ores are highly manganiferous and specimens of pyrolusite of good quality have been found. The limestones connected with these ores at Springville and Black Rock are, in some instances, rich enough in carbonate of iron to be available for furnace use."

"'The source of these bodies of ore may be sought for in the oxidation and concentration of the iron in the limestones, and from the beds of red hematite in the Upper Silurian already referred to, several of which are in the immediate vicinity."

* Trans. Am. Inst. M.E., Vol. XIV, 1885, p. 60.

" 'The ores are compact mammillated and fibrous, and their quality is shown by the following analyses:'" IRON.

Discovery and development, Nova Scotia.

Composition.	I.	II.	III.	IV.
Iron oxides	88·92	93·00	81·19	48·223
Manganese oxide	·78	1·10	·20	14·410
Alumina	·71	.....	.....	.....
Lime carbonate	1·44	.....	.....	·015
Magnesia "	·82	.....	.....	Traces.
Phosphoric acid	·34	.....	·15	.....
Phosphorus	.....	None.	.....	·020
Sulphur	·24	·04	Traces.	·480
Titanic acid	Trace.	.....	.....	.....
Silica	2·14	4·80	4·26	25·130
Moisture	4·61	.....	13·60	12·530
Metallic iron	62·24	65·20	56·83	33.826

I.—Dr. S. Macadam.
II.—Dr. T. E. Thorpe.
III.—J. H. Huxley.
IV.—E. Gilpin, Jr.

" Active operations were being carried on by the Pictou Charcoal Iron Co., and the New Glasgow Iron, Coal and Railway Co., with furnaces at Bridgeville and Ferrona respectively."

Pictou Charcoal Iron Co.—" This company owns a large area of land in the vicinity of and east of Bridgeville and apart from the land taken up for iron have several thousand acres of hardwood timber lands scattered over which they have many bee-hive charcoal kilns, three of which are situated at the works. Pictou Charcoal Iron Co.

" The mining development made by the company up to the time of my visit consisted of two drifts and several open cuts and pits. In No. 1 drift to the north of the furnace they drove into the face of the hill for a distance of thirty feet where they struck a nine foot vein of good ore, between red and yellow clay walls. The vein strikes N. 20° E and dips 46° S.W., and they had begun to rise on the vein to the surface a distance of ninety feet. Near the mouth of the drift and beneath

IRON.

Discovery and development, Nova Scotia.

the surface soil and loam was found a shaly rock striking N. 30° E, dipping 15° S.E., between which and the ore the working was driven through about 100 feet of yellow clay, forming the hanging wall of the vein. In No. 2 drift, about 200 yards to the south-east, they had driven 260 feet and opened up a large body of very solid botryoidal limonite occurring under similar conditions to that in drift No. 1. Owing to the timbering, I was unable to get the course of the vein which is said to be a continuation of that opened in No. 1 drift, but which must describe a semi-circle to have been met with at this point. Immediately over No. 2 drift a large open cut has been made on the exposure of the vein on the crest of the hill and prior to 1892 some 4,000 tons of ore extracted and shipped to Londonderry where it was converted into pig iron. The company has also made test pits and strippings proving the existence of many large and valuable deposits of ore and in many places boulders and masses of both ankerite and limonite occur in sufficient quantities to warrant their collection.

"The plant of the company consists of:—

1 blast furnace, 50 ft. high, 6 ft. bell, 11 ft. bosh, daily capacity 25 tons.

2 horizontal blowers 5 ft. diameter, and 5 ft. stroke.

1 double set of engines 13 by 18 inch. cylinders operating blowers.

1 modified "Durham" cast-iron stove containing sixty 6-inch U tubes 13 ft. long.

4 boilers 30 ft. by 36 inches.

"The buildings consist of cast house, coal and ore sheds, engine and boiler-houses, compressor-house, stove-house, blacksmith shop, office and stables, and twenty charcoal kilns with a capacity of 660 cords. Railway communication is had by means of a half-mile siding from the N.G.I.C. & R. Company's tracks.

New Glasgow Iron, Coal and Railway Co.

The New Glasgow Iron, Coal and Railway Company.—"This company with works and headquarters at Ferrona near the junction of the East and West Branches of the East River were just about to put their furnace into blast at the time of my visit, 24th August. The works are those of a fully equipped blast furnace plant of about 80 tons daily capacity and consist of the following:—

1 blast furnace, 75 ft. high, 16 ft. bosh, 10 ft. crucible, 8 tuyeres.

3 Stoves (Massick and Crooke) 60 ft. by 16 ft. 6 inches.

8 boilers, totalling 900 h.p.

2 blowers, 36 inch cylinders, 84 inch tubs, 4 ft. stroke.

36 coke ovens, with pusher (Bernard patent, modified Belgian Coppee ovens), 33 feet long, 26 inches wide, capacity 80 tons coke per day.

1 coal washing plant, 250 tons daily capacity (Schurtermann Improved Hartz jig), fine corn size.

1 double elevator and engine.

1 ore washer.

"The buildings consist of cast-house, engine and boiler-houses, coal washer shed, ore and coke shed, forge and office. The company also owns and operates the railroad running from Eureka Junction on the Intercolonial Railway to Black Rock, a distance of about twelve and a half miles.

"The company own or control a very large extent of iron-bearing territory on the East Branch, but at the time of my visit were operating on four properties only, the McDonald, Grant and Fraser farms, and at Black Rock further south.

McDonald Farm.—"On the McDonald farm they have sunk on the vein, which dips about 30° to the west, for about 450 feet, and from this slope several levels have been run in ore either way, the longest being to the southward, in which direction they have followed the vein for 250 feet. The vein, as seen in the slope, averages about nine feet, in places being as much as seventeen feet in thickness. It was found impossible to get even an approximate idea of the extent of the workings here, as the timbering in many places had been either removed or had fallen away and the workings abandoned. The work is of a necessity very irregular, and for the greater part consists in following the ore. The ore, as in most deposits on the East Branch, occurs between walls of clay and is oolitic in character, though in certain parts it is solidly botryoidal or fibrous. The workings here are very wet, a large pump with three-inch discharge barely sufficing to hold the water in check. The plant consists of steam hoisting gear, engine and pump.

"The ore from this slope afforded the following results on assay by Messrs. Stein and Schwarz of Philadelphia:*

Crude wash ore.

	Per cent.
Siliceous matter	9 38
Metallic iron	51·63

* This and the following assays of ore were made by Messrs. Stein and Schwarz for the N. G. Iron, Coal and Railway Co.

IRON.

Discovery and development, Nova Scotia.

"This was washed affording 88 per cent coarse or washed ore and 12 per cent clay or loss. The washed ore and clay afforded the following:

Washed ore.

	Per cent.
Siliceous matter	6·75
Metallic iron	58·41
Manganese	1·88
Combined water	11·02
Phosphorus	·016

Clay washed from ore.

	Per cent.
Siliceous matter	28·67
Metallic iron	38·58

The more solid or lump ore found in parts of this mine gave:—

Lump ore.

	Per cent.
Siliceous matter	8·18
Metallic iron	52·92
Phosphorus	·019
Sulphur	·069
Manganese	4·43
Combined water	10·50

Grant Farm.

Grant Farm.—"The property next adjoining the above to the south and between that and the Charcoal Iron Company's property is the Grant farm, on which are two drifts and one shaft. The shaft is on the brow of the hill and is fifty-five feet deep, the upper twenty feet of which was through surface soil and clay, beneath which the ore was cut diagonally for a distance of thirty-five feet and bed rock struck immediately beneath. This consisted of a slaty rock of pre-Carboniferous age. The vein in the shaft had a thickness of from seven to eleven feet. The upper drift, down the hill and beneath the shaft, is 200 feet in length through clay and taps the vein at a distance of 180 feet where seven feet of good ore was found. The lower drift about fifty feet below the above was carried in about 250 feet. In this the part of the clay mass usually occupied by the vein was found to be practically barren of iron though small bunches and masses of ore were found. It is the intention to connect these workings by rising from the lower drift past the upper to the shaft so that the ore will all be

drawn from the lower drift and run on the level to the ore bin close at hand on the company's tracks. IRON. Discovery and development, Nova Scotia.

"The ore from this property afforded Messrs. Stein and Schwarz the following result:—

Ore from Grant Farm.

	Per cent.
Siliceous matter	5·58
Metallic iron	56·57
Phosphorus	·213
Sulphur	·096
Water	10·90

Fraser Farm.—"The next property to the southward operated by this company is the Fraser farm separated from the Grant farm by the Pictou Charcoal Iron Company's land. Here the operations consist of a shaft and drift. The shaft near the brow of the hill was sunk fifty feet to the vein, and from its base two levels have been run fifty feet in either direction on the vein. Lower down the hill a drift has been run fifty feet striking the vein, upon which they had begun to rise to the shaft. The vein here averages ten feet of good ore in walls of clay. Fraser Farm.

"All the workings from the McDonald farm through the Grant farm, Pictou Charcoal Company's workings and the Fraser farm would seem to be upon the same vein or contact deposit which follows in all its sinuosities the junction between the Lower Carboniferous and Devonian or Silurian strata.

Black Rock.—"At Black Rock, the present terminus of the railway, extensive bodies of ore occur in a somewhat similar manner to the foregoing and are probably but a continuation of them. Work here is carried on principally in an open-cut, about 150 feet above the track, where the ore is found beneath a slight covering of surface soil filling a small bay or indentation in the pre-Carboniferous rocks. Beneath the open cut a drift was run to the south-east on the vein for a distance of 200 feet, with at fifty feet from the mouth, a rise to the open cut, a distance of sixty feet, showing good ore throughout the rise. From these openings the ore is run on an incline to ore-bins on the railway. About seventy-five feet beneath the above a drift was run through limestone to strike the vein which was found at a distance of 450 feet. In this drift and about 150 feet from the entrance an elbow of the so-called "black rock" (diorite,? intrusive in the pre-Carboniferous) was struck, and the drift in consequence deflected somewhat from its direct course. Black Rock.

IRON.

Discovery and development, Nova Scotia.

"At the point of contact between the limestone and the 'black rock' no ore was found, but at the junction of the limestone and underlying rocks at the end of the drift the ore was found to be excellent both as to quality and quantity. It is the intention to rise from this lower drift and make it the main way of the workings.

"Analyses of the ore from Black Rock were made by Messrs. Stein and Schwarz with the following results:—

Fine Crude Ore from Black Rock.

	Per cent.
Siliceous matter	24·48
Metallic iron	41·70
Phosphorus	·043
Manganese	1·01

"The ore on being washed afforded 85 per cent. ore and 15 per cent. clay. The clay on analysis was found to contain 51·08 per cent. of siliceous matter, and 21·49 per cent metallic iron while the resultant washed ore afforded the following:—

Washed Ore from Black Rock.

	Per cent.
Siliceous matter	19·78
Metallic iron	45·27
Manganese	1·08
Phosphorus	·045
Water of hydration	11·10

"Besides that being carried on by the two companies mentioned, no work was being done on the East River, though large areas of iron lands are held by local and western capitalists."

The other mines working were those of the Londonderry Iron Company, and those of the Annapolis valley supplying ore to the same company.

New Brunswick.

NEW BRUNSWICK.

Beyond a little prospecting work nothing was done in this province in the development of iron ore.

Quebec.

QUEBEC.

The mining of the bog iron ores of the province was continued by Messrs. Jno. McDougall & Co., of Montreal, for the supply of their smelting works at Drummondville, as well as by the Canada Iron Furnace Company under the direction of Mr. George E. Drummond.

The latter company have their works at Radnor Forges, Champlain county, and have been engaged in extending and improving their plant. Their works were not visited by any of the officers of the survey, but the report of the Commissioner of Crown Lands of the province gives the following interesting notes regarding operations. :— IRON. Discovery and development, Quebec.

" In August, 1891, the work of demolishing the old furnace was begun, a new furnace was then constructed, and blown in March 12th, 1892. The present furnace is forty feet high, nine feet bosh. The metal shell is of boiler plate, supported by cast iron columns, and up to bosh line is stayed by a water jacket. The blast enters at a temperature of 750 degrees, pressure being 3½ lbs through the four bronze tuyères. The air is heated with a hot blast stove on the pipe principle, and steam power is used in connection with the blast. Radnor Forges.

" The old fashioned blowing engines are being replaced by a modern Weimer engine of larger capacity, which will give increased quantity and pressure.

" A battery of four boilers is fired with the waste gases from the furnace.

" The ore used is procured from both sides of the river St. Lawrence, on the south shore at Gentilly and Becancour, on the north shore at Champlain, Pointe du Lac, Lanoraie, St. Felix de Valois, Joliette, and in the parishes near the Forges, county of Champlain. Large quantities are taken from Turtle lake by means of a dredge, and the deposits here seem to be inexhaustible. New discoveries are being made frequently. The company has at present in operation twenty-four kilns for producing charcoal which is sufficient for the furnace now. Eight of these are rectangular ; the others are of the bee-hive pattern, capacity of each sixty cords, (twelve new ones at Grandes Piles.) About 200 men are employed in the manufacture proper ; but when the men who raise the ore and get out the firewood are computed, the total number is certainly from 500 to 800 according to the season. The company's mark is C.I.F. The iron is divided into ten grades, from which can be selected material for the finest stove-plates, car-wheels, rolling-mill rolls, chill-plates, etc. Grandes Piles is being made a base for a large supply of wood and charcoal. The company has constructed one steamboat and three large scows, and three more are to be built. With these the wood is to be brought down river to the kilns at shipping point. The wood is procured on each side of the St. Maurice above Grandes Piles, and the supply is practically inexhaustible.

" Since the furnace was blown in, the daily output has averaged about twenty-five tons, but with the new blowing apparatus it is expected to increase this to forty tons or more. The company have made

IRON.

experiments with a magnetic ore and contemplate using the same. The ore is procured from St. Jérôme.

Discovery and development, Quebec.

"This company has also in operation an extensive plant for the manufacture of ordinary and repressed brick, with a capacity of 2,000,000 per annum. The company propose enlarging this branch of business and contemplates supplying a regular line of fancy bricks.

"I direct attention to the remarkable development of this industry as there are only three other points in the Dominion of Canada where similar workings are carried on, viz.: Drummondville, P.Q., Londonderry and New Glasgow, N.S.

"The old furnace, at Radnor, at its best, only produced five tons per day. This industry reflects most creditably on the province, as the product competes with foreign material in the open market, and owes success to its superior quality. Up to the present time the furnace product has been wholly utilized in Canada.

"From a local point of view this industry is of course very important, giving work to a large population, enabling a class of wood to be utilized, which otherwise the settlers would destroy by fire in order to clear the land for agricultural purposes.

Magnetic sands of the Gulf.

"Some attention has of late been given to the Magnetic Sands of the North Shore of the Gulf, and a small quantity was shipped to England for experimental purposes, but the result of same has not yet been declared."

Between them these two companies have nearly 1,000 men on their pay-rolls.

Some of the deposits mentioned above are alluded to in Mr. Giroux's summary report of the season's work as follows:—*

"The old mines and other points of interest about Joliette, Radstock, St. Alphonse and Chertsey were then examined; the Canada Iron Furnace Company of Radnor has been working actively since the middle of September in ranges 3 and 4 of the township of Joliette, St. Ambroise parish, Joliette county. It was learned from the company's foreman that the deposit of bog iron ore on range three, township of Joliette, was one of the best yet worked by the company. It varies from twelve to eighteen inches in thickness and is about three chains wide by five chains long. This company has worked at a small deposit of magnetic iron ore in concession St. Charles, Rang Double, of the parish of Ste. Ursule, and expects to ship about 100 carloads of ore from St. Ambroise parish, and about forty carloads from the parish of Ste. Elizabeth."

* Summary Report of Geological Survey Department for 1892, p. 31.

Bristol Mine.—In Pontiac county, Messrs. Evans & Co., of Philadelphia, operated the Bristol Mine during four months of the year, employing some sixty-five men. This ore, which is valued at $1.00 per ton raw, or $1.50 per ton roasted, is as in the past, all shipped to the United States. IRON. Bristol mine.

ONTARIO. Ontario.

None of the mines of this province were operated during the year.

BRITISH COLUMBIA. British Columbia.

Texada Island.—No work was done on the Texada Island mine during the year. Texada Island.

Glen Iron Mine—The Glen Iron Mining Company operated their mine at Cherry Bluff, near Kamloops with a force of about twenty men. The ore was all exported, being sent to Tacoma in Washington State and to Portland and Oswego in Oregon. Glen iron mine.

Mr. McEvoy of the Survey staff visited this mine, regarding which he makes the following observations :—*

"Before returning the Glen iron mine on Kamloops lake was visited. The ore is magnetite throughout, with a slight mixture of calcite and felspar in a few places, which, however, does not injure the ore for smelting. The following items were noted :—

"1. An opening a few feet from the railway, filling an irregular angular fissure from two to six feet in width.

"2. Three hundred feet south of last a deposit of four feet of good ore, with five feet mixed ore and country rock.

"3. Five hundred feet southward from last a large deposit of fourteen feet good ore, with ten feet of mixed.

"4 Thirty feet north-west of last, twelve feet of ore.

"5. West of last a vein three feet thick.

"6. South-west of last numerous croppings of good ore undeveloped. At a low estimate ten per cent of the mass here is ore.

"7, North-east of No. 3 a vein four to ten feet thick. This is the principal source of output at present and is connected with the railway by an ærial tramway.

"All the veins run in an easterly and westerly direction and are nearly vertical or dipping northward at high angles."

* Summary Report of Geological Survey Department for 1892, p. 31.

IRON.

Pig iron and steel.

Pig Iron and Steel.

As mentioned above there were 103,248 tons of iron ore produced from all the mines of the Dominion. Of this quantity 96,948 tons were used in the country. This amount represents the ore fed to the furnaces of the following operators, viz. :—

The New Glasgow Iron, Coal and Railway Co., Ltd.
The Londonderry Iron Company, Ltd.
The Pictou Charcoal Iron Company, Ltd.
} In Nova Scotia,

The Canada Iron Furnace Company, Ltd
Messrs. John McDougall & Co.
} In Quebec.

The number of furnaces in blast during the year was five, of which three used charcoal for fuel and two coke with a little raw coal.

The following table, No. 3, gives further details :

Pig iron.

IRON.

TABLE 3.

PIG IRON PRODUCTIVE : CONSUMPTION OF ORE, FUEL, ETC.

Materials made and used.		1891.		1892.	
		Quantity.	Value.	Quantity.	Value.
Pig iron made	Tons.	23,891	$368,901	42,443	$637,421
Iron ore consumed	"	60,933	130,955	96,948	250,966
Fuel consumed	Charcoal. Bush.	441,812	22,091	1,121,365	78,291
	Coke. Tons.	30,626	98,402	50,882	152,311
	Coal. "	2,170	2,868	1,740	1,797
Flux consumed	"	11,377	11,546	22,967	21,687

Table No. 4 gives the exports of iron and steel goods from Canada, and tables 5, 6 and 7 following give data regarding the country's consumption of similar commodities whose value is based chiefly upon the amount of iron they contain than upon their highly manufactured condition.

IRON.

IRON.

Exports of iron and steel.

TABLE 4.

EXPORTS OF IRON AND STEEL GOODS THE PRODUCE OF CANADA.

Province.	Pig Iron.	Iron Stoves.	Scrap Iron.	Iron Castings.	Iron, all other and hardware.	Steel and manufactures of.	1892 Totals.	1891 Totals.
Ontario	.....	$691	$1,043	$5,146	$10,441	$17,498	$34,819	$27,436
Quebec	$330	187	605	4,518	54,319	9,792	69,751	53,039
Nova Scotia	...	2,419	882	287	15,887	25,403	44,878	63,738
New Brunswick	....	.....	....	... .	4,232	.. . .	4,232	5,602
Prince Edward Isl'd.	.....	3	.....	.....	129	.....	132	14
Manitoba	.....	152	.....	8	94	544	798	344
North-west Ter's	.....	.....	344	22	62	.....	428	.....
British Columbia	. . .	55	192	....	29	283	559	2,746
Totals	$330	$3,507	$3,066	$9,981	$85,193	$53,520	$155,597	$152,919

IRON.

TABLE 5.

IMPORTS OF PIG IRON, ETC.

FISCAL YEAR.	PIG IRON, CHARCOAL.		PIG IRON, ALL OTHER.		PIG IRON, KENTLEDGE, ETC.		TOTAL.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
1880	....	.....	23,159	$371,956	.....	.....	23,159	$371,956
1881	.....	.....	43,630	715,997	.....	.. ..	43,630	715,997
1882	6,837	$211,791	56,594	811,221	.....	.....	63,431	1,023,012
1883	2,198	58,994	75,295	1,085,755	.....	... .	77,493	1,144,749
1884	2,893	66,692	49,291	653,708	....	.....	52,184	720,310
1885	1,119	27,333	42,279	545,426	.....	.....	43,398	572,759
1886	3,185	60,086	42,463	528,483	.....	.....	45,648	588,569
1887	3,919	77,420	46,295	554,388	....	....	50,214	631,808
1888	.....	.....	.....	.....	48,973	$648,012	48,973	648,012
1889	....	.....	....	.....	72,115	864,752	72,115	864,752
1890	.....	.....	.....	.....	87,613	1,148,078	87,613	1,148,078
1891	.....	... .	.....	.....	81,317	1,085,929	81,317	1,085,929
1892	.....	.....	.. .	.....	68,918	886,485	68,918	886,485

Iron.

Exports of iron and steel.

Iron.

Table 6.

Imports: Iron in Slabs, Blooms, Loops and Puddled Bars, etc.

Fiscal Year.	Cwt.	Value.
1880	195,572	$244,601
1881	111 666	111,374
1882	203,888	222,056
1883	258,639	269,818
1884	252,310	264,045
1885	312,329	287,734
1886	273,316	248,461
1887	522,853	421,598
1888	110,279	93,377
1889	80,383	67,181
1890	15,041	15,923
1891	41,567	38,931
1892	64,397	56,186

Iron.

Table 7.

Imports of Iron and Steel Goods.*

Fiscal Year.	Value.
1880	$6,620,260
1881	8,484,175
1882	8,578,685
1883	8,613,739
1884	6,143,870
1885	4,606,193
1886	4,698,882
1887	6,084,704
1888	5,147,111
1889	7,108,052
1890	7,260,845
1891	9,188,502
1892	9,509,489

Lead.

LEAD.

Production.

PRODUCTION.

The amount of this metal produced during 1892 shows a large increase as compared with previous years, the figures being as follows:—

1890	113,000 lbs.	valued at	$ 5,805
1891	588,665	"	25,607
1892	1,768,420	"	72,505

Practically the whole of this production is to be credited to British Columbia and represents the lead contents of the galena ores shipped from that province. LEAD.

All the lead production of the country is shipped as ore, there being no smelters in operation.

EXPORTS AND IMPORTS.

Exports and imports.

LEAD.

TABLE 1.

IMPORTS OF LEAD.

FISCAL YEAR.	OLD, SCRAP AND PIG.		BARS, BLOCKS, SHEETS.		TOTAL.	
	Cwt.	Value.	Cwt.	Value.	Cwt.	Value.
1880					30,298	$124,117
1881	16,236	$ 56,919	18,222	$70,744	34,458	127,663
1882	36,655	120,870	10,540	35,728	47,195	156,598
1883	48,780	148,759	8,591	28,785	57,371	177,544
1884	39,409	103,413	9,704	28,458	49,113	131,871
1885	36,106	87,038	9,362	24,396	45,468	111,434
1886	39,945	110,947	9,793	28,948	49,738	139,895
1887	61,160	173,477	14,153	41,746	75,313	215,223
1888	68,678	196,845	14,957	45,900	83,635	242,745
1889	74,223	213,132	14,173	43,482	88,396	256,614
1890	101,197	283,096	19,083	59,484	120,280	342,580
1891	86,382	243,033	15,646	48,220	102,028	291,253
1892	97,375	254,384	11,299	32,368	108,674	286,752

LEAD.

TABLE 2.

IMPORTS OF LEAD MANUFACTURES.

Fiscal Year.	Value.
1880	$15,400
1881	22,629
1882	17,282
1883	25,556
1884	31,361
1885	36,340
1886	33,078
1887	19,140
1888	18,816
1889	16,315
1890	25,600
1891	23,893
1892	22,636

LEAD.

DISCOVERY AND DEVELOPMENT.

Discovery and development.

Regarding discovery and development nothing of importance was done in this metal in the eastern provinces.

Nova Scotia.

NOVA SCOTIA.

Mr. Brumell when in the province of Nova Scotia found opportunity to visit one lead deposit regarding which he furnishes the following notes :—

Colchester County

Smithfield.

Smithfield.—" A visit was made during the summer to this property which is now held by Messrs. C. F. Fraser, Howard Clark, *et al* of Halifax. Although the shafts were full of water and the property idle for some time there was every evidence of considerable work having been done. I was informed that the underground work consisted of two shafts thirty and sixty feet deep. From the bottom of the thirty feet shaft a cross-cut has been run from the foot-wall a distance of thirty-three feet to the south, traversing good ore throughout, but falling short of reaching the hanging wall. From the easterly or sixty feet shaft two drifts had been run on the vein in either direction to a distance of thirty feet each.

" The vein with an estimated thickness of thirty feet strikes approximately east and west and dips at an angle of 80° or 85° to the south, the country rock consisting of Carboniferous limestone, striking N. 75° W. The ore consists of fine and coarse grained argentiferous galena associated with iron-pyrites, calcite and small quantities of light coloured zinc-blende and, it is said, can be dressed to 16 per cent pure galena.

" A small furnace was erected at the mine but proved unsuccessful.

" The following analyses of ore from the property are available :—

I. Assay of ore by E. Gilpin, jr., Halifax.
II. " pure galena " "
III. " ore by " "
IV.-V. " " Johnson Matthey & Co., London.
VI. " " Ledoux & Ricketts, New York.

I.	II.
Lead, 975 lbs. to ton of ore.	1,600 lbs. to ton of galena.
Silver, 10 ozs. " lead.	34 ozs. " lead.
Gold traces.	Not found.

III.	IV.	V.
Lead, 42 per cent.	65·5 per cent	22 per cent.
Silver, 2½ ozs. to ton of lead.	15 dwts.	10 dwts.
Gold, trace.	Trace.	Trace.

LEAD.
Discovery and development,

VI.

Lead, { 40 per cent wet analysis.
38·84 per cent smelting.

Silver, trace.

Gold, none.

"It is expected that the Stewiacke Valley and Lansdowne Railway will shortly complete its projected line when the property will be within two miles of railway communication."

BRITISH COLUMBIA.

British Columbia.

In this province the working of the veins carrying argentiferous galena situated in its south-eastern portion forms an important new feature. For many years past veins of this character had been known to exist in various parts of the districts of East and West Kootenay and Yale. In some camps the galena was accompanied by sulphurets of iron and of copper and often by blende, the proportion of these minerals varying very considerably in different veins. In previous years more or less development work was done on these veins notably in the sub-districts of Illecillewaet, Nelson and Ainsworth of West Kootenay and at various places in Yale as well as in East Kootenay, but the great feature of 1892 was the discovery and development of very many veins in the new Slocan district, situated about twenty miles north of Nelson, between Kootenay and Arrow Lakes, about ten miles west of the latter. The first discovery was made late in the previous fall and, the ore being found to assay well in silver, a rush was made in the spring which led to very numerous discoveries and great activity in the district during 1892, which resulted in the shipments of ore, the lead contents of which figure above under the head of production.

The ore thus shipped all went to smelters in the western States and consisted for the most part of solid galena selected from the ore mined

Further details regarding this district are to be found in the article on precious metals following.

Besides the Slocan district above mentioned, important work was done in the discovery and development of galena bearing veins in the Fish River valley tributary to Illicillewaet on the Canadian Pacific Railway, and in the Lardeau River country, Goat River, Trail Creek Ainsworth and various other places in West Kootenay.

LEAD.
Markets.

Markets.—Practically all the lead ore produced in Canada has so far found a market in the United States, but by reason of the duty on lead none but ores rich in silver can be shipped there at a profit.

The home market is not large, some idea of its extent being gained by a study of the tables Nos. 1 and 2 previously given.

MANGANESE.

MANGANESE.

Production.

PRODUCTION.

The quantity of manganese produced during the year was 115 tons, valued at $10,250, all the production of Nova Scotia. The production of the year previous was not obtained direct from the operators, but was supposed to have been represented by the exports which were 255 tons valued at $6,694. If that amount properly represents the output for the year 1891, there was in 1892 a falling off of 140 tons, while the value increased $3,556. This increase is no doubt due to the re-opening of the Teny Cape mines and the shipment of high-grade ore therefrom.

Exports and imports.

EXPORTS AND IMPORTS.

The following tables illustrate the exports and imports during the past few years:—

MANGANESE.

TABLE 1.

EXPORTS OF MANGANESE ORE PRIOR TO 1873.

FISCAL YEARS.	NOVA SCOTIA.		NEW BRUNSWICK.		TOTAL.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
1868.....	156	$4,700	861	$19,019	1,017	$23,719
1869.....	156	4,695	332	6,174	488	10,869
1870...	1,256	4,102	146	3,580	1,402	7,682
1771.....	102	1,608	954	8,180	1,056	9,788
1872.....	131	4,005	1,075	24,495	1,206	28,500
1873..... ...	.....	.....	838	17,171	838	17,171

MANGANESE.

TABLE. 2

EXPORTS OF MANGANESE ORE.

MANGANESE. Exports and imports.

YEARS.	NOVA SCOTIA.		NEW BRUNSWICK.		TOTAL.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
1873	.....	.....	1,031	$20,192	1,031	$20,192
1874	6	$ 12	776	16,961	782	16,973
1875	.....	200	194	5,314	203	5,514
1876	21	723	391	7,316	412	8,039
1877	106	3,699	785	12,210	891	15,909
1878	106	4,889	520	5,971	626	10,860
1879	154	7,420	1,732	20,016	1,886	27,436
1880	79	3,090	2,100	31,707	2,179	34,797
1881	200	18,022	1,504	22,532	1,704	40,554
1882	123	11,520	771	14,227	894	25,747
1883	313	8,635	1,013	16,708	1,326	25,343
1884	134	1,054	469	9,035	603	20,089
1885	77	5,054	1,607	29,595	1,684	34,649
1886	(a) 441	854	1,377	27,484	(a)1,818	58,338
1887	578	14,240	837	20,562	1,415	34,802
1888	87	5,759	1,094	16,073	1,181	21,832
1889	59	3,024	1,377	26,326	1,436	29,350
1890	177	2,583	1,729	34,248	1,906	36,831
1891	22	563	233	6,131	255	6,694
1892	84	6,180	59	2,025	143	8,205

(a) 250 tons from Cornwallis should more correctly be classed under the heading of mineral pigments.

MANGANESE.

TABLE 3.

IMPORTS: OXIDE OF MANGANESE.

Fiscal Year.	Pounds.	Value.
1884	3,989	$ 258
1885	36,778	1,794
1886	44,967	1,753
1887	59,655	2,933
1888	65,014	3,022
1889	52,241	2,182
1890	67,452	3,192
1891	92,087	3,743
1892	76,097	3,530

DEVELOPMENT AND DISCOVERY.

Discovery and development.

There is little to report upon in the industry during the year, the following observations made by Mr. H. P. Brumell being all the available data :—

MANGANESE.

NEW BRUNSWICK.

Albert County.

Discovery and development in New Brunswick. Albert.

Albert.—"About two miles and a half west of Albert village and north of the main road to Alma a property under lease to C. J. Butcher, *et al* of Moncton was being actively prospected for manganese with but slight success. Several test pits have been sunk, in some of which small quantities of high-grade ore have been found. On the southern limit of the lease a large body of ore was opened up some years ago and a considerable quantity extracted and shipped. This fact, combined with the prevalence of large masses of "float" manganese to the northward and higher up the hill, led the lessees to undertake the present operations. The rocks of the vicinity are sandstone interstratified with limestone, in which latter it is expected will be found paying quantities of ore. The ore so far found is high-grade pyrolusite with manganite."

Dawson settlement.

Dawson Settlement.—"The works erected here for the drying of the bog-ore found in the vicinity were idle during the year, nor is it expected, at least until the plant is improved, that active operations will be again undertaken. The plant at present consists of three drying pans twelve by forty feet, each heated by two flues running the entire length of the pans and feeding into one smoke-stack about twenty feet high, the whole being well planned for the creation and maintenance of a high drying temperature. The pans are placed in a frame building containing also the dry-ore bins, alongside of which is a spur from the Salisbury and Harvey Railway, owned and operated by the same company. A wagon road has also been built from the works to the main-road between Hillsboro' and Salisbury. In the ore deposit, a considerable amount of cross-trenching has been done without, however, very materially draining the mass.

"The suspension of operations is due to the inability of the producer to thoroughly dry the ore and consequently keep up per centages, there is no reason, however, why, with improved methods, the ore should not be dried and 48 to 55 per cent stuff shipped in large quantities."

Nova Scotia.

NOVA SCOTIA.

Hants County.

Teny Cape.

Teny Cape.—"Operations were resumed at this well-known locality by A. E. Shaw, *et al* of Windsor, and good ore was being extracted. Several new veins have been found ranging in width from six inches to three feet and consisting of pure pyrolusite. The three feet vein was being worked in the bottom of the old 250 feet shaft with good results.

Colchester County.

MANGANESE.

Discovery and development in Nova Scotia. Onslow.

Onslow.—"A visit was made to this property which has for some years lain idle, in consequence of which the several test pits and the large open cut were full of water. The work done shows the ore to occur as thin plates and small bunches in a slaty sandstone, striking N. 25° E. and dipping <45° S.E. No ore was visible in the sandstone above the water in the pits. A small mill containing three jigs, engine and upright boiler was erected some time ago, but having been idle for over two years has fallen somewhat into decay. The dressed ore found in barrels in the mill consisted of low grade manganite and psilomelane."

Cape Breton County.

Loch Lomond.

Loch Lomond.—"Operations were being carried on as usual at this place under the proprietorship of Hon. E. T. Moseley, Q.C., of Sydney, who reported the markets and prospects good. The ore which is pyrolusite and manganite is all shipped from Big Pond, C.B., the greater proportion going to the United States."

MICA.

MICA.

PRODUCTION.

Production

The production of mica still shows an increase over that of previous years, the value of the mineral produced and sold for 1892 being $104,745 as against $71,570 for 1891, or an increase of over 46 per cent on last year's figures.

The production for past years is given below :—

1886	$ 20,008
1887	20,816
1888	30,207
1889	28,718
1890	68,074
1891	71,510
1892	104,745

It is very difficult to get at an exact figure of production as mining is carried on by so many small operators scattered all over the mica producing districts who sell to the larger operators, and to the travelling buyers of the electrical companies, thereby rendering it impossible to get direct returns from them all. The above figures therefore represent the export returns to which have been added the values of the mica used in Canada by the various electrical manufacturers.

MICA.

It is in this direction that this mineral finds its chief use, and the sudden increase in the production after 1889, as shown above, was due to the demand that then arose for the varieties of phlogopite and biotite suitable for this purpose. Previous to that time the mica mined was nearly all muscovite for stove manufacture and other purposes.

A small amount of the refuse clippings from the cutting and trimming of the crystals is ground and sold to manufacturers of lubricants and used in wall paper manufacture, etc.

Other details regarding this industry are to be found in the previous publications of this division.

Exports and imports.

EXPORTS AND IMPORTS.

There were exported 1,338,570 pounds of crude and cut mica valued at $79,845 with $6,717 worth of the ground mineral from Quebec. The exports are credited to the various provinces as follows :—

Ontario	1,330,966,	valued at	$77,757	to United States.
Quebec	5,410,	"	1,473	"
"	2,194,	"	615	to Great Britain.
" (ground)		"	6,717	
			$86,562	

During the past few years the exports have been as follows :—

1887	$ 3,480
1888	23,563
1889	30,597
1890	22,468
1891	37,590
1892	86,562

Discovery and development in Quebec.

DISCOVERY AND DEVELOPMENT.

QUEBEC.

In this province the mica mined was got as formerly from deposits in the River Gatineau and River du Lièvre districts in Ottawa county. Mr. Giroux of the survey staff speaks of a deposit near Lake Cutaway, DeMaisonneuve, Berthier county as occurring in a dyke of coarsely crystalline felspar and quartz where although the mineral is of good colour, the crystals are so intermixed and twisted as to make the deposit of little value.

Discoveries of mica have been reported from other parts of the province, notably Pontiac, Argenteuil, Berthier, Chicoutimi, Charlevoix, etc., but no developments of any importance have been made.

In the eastern part of this province, in the Laurentian rocks, the known occurrences are very numerous, but only a few of them were worked during the year, and there is nothing of importance to note about the work done. MICA.

MINERAL PIGMENTS.

MINERAL PIGMENTS.

Ochres.—The production of ochres during the year was 390 tons valued at $5,800, a decrease compared with 1891 of 510 tons and in value of $11,950. The following figures show the production during the past few years:— OCHRES.

1887	385	tons valued at	$2,233
1888	397	"	7,900
1889	794	"	15,280
1890	275	"	5,125
1891	900	"	17,750
1892	390	"	5,800

There is nothing new to report regarding the industry, operations being carried on as in previous years. Mr. N. J. Giroux in the summary report of the Geological Survey for 1892 mentions an occurrence as follows:—

"On the east shore of Rivière du Milieu and about three miles and a half north-west of Lac des Pins, there is a deposit of iron ochre of indian red and vandyke brown colours which has been worked by Mr. Gaucher, of Montreal, who had a few tons of it dried and sent to him to test, but no work has been done lately." RIVIÈRE DU MILIEU.

There are no figures of exports available nor is it thought any were made. The following table illustrates the imports during recent years:—

MINERAL PIGMENTS.
TABLE 1.
IMPORTS OF OCHRES.

Fiscal Year.	Pounds.	Value.
1880	571,454	$ 6,544
1881	677,115	8,972
1882	731,526	8,202
1883	898,376	10,375
1884	533,416	6,398
1885	1,119,177	12,782
1886	1,100,243	12,267
1887	1,460,128	17,067
1888	1,725,460	17,664
1889	1,342,783	12,994
1890	1,394,811	14,066
1891	1,528,696	20,550
1892	1,708,645	22,908

MINERAL PIGMENTS. Baryta.

Baryta.—During the year there were 315 tons of baryta marketed having a value of $1,260. For the past seven years the production has been as follows:—

1886	3,864 tons,	valued at	$19,270
1887	400	"	2,400
1888	397	"	7,900
1889	none	"	none
1890	1,842	"	7,543
1891	none	"	none
1892	315	"	1,260

The following table illustrates the imports during past years. No. figures of exports are available :—

MINERAL PIGMENTS.

TABLE 2.

IMPORTS OF BARYTA.

Fiscal Year.	Cwt.	Value.
1880	2,230	$1,525
1881	3,740	1,011
1882	497	303
1883		185
1884		229
1885	7	14
1886		62
1887	379	676
1888	236	214
1889	1,332	987
1890	1,322	978
1891		
1892		

Litharge.

Litharge.—This material is not produced in Canada, the only available figures are therefore those of imports, which are as follows :—

MINERAL PIGMENTS.

TABLE 3.

IMPORTS OF LITHARGE.

Fiscal Year.	Cwt.	Value.
1880	3,041	$14,334
1881	6,126	22,129
1882	4,900	16,651
1883	1,532	6,173
1884	5,235	18,132
1885	4,990	16,156
1886	4,928	16,003
1887	6,397	21,865
1888	7,010	23,808
1889	8,089	31,082
1890	9,453	31,401
1891	7,979	27,613
1892	10,384	34,343

MINERAL WATERS.

PRODUCTION.

The production of mineral water during the year was 640,380 gallons having a value of $75,348, the increase over the year previous being in quantity 212,895 gallons and in value $21,080.

The production during the past five years according to returns made to this office was :—

1888.....	124,850	gallons.....	$ 11,456
1889.....	424,600	"	37,360
1890.....	561,165	"	66,031
1891.....	427,485	"	54,268
1892.....	640,380	"	75,348

The springs producing during the year according to replies received at this office were :—

Winchester Springs		W. J. Anderson, M.D., Smith's Falls, Ont.
Victoria Sulphur Springs		F. O. Ring, Ottawa, Ont.
Borthwick's	"	W. Borthwick, Ottawa, Ont.
Southampton	"	F. C. Carey, Southampton, Ont.
Hawthorne	"	J. Langstaff, Thornhill, Ont.
Georgian Saline	"	W. K. Kains, Treadwell, Ont.
Ancaster	"	R. A. Smith, Toronto, Ont.
Eudo	"	L. Forest, Toronto, Ont.
Blue Mountain	"	E. Wensley, Camperdown, Ont.
Preston Mineral	"	John C. Kress, Preston, Ont.
Eastman's	"	J. Boyd & Son, Eastman's Springs, O.
Caledonia	"	Grand Hotel Co., Caledonia Springs, Ont.
Richelieu	"	J. H. M. Harte, Montreal, Que.
Ste. Geneviéve	"	J. H. M. Harte, Montreal, Que.
St. Leon	"	St. Leon Mineral Water Co., St. Leon Springs.
Divina	"	E. Lemire, St. Sévere, Que.
St. Hyacinthe	"	La Cie d'eau Minérale de St. Hyacinthe, Que.
Havelock	"	Havelock Mineral Co., Petitcodiac, N.B.
Apohaqui	"	Jno. R. Smith, St. John, N.B.
Spa	"	Wilmot Spa Springs, Middleton, N.S.

During 1892 "The New Toronto Oil and Natural Gas Co." in one of their wells sunk near Islington obtained a useful mineral water

MINERAL WATERS.

"Obico" water.

which has been placed on the market under the name of "Obico Mineral Water," of which the following analysis by Mr. Thos. Heys of Toronto, is available.

Carbonate of iron	5·887
Chloride of sodium	822.000
" potassium	87·982
" calcium	2,820·980
" magnesium	730·750
" ammonium	55·073
Sulphate of magnesium	56·940
Carbonate of calcium	106·533
Phosphate of sodium	2·400
Organic ammonia	·070
Silica and alumina	3·920
Total grains in imperial gallon	4,692·535

The various mineral waters lately put upon the market in Ontario, such as the "Obico" mentioned above, the "Eudo" from Brechin on Lake Simcoe and a water from Southampton seem to have created a very good impression, and the producers report a marked increase in the demand. For table use many of the Canadian mineral waters are largely replacing those from the celebrated Apollinaris and other European springs.

Exports and imports.

EXPORTS AND IMPORTS.

No figures of exports are available. The imports are according to the following table :—

MINERAL WATERS.
TABLE 1.
IMPORTS.

Fiscal Year.	Value.
1880	$15,721
1881	17,913
1882	27,909
1883	28.130
1884	27,879
1885	32,674
1886	22,142
1887	33,314
1888	38,046
1889	30,343
1890	40,802
1891	41,797
1892	55,763

MISCELLANEOUS.

PRODUCTION.

In the following table will be found the production during 1892 of various articles, which, for convenience, will be treated of under this heading.

MISCELLANEOUS.

TABLE 1.

PRODUCTION.

Product.	1891.		1892.	
	Quantity.	Value.	Quantity.	Value.
Felspar.. ..... Tons.	685	$3,425	175	$ 525
Fireclay ..... "	250	750	1,991	4,467
Moulding sand..... "	230	1,000	345	1,380
Platinum.....	.....	10,000	....	3,500
Precious stones.....	.....	1,000	... .	1,000
Soapstone . . .... Tons.	....	....	1,374	6,240

Felspar.—As may be seen, the production of this material has fallen off very considerably since 1891 when shipments were being made from a deposit near Rideau Lake in Ontario. The many large deposits of felspar known to exist in Canada are not as yet being worked owing to lack of rail communication. This, however, is being rapidly remedied and it is expected that in the future large quantities will be annually produced. Felspar.

The production during the past three years was as follows :—

1890.....	700 tons, valued at		$3,500
1891.....	685 "	"	3,425
1892.....	175 "	"	525

There are no figures of exports or imports available.

Fireclay.—This production is altogether that of Nova Scotia, as it has been in the past. Fireclay.

The quantities produced yearly since 1889 are as follows :—

1889.....	400 tons, valued at		$4,800
1890.....	Not reported.		
1891.....	250 tons, valued at		750
1892.....	1,991 "	"	4,467

MISCELLANEOUS. Moulding sand.

Moulding Sand.—This material has up to the present year been reported only from Nova Scotia, although it is known to be produced at many points in Ontario and Quebec, principally for local use. The production during past years as reported to this office is as follows :—

1887.	160	tons, valued at	$800
1888.....	169	" "	845
1889.....	170	" "	850
1890.....	320	" "	1,410
1891.....	230	" "	1,000
1892.....	345	" "	1,380

Platinum.

Platinum.—The production of this metal as reported is altogether that of British Columbia, and is taken from the reports of the Minister of Mines of that province, which show the output to have been in past years as follows :—

1887.....	$5,600
1888.....	6,000
1889.....	3,500
1890.....	4,500
1891.....	10,000
1892.....	3,500

The following notes regarding this metal are taken from the report of the Minister of Mines of British Columbia :—

"It will be noticed that the yield for the season, estimated at $3,500, falls far short of the amount ($10,000) mined in 1891. A decline in the market value of the metal is offered in explanation of the reduced production. There is reason, however, to think that certain claims on the Tulameen River, in the southern portion of the Yale Division, which have been acquired by the Tulameen Hydraulic Company, have not received the same attention during the past season as of late years. An amount exceeding $20,000 has already been expended in the development of the property, and steps are now in progress for the purpose of obtaining the necessary capital to work the claims to advantage. Should the company succeed in their efforts mining operations will be resumed without delay on an extensive scale."

The following table shows the imports of this metal in all forms. No exports were reported. MISCELLANEOUS.

MISCELLANEOUS.

TABLE 2.

IMPORTS OF PLATINUM.

Fiscal Year.	Value.
1883	$ 113
1884	576
1885	792
1886	1,154
1887	1,422
1888	13,475
1889	3,167
1890	5,215
1891	4,055
1892	1,952

Precious Stones.—Under this heading are included all cut and polished Canadian gem stones and certain ornamental ones such as agate, perthite, peristerite, jasper and jasper conglomerate. The cut gems include asteriated quartz, sodalite, garnet, labradorite, etc. Precious stones.

The imports of precious stones, including diamonds, imported during the fiscal year ending 30th June, 1892, were $63,738.

Soapstone.—The production of this material during 1892 shows a marked increase over that of the various years since 1886 when returns were first received by this department. The material is used in Canada altogether in the manufacture of roofing cement. Soapstone.

The production during the past seven years was as follows :—

1886	50	tons,	valued	at	$ 400
1887	100	"	"		800
1888	140	"	"		280
1889	195	"	"		1,170
1890	917	"	"		1,239
1891	None produced.				
1892	1,374	tons,	valued	at	6,240

Whiting and Chalk.—Whiting was not produced during the year nor has any been manufactured in Canada since 1890 when the production was 500 barrels. During the fiscal year of 1892 there were $26,867 worth imported. Whiting and chalk.

MISCELLANEOUS.

Whiting and Chalk.

Chalk is not found in Canada, so that no data are available except the figures of imports, which are shown in the following table :—

MISCELLANEOUS.

TABLE 3.

IMPORTS OF CHALK.

Fiscal Year.	Value.
1880	$2,117
1881	2,768
1882	2,88 :
1883	5,067
1884	2,589
1885	8,003
1886	6,583
1887	5,635
1888	5,865
1889	5,336
1890	7,221
1891	8,193
1892	9,558

The following table illustrates the imports of whiting during past years :—

MISCELLANEOUS.

TABLE 4.

IMPORTS OF WHITING.

Fiscal Year.	Cwts.	Value.
1880	84,115	$26,092
1881	47,480	16,637
1882	36,270	16,318
1883	76,012	29,334
1884	76,268	28,230
1885	67,441	23,492
1886	65,124	25,533
1887	47,246	15,191
1888	76,619	20,508
1889	84,658	22,735
1890	96,243	27,471
1891	84,679	27,504
1892	102,985	26,867

Arsenic.—There was no production of arsenic during 1892, the operations at Deloro, Hastings County, Ontario, having ceased in the fall of the previous year. MISCELLANEOUS. Arsenic.

During past years since 1885 the production was as follows :—

1885.....	440	tons,	valued at	$17,600
1886.....	120	"	"	5,460
1887.....	30	"	"	1,200
1888.....	30	"	"	1,200
1889.....	None.	"	"	None.
1890.....	25	"	"	1,500
1891.....	20	"	"	1,000

The following table illustrates the imports during past years; no exports are reported.

MISCELLANEOUS.

TABLE 5.

IMPORTS OF ARSENIC.

Fiscal Year.	Pounds.	Value.
1880.....	18,197	$ 576
1881.....	31,417	1,070
1882.....	138,920	3,962
1883.....	51,953	1,812
1884.....	19,337	773
1885.....	49,080	1,566
1886.....	30,181	961
1887.....	32,436	1,116
1888.....	27,510	1,016
1889.....	69,269	2,434
1890.....	138,509	4,474
1891.....	115,248	4,027
1892.....	302,958	9,365

Mercury.—This metal has not as yet been produced in Canada, though several deposits of the ore are known to occur. Of one of these Mr. E. D. Ingall, in the summary report of the Geological Survey for 1892, writes as follows :— Mercury.

" The cinnabar deposit, on the north shore of Kamloops Lake, near the mouth of Copper Creek, about six miles from the western end of the lake, was visited on the 26th of October. Kamloops Lake.

" Here, owing to the recentness of the discovery, the work done on the veins has not been extensive, consisting only of shots and shallow pits on the outcroppings. The area visited was covered by the Rosebush claim, in which several spar and quartz veins are to be seen, averaging about a foot or so in width ; on these, at a number of points, very

MISCELLANEOUS.

encouraging showings of ore have been exposed, justifying the hope that still better results might be achieved by extensive developments. The cinnabar itself occurs in such a manner in the gangue in ribs, etc., that by hand picking a high grade of ore can be easily selected, and no difficulty was found in procuring handsome specimens for the museum."

The following table illustrates the imports of refined mercury, and is the only statistical information available :—

MISCELLANEOUS.

TABLE 6.

IMPORTS OF MERCURY.

Fiscal Year.	Pounds.	Value.
1882	2,443	$ 965
1883	7,410	2,991
1884	5,848	2,441
1885	14,490	4,781
1886	13,316	7,142
1887	18,409	10,618
1888	27,951	14,943
1889	22,931	11,844
1890	15,912	7,677
1891	29,775	20,223
1892	30,936	15,038

TIN.

Tin.—The following table illustrates the imports of tin and all manufactures of tin and constitutes all the information available regarding this metal in Canada :—

MISCELLANEOUS.

TABLE 7.

IMPORTS OF TIN AND TINWARE.

Fiscal Year.	Value.
1880	$ 281,880
1881	413,924
1882	790,285
1883	1,274,150
1884	1,018,493
1885	1,060,883
1886	1,117,368
1887	1,187,312
1888	1,164,273
1889	1,243,794
1890	1,289,756
1891	1,206,918
1892	1,594,205

Zinc.—Although no production is reported of this metal, active exploratory work was being carried on at the "Lawn Mine" on Calumet Island, Pontiac county, Quebec. Assays of the ore show it to contain from 39 to 54% of zinc with 15% of lead and 12 oz. of silver to the ton. In the report of the Commissioner of Crown Lands of the Province of Quebec for 1892, Mr. J. Obalski, mining engineer to the province, reports as follows on this deposit :— MISCELLANEOUS. Zinc.

"The Lawn mine situated on Calumet Island, county of Pontiac, IV., 10½ E. and 11, was worked last season by Messrs. Jas. and Calvin Russell, a considerable quantity of mineral was extracted and a few tons shipped to England as a sample. The mineral is found in the shape of blende containing a little galena having the following composition: Lawn mine.

Zinc.....40 per cent.
Lead.....12 "
Silver.....15 ounces per ton of mineral.

"The work done consisted in exposing the principal and neighbouring seams. On the main vein the outcrops can be traced about 300 feet and by a shaft sunk about twelve feet, the thickness is shown to be about five feet in a north-east direction with a dip of 45° east. The ore is shipped from Clark's station, P. & P. Jct. Ry., situated six miles about from the mine, which in the other direction is three-quarters of a mile say, from Ottawa River."

The following tables illustrate the imports of zinc in all forms : Imports of zinc.

MISCELLANEOUS.

TABLE 8.

IMPORTS OF ZINC IN BLOCKS, PIGS AND SHEETS.

Fiscal Year.	Cwts.	Value.
1880	13,805	$67,881
1881	20,920	94,015
1882	15,021	76,631
1883	22,765	94,799
1884	18,945	77,373
1885	20,954	70,598
1886	23,146	85,599
1887	26,142	98,557
1888	16,407	65,827
1889	19,782	83,935
1890	18,236	92,530
1891	17,984	105,023
1892	21,881	127,302

MISCELLANEOUS.

Imports of zinc.

MISCELLANEOUS.

TABLE 9.

IMPORTS OF ZINC, MANUFACTURES OF.

Fiscal Year.	Value.
1880	$ 8,327
1881	20,178
1882	15,526
1883	22,599
1884	11,952
1885	9,459
1886	7,345
1887	6,561
1888	7,402
1889	7,233
1890	6,472
1891	7,178
1892	7,563

MISCELLANEOUS.

TABLE 10.

IMPORTS OF SPELTER.

Fiscal Year.	Cwts.	Value.
1880	1,073	$ 5,310
1881	2,904	12,276
1882	1,654	7,779
1883	1,274	5,196
1884	2,239	10,417
1885	3,325	10,875
1886	5,432	18,238
1887	6,908	25,007
1888	7,772	29,762
1889	8,750	37,403
1890	14,570	71,122
1891	6,249	31,459
1892	13,909	62,550

NATURAL GAS

NATURAL GAS.

By H. P. H. BRUMELL, F.G.S.A.,

Production.

PRODUCTION.

This industry has reached somewhat large proportions and may now be considered as having been firmly established among the important mineral industries of Canada. The sales during the year 1892 amounted to about $150,000, all the production of Ontario as the revenue, if any, derived from the several wells in the North-west Territories was not obtained. It would not, however, very materially alter the figures given above.

DISCOVERY AND DEVELOPMENT.

NATURAL GAS
Discovery and development.

As in previous years active operations were largely confined to Essex and Welland counties where the several large and important companies operate.

Essex County.

Essex County.

In Essex County, both the Ontario Natural Gas and Oil Company and the Kingsville Natural Gas and Oil Company sank new wells, very materially increasing their available capacity.

Kingsville Natural Gas and Oil Co.

Kingsville Natural Gas and Oil Company.—On the 22nd December, 1891, this company brought in their No. 4 well on the C. G. Fox farm, lot 7, con. 1, Gosfield south. This boring was carried to a total depth of 1,063 feet, the surface deposits measuring 116 feet. A flow of mineral water was encountered at about 160 feet, but was cased off, the casing being carried to a depth of 531 feet. Gas was struck at 1,030 feet but drilling was continued to the total depth passing entirely through the vesicular "gas-rock" into a marly dolomite beneath. The initial flow of gas through the three-inch tubing was 2,231,000 cubic feet per day with a rock pressure of 400 pounds.

This company during the year did a considerable amount of work in the improvement of their system of mains, etc., in Kingsville and supplied to the various houses, shops and factories about 600,000 cubic feet of gas per day.

Ontario Natural Gas and Oil Co.

Ontario Natural Gas and Oil Company.—This company during the year again undertook active operations, the disagreements between members of the directorate having been adjusted. Three wells in all were sunk during the year, numbered 5, 6 and 7, the older wells having been drilled under the old management. No. 5 well was sunk on the Charles Lypps farm, lot 8, con. 1, Gosfield South, and was carried to a depth of 1,045 feet, the surface deposits measuring 136 feet. Considerable difficulty was met with in this well owing to quicksands, to keep out which it was necessary to use two drive-pipes to the rock. Casing was carried to a depth of 565 feet and a small flow of gas was obtained at 950 feet at which point the well was shot. The measured daily flow of gas was only 56,700 cubic feet.

No. 6 well is situated on the Charles Wigle farm on the east half of lot 6, con. 1, Gosfield South, and was carried to a depth of 1,030 feet, of which ninety-five feet consisted of surface deposits. Casing was carried to a depth of 530 feet, effectually shutting off all water. Gas was struck at 987 feet, which, through the three-inch tubing, registered a daily flow of 6,422,000 cubic feet, with an initial rock pressure of 400 pounds.

NATURAL GAS

No. 7 well is on the Solomon Wigle farm, west half of lot 6, con. 1, Gosfield South, and is 1,035 feet deep. In this gas to the extent of 1,000,000 cubic feet per day was found at 1,030 feet, at which point the well was "shot." The shooting was disastrous as salt water broke in, rendering the well comparatively useless, the gas being used only in the lighting and heating of Mr. Wigle's house. The surface deposits here measured fifty-four feet and casing was carried to a depth of 525 feet.

This company are laying mains to Leamington, *via* Ruthven, and expect to serve both these towns and vicinity.

Kent County.

Kent County.

In this county operations were carried on until the beginning of the year, when, owing to lack of success, all work ceased.

Norfolk County. Simcoe Natural Gas Co.

Norfolk County.

In this county the Simcoe Natural Gas Co. sank one well at Simcoe without success, a small flow only of gas having been met with beneath the surface deposits at a depth of ninety-eight feet. A record of the well has very kindly been forwarded by the drillers, Messrs. Carmody Bros., and is as follows :—

	Feet.	
Surface deposits	98	
Hard rock	102	
Limestone	70	
Shale and gypsum	70	
Limestone	60	Corniferous and Onondaga,
Shale	3	
Limestone	42	
Shale	5	
Limestone	95	
Shale	5	
Limestone	315	Lower Onondaga,
Shale	80	Guelph and Niagara.
Limestone	45	Clinton.
Shale	5	
Red sandstone	20	
Shale	65	Medina.
White sandstone	5	
Red shale	690	
White "	625	Hudson River.
Brown "	144	Utica.
Limestone	158	Trenton.
Depth	2,702	

No data are at hand regarding the various features of the well, though it is understood that neither gas nor oil was found in the rocks.

Haldimand County.

NATURAL GAS
Haldimand County.
Dunnville Natural Gas Co.

Although the wells in Dunnville were drilled during 1891, it has been thought advisable to note them here, as they have not been officially noticed by this Department before. Three wells in all were sunk by the Dunnville Natural Gas Co., the first one in the eastern part of the village to the north of and near the Welland Canal feeder. The following record of No. 1 well has kindly been forwarded by the drillers, Messrs. Carmody Bros. :—

	Feet.	
Surface deposits	76	Onondaga, Guelph and Niagara.
Limestone with gypsum	74	
Shale with gypsum	205	
Limestone	210	
Shale	47	
Limestone	24	Clinton.
Shale	4	
Red sandstone	45	Medina.
Shale	40	
White sandstone with shale	15	
White sandstone	12	
Red shale	20	
Depth	772	

Sulphurous water was struck at eighty-five feet and at 500 feet a flow of saline water was noted. Casing was carried 565 feet. Gas was found at 612 feet at the summit of the Clinton limestone and again in the white sandstone at from 740 to 752 feet. The initial rock pressure was 375 pounds, and the daily flow was estimated to be about 175,000 cubic feet.

The second well was sunk on the west side of the Grand River, opposite the village, and about one mile from No. 1. In this, as may be seen from the following record, the rocks pierced were very similar to those of No. 1 :—

	Feet.	
Surface deposits	70	Onondaga, Guelph and Niagara.
Limestone	80	
Shale	190	
Limestone	227	
Shale	45	
Limestone	22	Clinton.
Shale	1	
Red sandstone	45	Medina.
Shale	50	
White sandstone	20	
Red shale	30	
Depth	780	

NATURAL GAS

The underground characters of the well are similar to those of No. 1, except that the rock pressure was but 335 pounds, as it was also in the third well sunk by the company. The average daily capacity of the three wells is said to be about 150,000 cubic feet each. Mains have been laid and the whole town more or less supplied for lighting and heating purposes.

Welland County.

Welland County.

Extensive operations were carried on throughout this county, principally by the Provincial Natural Gas and Fuel Company and the Erie County Natural Gas and Fuel Company, a small amount of work having been done by the Mutual Natural Gas Company of Port Colborne.

Mutual Natural Gas Co.

Mutual Natural Gas Company.—The latter company have taken over the plant and useful wells of the old Port Colborne Natural Gas, Light and Fuel Company, and have drilled or bought four new wells as follows : Mutual well No. 1, lot 29, concession I., and No. 2 on lot 28 in concession II., of Humberstone, and the Hopkins wells Nos. 2 and 3 on lot 28, concession II. of Humberstone.

The Mutual well No. 1 was carried to a depth of 831 feet, at which point red shale was struck. The surface deposits measured only two feet; salt water was struck at 440 feet, and the well was cased to a depth of 573 feet. The first white gas sand was struck at 690 feet and the second at 738 feet, the combined flow from these strata being about 200,000 cubic feet per day. In No. 2 the boring was carried 708 feet and gas to the extent of 1,500,000 cubic feet per day found at 685 feet. The surface deposits measured two feet, beneath which was found 100 feet of limestone. Salt water was struck at 440 feet and was cased off, the casing being carried 635 feet. The gas rock in this well measured fifteen feet, shale being found at 700 feet. The two Hopkins wells are leased by the company and are both located on lot 28, concession I., Humberstone, No. 2 being in the village of Humber stone, near the Welland Canal, and No. 3 further to the west. No. 2 well was sunk 800 feet and gas to the amount of 400,000 cubic feet per day found at 670 feet, in the Clinton. No. 3 is sunk seventy feet north of the Mutual Company's No. 2 and afforded 1,000,000 cubic feet of gas per day. The underground characters were similar.

Provincial and Erie County Cos.

Provincial and Erie County Companies.—Regarding the operations of the Provincial and Erie County Companies nothing can be said beyond the fact that active drilling operations were kept up during the year throughout the territory already proved, and many improvements

made to their systems of mains, etc., both in Welland County and on the Buffalo side of the river. NATURAL GAS.

Bertie Natural Gas Company.—Although the operations of the Bertie Natural Gas Company belong to the year 1891, it has been thought advisable to mention them here, as no official notice has as yet been taken of them by this Department. On the 15th April, 1891, a well was begun a short distance to the north of the Grand Trunk Railway station at Bertie and carried to a depth of 870 feet, the record of the well being as follows :— Bertie Natural Gas Co.

	Feet.	
Flinty limestone	60	Corniferous.
Shale and gypsum	90	
Shale	5	
"Shaly rock"	30	
Shale and gypsum	15	
Shale	230	Onondaga, Guelph and Niagara.
Limestone	115	
" Siliceous	15	
" hard	110	
Shale	50	
Limestone (gas)	10	Clinton.
Shale	10	
Red sandstone	70	
Sandstone	10	
Shale	20	Medina.
White sandstone	12	
Red shale	18	

Gas was found at 725 feet, at which point the boring was in the Clinton limestone, and it was again found in the Medina sandstone at 840 feet. Water was found at 100 feet and at various points up to 250 feet ; this was shut off by casing, which was carried to a depth of 660 feet.

NATURAL GAS

Welland Natural Gas Co.

Welland Natural Gas Company.—During the latter part of the year 1891 two wells were sunk for gas near the town of Welland, in neither instance successfully.

The record of No. 1 well, located on Alexander Asher's farm, has been furnished by the drillers, Messrs. Carmody Bros., and is as follows :—

	Feet.	
Surface deposits	110	
Shale	80	Onondaga, Guelph and Niagara.
Limestone	225	
Shale, blue	65	
Limestone	20	Clinton.
Shale	5	
Red sandstone	55	Medina.
Shale	10	
White sandstone	5	
Shale	20	
White sandstone	20	
Red Shale	97	
Depth	712	

A small flow of gas was found at 300 feet, and again at 512 feet, in the Clinton limestone. Sulphurous water was met with at 220 feet, which, as well as the first gas, was shut off by casing, which reached 430 feet.

The second well was sunk on the Leitch farm, about one half-mile to the south of the above and the same distance north-east of the Welland station on the Michigan Central Railway.

The rocks pierced here were as follows :—

	Feet.	
Surface deposits	112	
Shale	118	Onondaga, Guelph and Niagara.
Limestone	240	
Shale	50	
Limestone	13	Clinton.
Red sandstone	45	Medina.
Shale	25	
White sandstone	20	
Red Shale	82	
Depth	705	

The record shows an absence of shale in the lower part of the Clinton formation, and on that account is thought to be rather incorrect, as in no other instance throughout this district where the Clinton is found are the shales wanting. Other than the above

record, no data are at hand regarding this well, except that a small flow of gas of no commercial value was found. NATURAL GAS.

York County. York County.

In the vicinity of New Toronto, about ten miles west of Toronto, the New Toronto Oil and Natural Gas Company, Limited, carried on active operations, sinking several wells unsuccessfully. Their first well was sunk on the west side of Seventh street, behind McDonald's tin works. It was carried to a depth of 1,312 feet, the record being, according to Mr. L. G. Harris, the manager, as follows :—

Surface deposits	5 feet.
Shale, black	640 "
Limestone	595 "
Sandstone and "Arkose"	72 "

Water was struck at seventy-five and 353 feet and was cased off, the casing being carried to a depth of 364 feet. Salt water was again struck at 1,250 feet in large quantities. Small quantities only of gas were found at 780, 885 and 1,089 feet, at which points the well was shot. The combined flow from these depths was certainly not over 50,000 cubic feet per day. After several more unsuccessful attempts to find gas in quantity in the vicinity operations were discontinued.

It may not be known to all natural gas operators throughout Ontario that the Provincial Legislature passed an Act on April 14th. 1892, regarding the management of abandoned or unsuccessful wells, For the benefit of the reader, it has been thought advisable to publish it here in full :—

"AN ACT TO PREVENT THE WASTING OF NATURAL GAS. Act to prevent waste of gas.

"Approved by the Lieutenant-Governor, April 14, 1892.

"Her Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows :—

"1. From and after the passing of this Act any person or corporation, and each and every of them in possession, whether as owner, lessee, agent or manager, of any well in which natural gas has been found, shall, unless said gas is sooner utilized, within a reasonable time, not, however, exceeding two months from the completion of said well, in order to prevent the said gas wasting by escape, shut in and confine the same in said well until such time as it shall be utilized; provided, however, that this section shall not apply to any well while it is being operated as an oil well.

NATURAL GAS Act to prevent waste of gas.

"2. Whenever any well shall have been put down for the purpose of drilling or exploring for gas, upon abandoning or ceasing to operate the same, the person or corporation in possession as aforesaid shall, for the purpose of excluding all water from the gas-bearing rock, and before drawing the casing, fill up the well with sand or rock sediment to a depth of at least twenty feet above the gas-bearing rock, and drive a round seasoned wooden plug, at least three feet in length, equal in diameter to the diameter of the well below the casing, to a point at least five feet below the bottom of the casing, and immediately after drawing the casing shall drive a round, seasoned wooden plug at a point just below where the lower end of the casing rested, which plug shall be at least three feet in length, tapering in form, and of the same diameter at the distance of eighteen inches from the smaller end as the diameter of the hole below the point at which it is to be driven. After the plug has been properly driven there shall be filled on top of the same sand or rock sediment to the depth of at least five feet.

"3. Any person or corporation contravening any of the provisions of the first or second sections of this Act shall be liable to a penalty not exceeding $100 for each and every violation thereof, and to the further penalty of $25 for each thirty days during which said violation shall continue; and all such penalties shall be recovered, with costs of suit, in a civil action or actions in the name of any person or persons who may sue for the same.

"4. Whenever any person or corporation in possession of any well in which gas has been found shall fail to comply with the provisions of the first section of this Act within the time therein set forth, any person or corporation lawfully in possession of lands on which the well is bored, or of lands situate, adjacent to or in the neighbourhood of said well, may after ten days' notice in writing to the owner of the well or his lessee, agent or manager, enter upon the lands upon which said well is situated and take possession of said well from which gas is allowed to escape or waste, in violation of said first section, and tube and pack said well and shut in said gas, and may maintain a civil action in any court of this province against the owner, lessee, agent or manager of said well, and each and every of them, jointly and severally, to recover the cost thereof, in addition to the penalties provided by section three of this Act.

"5. Whenever any person or corporation shall abandon any gas well and shall fail to comply with the second section of this Act, any person or corporation lawfully in possession of lands adjacent to or in the neighbourhood of said well may after ten day' notice in writing to the owner or his lessee, agent or manager, enter upon the land upon

which said well is situated and take possession of said well and plug the same in the manner provided by the second section of this Act, and may maintain a civil action in any court of this province against the owner or person abandoning said well, and every of them, jointly and severally, to recover the cost thereof, in addition to the penalties provided by the third section of this Act. NATURAL GAS Act to prevent waste of gas.

"6. This Act shall take effect on, from and after the first day of May, 1892."

Attention may again be called to the efforts of this department to place on record all information likely to assist in the discovery and development of natural gas and petroleum. In this much difficulty has been encountered in consequence of the indifference of drillers and others, and their failure to supply the department with a record of the facts observed in the course of their operations.

It is again earnestly urged that this office may be informed of all boring operations and that samples of the drillings be carefully kept, that accurate records of the wells may be made. For this purpose bottles or boxes will be forwarded at once on application.

Through lack of attention to the geological features of various districts many abortive attempts to find gas were made during the year. In commenting on these I cannot do better than quote part of a paragraph from the report of 1891, as follows:—

"In view of the many failures to obtain gas it cannot be too strongly impressed upon the public that there are certain definite laws governing the production and distribution of gas, and that many thousands of dollars are annually spent in futile efforts to obtain gas in ground that is known to be either barren or flooded. Gas is not to be obtained everywhere and anywhere, and before expending their capital it would be well if investors and promoters of companies would inform themselves as to the rocks and geology of the district wherein they intend operating. Of course the greater part of the advice possible for the geologist to give is necessarily of a negative character, experiment alone making absolute certainty of the productiveness of any gas territory."

NICKEL.

Nickel.

NICKEL.

Production.

PRODUCTION.

The production of nickel in Canada for 1892 shows a falling off as compared with the previous year's figures of 43 per cent in quantity and 49 per cent in value.

	Pounds of Nickel in Matte.		
1890	1,435,742,	valued at	$933,232
1891	4,626,627	"	2,775,976
1892	2,413,717	"	1,399,956

The figures given above represent the quantity of nickel contained in the matte produced and shipped, together with the full value of the same at the average price for the year, for fine metal as per quotations given from time to time in the *Engineering and Mining Journal* of New York. These figures therefore represent the full value of this item of the country's mineral resources which would be realized during the year by mining operations, were the process of extraction of this useful metal completed in the country.

This, however, is not the case, the process being only carried before shipment as far as the production of a matte. The price realized for this matte is based upon its contents in nickel and copper, valued in this condition, of course, much below their final market quotation. Thus, calculating from this standpoint we get the following for the shipments of nickeliferous matte made during the year:

Nickel contents of matte, etc., at 18⅔c. per lb.	2,413,717 lbs.	$450,560
Copper contents of matte, etc., at 5 14/15c. per lb.	2,203,795 lbs.	130,758
Value of matte as shipped.....		$581,318

The shipments of matte as per railroad returns were 8,095,030 lbs. or 4,048 tons.

There were 564 men returned as employed in the mines and works, and 57,022 tons of ore treated.

The books of the Customs Department give the exports of "fine nickel" as below:—

5,096,332 lbs.,	valued at.....	$242,149	to the United States.
727,150 "	"	39,300	to Great Britain.
234,000 "	"	11,700	to Germany.
6,057,482 "	"	$293,149	

As all the product of Canada's nickel mines is shipped abroad, there is evidently some error here, probably due to the local officers entering in some cases pounds of matte under the heading "fine nickel" in their books. The valuation also is much too low. NICKEL.

DISCOVERY AND DEVELOPMENT. Discovery and development.

There is nothing of very great importance to report in this respect for the year. At the nickeliferous pyrrhotite deposit near St. Stephen, New Brunswick, which was fully described in last year's report, nothing further has been done.

ONTARIO. Ontario.

The mines at Sudbury have been worked during the year as formerly, and particulars of the characteristics of the deposits and mode of working them and of producing matte from the ore have been fully given in former reports.

The chief operators and only producers were the Canadian Copper Company, working the Copper Cliff, Stobie and Evans Mines; the Dominion Copper Company, working the Blezard and Worthington Mines; Messrs. H. H. Vivian & Co., working the Murray Mine, and the Drury Nickel Company, working the Chicago Nickel Mine in the Township of Drury.

All these companies are fully equipped with plant, both for mining and smelting their ores, and ship their product in the shape of matte, averaging for the whole district nearly 30 per cent of nickel and about 27 per cent of copper.

At the Sheppard Mine, about a mile and a half north-east of the Blezard Mine, on lot 1, range III., in the township of Blezard, exploratory work was prosecuted with a force of almost forty men, with machinery, including power-drills.

A force of fifteen men worked for about three months on the Gersdorffite Mine for Messrs. Macdonell & O'Connor, of Sudbury, testing the deposit found there. This is situated in the township of Drury, on lot 12, range III., and is about a mile and a half north-east from Worthington Station, on the Algoma Branch of the Canadian Pacific Railway.

This constituted most of the work done in this province, with the exception of a small amount of development done to test a nickel property near Keewatin, in Lake of the Woods district, where some few tons of ore were extracted, which are said to have assayed well in nickel.

PETROLEUM.

PETROLEUM.

By H. P. H. Brumell, F.G.S.A.,

Statistics.

STATISTICS.

Production.—During the year, refining operations were confined to Petrolea and London in Ontario, where the following refineries were in operation :—

Imperial Oil Company, Petrolea.
McMillan, Kittredge & Co., Petrolea.
John McMillan, Petrolea.
Consumers' Oil Refining Company, Petrolea.
Petrolea Crude Oil and Tanking Company, Petrolea.
Fairbanks, Rogers & Co., Petrolea.
Premier Oil Company, Petrolea.
John McDonald, Petrolea.
Empire Oil Company, London.

From returns made direct to this office there were 27,218,812 gallons, or 777,680 barrels of crude oil consumed ; deducting from this the 2,035 barrels decrease in stocks held by the various tanking companies, and assuming that the quantity of oil carried into and out of the year in the tanks of the refiners to be the same, there was an approximate total production of 775,645 barrels, an increase over figures obtained in the same way for the year previous of 18,340 barrels. At the average price for crude oil of $1.26, the value of the year's production would be $977,313.

As in previous years the production of crude oil, as shown in the summary table of production, is obtained by compilation from the inspection returns of the Inland Revenue Department.

The tanking companies operating as such were : The Petrolea Crude Oil and Tanking Company, The Crown Warehousing Company, and the Producers Tanking Company, all of Petrolea, and all of whom kindly furnished returns of their operations during the year. These returns afford the following result :—

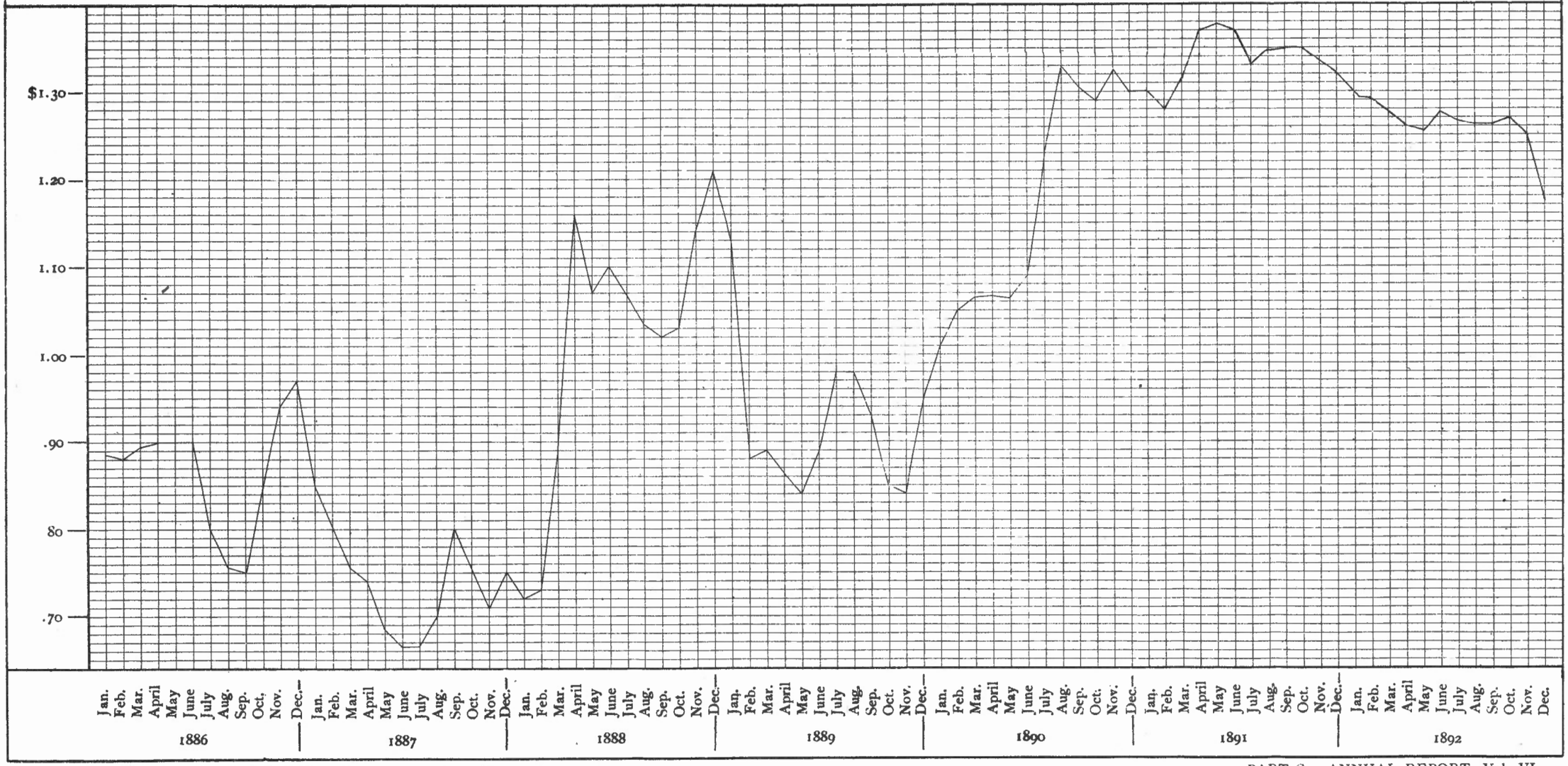
Stocks, 1st January, 1892	57,968$\frac{8}{35}$
Quantity of oil received	451,638$\frac{15}{35}$
" " delivered	453,673$\frac{12}{35}$
Stocks, 1st January, 1893	55,933$\frac{11}{35}$
Decrease in stocks during year	2,034$\frac{32}{35}$

Of the operations of the refiners in the manufacture of the various products of petroleum, the following tables compiled from returns made direct to this office give the necessary information.

PETROLEUM

TABLE A

RANGE OF PRICE (AVERAGE CLOSING PRICE) OF CRUDE OIL
DURING 1886, 1887, 1888, 1889, 1890, 1891, 1892



PETROLEUM. PETROLEUM. Statistics.

TABLE 1.

PRODUCTION OF CANADIAN OIL REFINERIES.

Products.	1891.		1892.	
	Quantity.	Value.	Quantity.	Value.
Illuminating oils ..... galls.	10,427,040	$1,170,241	10,806,806	$1,176,720
Benzine and naphtha.. "	603,971	36,790	793,263	60,130
Paraffine oils ..... "	622,287	75,772	1,051,163	127,351
Gas and fuel oils..... "	3,373,720	89,267	6,343,589	202,047
Lubricating oils and tar. "	2,500,000	101,752	3,177,853	133,336
Paraffine wax..... lbs.	741,611	60,687	876,570	82,781
Totals.....	.....	$1,534,509	.....	$1,782,365

PETROLEUM.

TABLE 2.

CONSUMPTION OF CRUDE OIL AND CHEMICALS.

Article.	1891.	1892.
Crude petroleum..... galls.	27,860,719	27,218,812
Sulphuric acid ..... lbs.	4,213,984	4,803,301
Soda ..... "	319,736	369,857
Litharge..... "	394,715	434,982
Sulphur..... "	54,032	73,278

The data for the compilation of the following figures and tables 3 and 4 are taken from the books of the Inland Revenue Department, and show the number of packages of Canadian oil inspected during the calendar year 1892, as well as the total quantity of refined oil, imported and domestic, inspected during the fiscal years from 1881 to 1892 inclusive.

During 1892 (calendar year) the packages of Canadian oil inspected were :

242,356 packages.....at 10 cents inspection fee.
3 " .....at 5 " "
38,349 " .....at 2½ " "

Assuming that these packages contain forty-two, ten and five gallons each respectively there will be found to have been an inspection of:

10,178,932 gallons, in packages of 42 gallons each.
30 " " 10 "
191,745 " " 5 "

PETROLEUM.

or a total inspection of 10,370,707 gallons. This quantity, computed at an average percentage of 38, would be equivalent to a consumption of crude oil of 27,291,334 gallons, or 779,753 barrels, which at the average price of $1.26 would have a value of $982,489.

The following table, computed in a manner similar to the foregoing, shows the quantity of crude oil used and inspected each fiscal year since 1881.

PETROLEUM.

TABLE 3.

Oils inspected.

CANADIAN OILS AND NAPHTHA INSPECTED AND CORRESPONDING QUANTITIES OF CRUDE OIL.

Fiscal Year.	Refined Oils Inspected.	Crude Equivalent Calculated.	Ratio of Crude to Refined.
	Galls.	Galls.	
1881	6,406,783	12,813,566	100 : 50
1882	5,910,787	13,134,993	100 : 45
1883	6,970,550	15,490,111	100 : 45
1884	7,656,011	19,140,027	100 : 40
1885	7,661,617	19,154,042	100 : 40
1886	8,149,472	21,445,979	100 : 38
1887	8,243,962	21,694,637	100 : 38
1888	9,545,895	25,120,776	100 : 38
1889	9,462,834	24,902,195	100 : 38
1890	10,121,210	26,634,763	105 : 38
1891	10,270,107	27,026,597	100 : 38
1892	10,370,707	27,291,334	100 : 38

The following table shows the total quantity of illuminating oil, both domestic and imported, inspected during the fiscal years from 1881 to 1892, inclusive, and illustrates the market for that product in Canada.

PETROLEUM.

TABLE 4.

TOTAL AMOUNT OF OIL, IMPORTED AND CANADIAN, INSPECTED.

Fiscal Year.	Imported.	Canadian.	Total.
	Galls.	Galls.	Galls.
1881	476,784	6,406,783	6,883,567
1882	1,351,412	5,910,747	7,262,159
1883	1,190,828	6,970,550	8,161,378
1884	1,142,575	7,656,011	8,798,586
1885	1,278,115	7,661,617	8,939,732
1886	1,327,616	8,149,472	9,477,088
1887	1,665,604	8,243,962	9,909,566
1888	1,821,342	9,545,895	11,367,237
1889	1,767,812	9,462,834	11,230,646
1890	2,020,742	10,121,210	12,141,952
1891	2,022,002	10,270,107	12,292,109
1892	2,601,946	10,370,707	12,972,653

EXPORTS AND IMPORTS.

Exports and imports.

The following tables of the exports and imports of oil are compiled from information obtained from the Customs Department, and explain themselves :—

PETROLEUM.

TABLE 5.

EXPORTS OF CANADIAN CRUDE AND REFINED PETROLEUM.

Calendar Year.	Gallons.	Value.
1873	5,869,579	$1,287,576
1874	28,946	2,509
1875	11,836	2,214
1876	2,533,772	583,550
1877	1,431,883	323,013
1878	609,171	85,571
1879	235,171	17,032
1880	3,085	751
1881	501	99
1882	1,119	286
1883	13,283	710
1884	1,098,090	30,168
1885	337,967	10,562
1886	241,716	9,855
1887	473,559	13,831
1888	196,602	74,542
1889	235,855	10,777
1890	420,492	18,154
1891	447,355	18,575
1892	311,533	13,045

PETROLEUM.

TABLE 6.

IMPORTS OF CRUDE AND REFINED PETROLEUM.

Fiscal Year.	Gallons.	Value.
1880	687,641	$131,359
1881	1,437,475	262,168
1882	3,007,702	398,031
1883	3,086,316	358,546
1884	3,160,282	380,082
1885	3,767,441	415,195
1886	3,819,146	421,836
1887	4,290,093	467,003
1888	4,523,056	408,025
1889	4,650,274	484,462
1890	5,075,650	515,852
1891	5,071,386	498,330
1892	5,649,145	475,732

PETROLEUM.

Subtracting the quantities of imported oil inspected (table 4) from those shown in table 6, there will be found to have been an annual importation of oil, crude and other than illuminating, as shown in the following table 7 :

PETROLEUM.

TABLE 7.

IMPORTS OF CRUDE AND MANUFACTURED OILS OTHER THAN ILLUMINATING.

Fiscal Year.	Gallons.
1881	960,691
1882	1,656,290
1883	1,895,488
1884	2,017,707
1885	2,489,326
1886	2,491,530
1887	2,624,399
1888	2,701,714
1889	2,882,462
1890	3,054,908
1891	3,049,384
1892	3,047,199

The imports of paraffine wax and paraffine wax candles are shown in the following tables 8 and 9 :—

Paraffine wax and candles.

PETROLEUM.

TABLE 8.

IMPORTS OF PARAFFINE WAX.

Fiscal Year.	Pounds.	Value.
1883	43,716	$ 5,166
1884	39,010	6,079
1885	59,967	8,123
1886	62,035	7,953
1887	61,132	6,796
1888	53,862	4,930
1889	63,229	5,250
1890	239,229	15,844
1891	753,854	50,275
1892	733,873	48,776

PETROLEUM. PETROLEUM.

TABLE 9.

IMPORTS OF PARAFFINE WAX CANDLES.

Fiscal Year.	Pounds.	Value.
1880	10,445	$2,269
1881	7,494	1,683
1882	5,818	1,428
1883	7,149	1,734
1884	8,755	2,229
1885	9,247	2,449
1886	12,242	2,587
1887	21,364	3,611
1888	22,054	2,829
1889	8,038	1,337
1890	7,233	1,186
1891	10,598	2,116
1892	9,259	1,952

DISCOVERY AND DEVELOPMENT.

Discovery and development Ontario.

ONTARIO.

During the year 1892 very little was done outside of the Petrolea district where operations were carried on as in the past. Altogether about 2,000 new wells were sunk. Of these a number were sunk on lot 4, concession I. of Enniskillen, a part of the territory hitherto left comparatively untouched and considered of little or no value. Along the north side of the Main street in Petrolea and to the west of the main part of the town several wells were sunk, which are said to have afforded from five to fifteen barrels each per day. Altogether about 5,000 wells were producing during the year the total production of which, computed from inspection returns, being 779,753 barrels, or a little less than one half barrel each per day.

Prices.

We are again indebted to Mr. James Kerr, Secretary Petrolea Oil Exchange, for the following prices of crude oil for the year which show a slight decrease from those of the year previous :

	1891.	1892.
January	$1.30	$1.20¼
February	1.28½	1.29
March	1.31¾	1.27¾
April	1.37	1.26
May	1.37½	1.25¾
June	1.37	1.27½
July	1.33½	1.26½
August	1.34¾	1.26
September	1.35	1.26¼
October	1.35	1.26¾
November	1.33¼	1.25
December	1.31½	1.18½
Year	1.33¾	1.26¼

PETROLEUM.

Discovery and development.

In Essex County Mr. Hiram Walker of Walkerville continued unsuccessfully his search for petroleum or natural gas in the vicinity of Marshfield, sinking some five or six wells and getting only small "shows" of oil in several of them. From "Walker's No. 1" they were still pumping about one barrel per day and using the oil as a lubricant on the Lake Erie and Detroit River Railway.

It is said that a small "show" of oil had been noted in the well drilled for salt at the Canadian Railway station at Windsor at a depth of 142 feet, not, however, of sufficient importance to warrant further work in its search.

Quebec.

QUEBEC.

In this province operations were carried on in the vicinity of Gaspé Basin by the Petroleum Oil Trust Company of London who completed several wells and claimed to have found oil in two of them. There have been many reports of large finds in this county, all of which have so far proved to be incorrect.

The following notes regarding operations in Gaspé are taken from a short article read by the writer before the Geological Society of America, December 30th, 1892.*

Gaspé Basin.

Operations in search of petroleum have been carried on in a desultory manner for about thirty years in the vicinity of Gaspé Basin, Gaspé county, Quebec, without as yet any economic result. The presence of oil at depth has, however, been proved through the efforts of "The Petroleum Trust," an English company, which has been operating on the south-west side of Gaspé Bay, in the neighbourhood of and to the south of Gaspé Basin.

In the eastern part of the Gaspé peninsula there is a great thickness of sandstones resting conformably upon almost as great a thickness of limestones, the whole being of Lower Devonian and possibly partly Upper Silurian age. According to Dr. R. W. Ells,† these sandstones have a thickness of about 3,000 feet, while the underlying limestone is estimated at about 2,000 feet. These rocks are largely developed in the vicinity of Gaspé Bay, where they form a series of almost parallel anticlinals, on or near the axes of which the greater part of the exploratory work has been done.

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*"Notes on the occurrence of Petroleum in Gaspé, Que.", Bull. Geol. Soc. Am., Vol. IV., p. 241.

†Report of Progress, Geol. Survey of Canada, 1880–82, p. 5 D D.

Dr. R. W. Ells, in the report cited above, speaks of these anticlinals as follows :— PETROLEUM.

Discovery and development. Gaspé Basin.

"The rocks of the series have a considerable development on the several rivers that flow into Gaspé Bay, where they lie in shallow basins, bounded by the anticlinals, which bring into view the strata of the lower or Gaspé limestone series. These basins are at least four in number, the dividing anticlinals being known as the Haldimand, the Tar Point, the Point St. Peter, and the Percé, the most southerly yet recognized. On the south side they rest upon rocks of the Silurian system. The whole formation may therefore be said to occupy a geo-synclinal basin, the western limit of which has not yet been traced, but which will probably be found to be continuous with the basin recognized on the Cascapedia River, and thence extending to the Metapedia."

In the "Geology of Canada," 1863, page 789, the following mention is made of the various natural oil springs of the district. This includes probably all that was known of the occurrence of oil in Gaspé up to that date :—

"At the oil spring at Silver Brook, a tributary of the York River, the petroleum oozes from a mass of sandstone and arenaceous shale, which dips south-eastwardly at an angle of 13° and is nearly a mile to the south of the crown of the anticlinal. The oil, which here collects in pools along the brook, has a greenish colour and an aromatic odour, which is less disagreeable than that of the petroleum of western Canada. From a boring which has been sunk in the sandstone to a depth of about 200 feet there is an abundant flow of water, accompanied with a little gas and very small quantities of oil. Farther westward, at about twelve miles from the mouth of the river, oil was observed on the surface of the water at the outcrop of the limestone. Petroleum is met with at Adam's oil spring, in the rear of lot B of York, nearly two miles east of south from the entrance of Gaspé Basin. It is here found in small quantities floating upon the surface of the water, and near by is a layer of thickened petroleum, mixed with mold, at a depth of a foot beneath the surface of the soil. A mile to the eastward, at Sandy Beach, oil is said to occur, and, again, at Haldimandtown, where it rises through the mud on the shore. These three localities are upon the sandstone and on the line of the northern anticlinal which passes a little to the north of the Silver brook oil spring. Farther to the south-east, on the line of the southern anticlinal and about two miles west of Tar Point, which takes its name from the petroleum found there, another oil spring is said to be found, three-quarters of a mile south of Seal Cove. On the south side of the

PETROLEUM.

Discovery and development. Gaspé Basin.

Douglastown lagoon, and about a mile west of the village, oil rises in small quantities from the mud on the beach. A well has here been bored to a depth of 125 feet in the sandstone, which dips to the south-west at an angle of 10°, but traces only of oil have been obtained. Farther to the westward oil is said to occur on the second fork of the Douglastown River. Traces of it have also been observed in a brook near Saint George's Cove, on the north-east side of Gaspé Bay. In none of these localities do the springs yield any large quantities of oil, nor have the borings which have been made in two places, been as yet successful. The above indications are, however, interesting, inasmuch as they show the existence of petroleum over a considerable area in this region, some part of which may perhaps furnish available quantities of this material."

Regarding later operations but little is known, as owing to the distance from our usual fields of work and the disinclination of operators to impart information it has been found impossible to closely follow actual operations. However, this much is known, that oil has been found at some depth, though in small quantities.

The following notes are gleaned from a report on mines and minerals of the province of Quebec recently prepared by J. Obalski, M.E., supplemented by information obtained by the writer :—

At Sandy Beach, on lot B, York township, two wells were sunk about twenty years ago, one of which is said to have afforded oil, and about a mile above Douglastown, on the southern side of the Saint John River, a well was sunk 125 feet without successful result. At Silver Brook two wells were bored to a depth of 800 and 900 feet respectively, both showing the presence of petroleum, and on the southern side of the York River, near Silver Brook, two borings were made by the Gaspé Oil Company to a depth of 700 and 800 feet, in neither of which was oil struck. Subsequent to these a well was sunk at Sandy Brook to a depth of 700 feet, in which oil was found, though in small quantity. The oil, a specimen of which was collected in 1882 by the writer, was brought to the surface of a small pool by the water, which flowed in considerable quantity from the boring, and was a heavy black oil of about 25° Baumé gravity.

In 1888 the International Oil Company of Saint Paul, Minnesota, sunk a shallow well, which was in 1889 deepened to 450 feet without finding oil. The lands and plant owned by this company were in the same year taken over by "The Petroleum Trust," which has since sunk five wells in the district. In one of these, bored at Seal Cove, a short distance south of the crown of the Tar Point anticlinal, they have met with a small quantity of high-grade oil. According to one of the

drillers, the boring reached a depth of 3,000 feet, of which the upper 2,150 consisted of yellow and white sandstone, followed by 850 feet of bluish shaly limestone, in which, at a depth of about 2,600 feet from the surface, the oil was found. The oil, which is green in colour, is of about 38° Baumé gravity, has an aromatic odour, and is bright ruby red by transmitted light. PETROLEUM. Discovery and development. Gaspé Basin.

NORTH-WEST TERRITORIES. North-west Territories.

It has been thought advisable to incorporate here the following extract from Mr. D. B. Dowling's summary report on his explorations during the summer of 1892. It is interesting as showing the extension eastward of the tar-sands of the Athabasca Basin:—

"The first river ascended was the Firebag, a small stream rising in a range of hills to the east of Fort McMurray, and joining the Athabasca about eighty miles below. This river in its lowest course cuts a deep valley through the lacustral deposits which form a wide belt bordering the southern shore of Lake Athabasca. Several exposures of the underlying rocks are seen; the first few are of the light coloured Devonian limestone, similar to that exposed on the Athabasca. Further up at the forks of the stream the limestone is followed by the black sandstone holding tar, but this is here represented by beds only a few feet thick, so that it probably does not extend much further to the east.

"The section of the later deposits consists of about ninety feet of stratified sand overlying beds of fine dark clay fifty feet thick. The bedding of the sand is accentuated by a liberal staining of occasional beds by tar. The surface of the country is generally undulating, the soil is principally sand with very little loam, so that it supports only a scanty growth of pines. This sandy country, or sandy plain, was found to stretch all along the south side of the lake and past the Beaver river."

The forks of the Firebag River mentioned above are about twenty-five miles above its confluence with the Athabasca.

PHOSPHATE. PHOSPHATE.

PRODUCTION. Production.

The falling off in the production of this mineral still continues, and the year 1892 shows a very considerable lessening of the figures. These are 11,932 tons, worth $157,424, as compared with 23,588 tons, worth $241,603, for last year, a drop in the quantity about 50 per cent, and in the total value of about 35 per cent.

PHOSPHATE.

As in past years the largest production is to be credited to the Quebec district, the Ontario mines along the line of the Kingston and Pembroke Railway contributing only about one-tenth of the total.

EXPORTS AND IMPORTS.

Exports and imports.

Excepting a few hundred tons used in Canada in the manufacture of mineral fertilizers, the whole production of the mines was exported, the greater part to Europe and a smaller proportion, mostly low grade, going to the United States. Much of this latter was previously ground and dressed at the mills at Buckingham on the Canadian Pacific Railway line, twenty miles east of Ottawa. Graphic table A represents the exports of this mineral for past years, and, as the quantity used at home is small, illustrates also the fluctuations in the industry. Tables 1 and 2 need no explanation :—

PHOSPHATE.

TABLE 1.

EXPORTS OF APATITE.

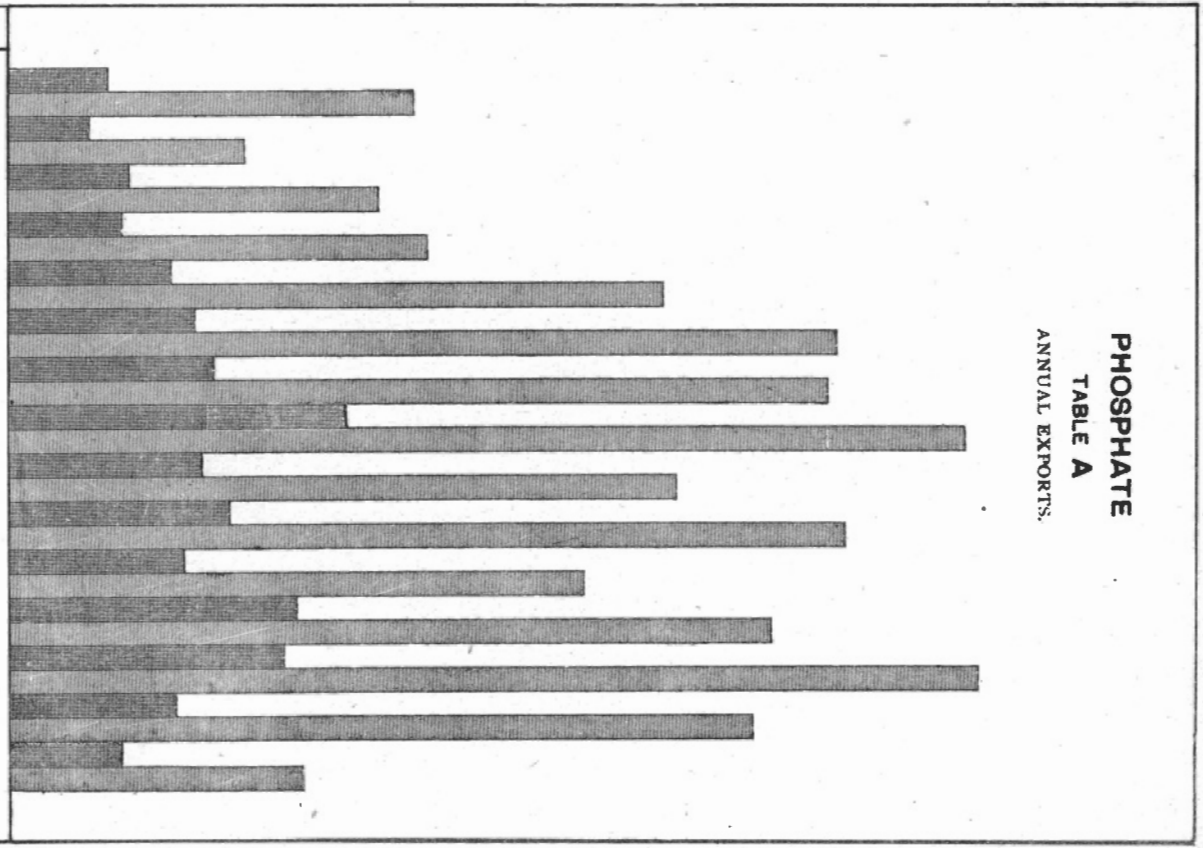
Year.	Ontario.		Quebec.	
	Tons.	Value.	Tons.	Value.
1878	824	$12,278	9,919	$195,831
1879	1,842	20,565	6,604	101,470
1880	1,387	14,422	11,673	175,664
1881	2,471	36,117	9,497	182,339
1882	568	6,338	16,585	302,019
1883	50	500	19,666	427,168
1884	763	8,890	20,946	415,350
1885	434	5,962	28,535	490,331
1886	644	5,816	19,796	337,191
1887	705	8,277	22,447	424,940
1888	2,643	30,247	16,133	268,362
1889	3,547	38,833	26,440	355,935
1890	1,866	21,329	26,591	478,040
1891	1,551	16,646	15,720	368,015
1892	1,501	12,544	9,981	141,220

PHOSPHATE

TABLE A

ANNUAL EXPORTS.

Year	Quantity	Value
	Tons	$
1878	10,743	208,109
1879	8,446	122,035
1880	13,060	190,086
1881	11,968	218,456
1882	17,153	338,357
1883	19,716	427,668
1884	21,709	424,240
1885	28,969	496,293
1886	20,440	343,007
1887	23,152	433,217
1888	18,776	298,609
1889	29,987	394,768
1890	28,457	499,369
1891	17,271	384,661
1892	11,482	153,764



PHOSPHATE.

PHOSPHATE.

TABLE 2.

Exports and Imports.

GREAT BRITAIN: IMPORTS OF CANADIAN APATITE COMPARED WITH TOTAL IMPORTS OF PHOSPHATES IN THAT COUNTRY.

Year.	Canadian Apatite.		Total Phosphates.		Per cent of Value of Canadian Apatite to total Value.
	Long Tons	£ stg.	Long Tons	£ stg.	
1882	8,187	39,851	199,428	613,198	6·5 per cent.
1883	16,531	66,714	246,945	813,825	8·2 "
1884..	15,716	52,370	219,225	643,851	8·1 "
1885.....	21,484	76,179	238,572	628,027	12·1 "
1886...	18,069	63,490	223,111	526,885	12·0 "
1887.....	19,194	65,974	283,415	614,088	10·7 "
1888.....	12,423	42,291	257,886	544,919	7·7 "
1889.....	23,123	71,037	304,953	703,704	10·1 "
1890.....	21,089	65,420	343,501	849,452	7·8 "
1891	15,918	54,235	256,772	628,395	8·6 "

DISCOVERY AND DEVELOPMENT.

Discovery and development.

Owing to the continued depression in the market for Canadian apatite due to the competition of the phosphate mines of the southern States, no attention has been paid to exploration, and there are therefore no discoveries to report.

Several of the older mines continued working, but on a much less extensive scale than formerly. Some were working principally for mica, extracting the phosphate as a by-product in the process.

QUEBEC.

Quebec.

On the Rivière du Lièvre the chief work done was at the High Rock mines of the Phosphate of Lime Co. and at the Ætna and Squaw Hill mines of the British Phosphate Company, formerly the Anglo-Continental Guano Company. These were the only two companies which worked continuously throughout the year, but the High Falls Mine was worked in the early part of the year, and the Ross Mountain, Central Lake, Ruby and others worked small gangs of men for short periods during the year.

PHOSPHATE.

Discovery and development. Quebec.

The completion of the dam and lock at Little Rapids, about twelve miles above Buckingham, have greatly facilitated the navigation of the river and will make it easier and safer to transport the mineral in scows from the mines above that point. The resultant raising of the water level has added two miles of navigable water where the Long Rapids used to be above High Rock Landing, thus facilitating the shipments from the vicinity of High Falls and giving a navigable stretch of over twenty miles above Buckingham village, where transhipment is made to the Canadian Pacific Railway system.

In the Templeton district a little work was done at some of the older mines.

Ontario.

ONTARIO.

For this province there is little to report. Some of the mines were worked in a small way, but the depression in the phosphate mining industry was felt perhaps even more there than in the Quebec districts.

PRECIOUS METALS.

THE PRECIOUS METALS.

Gold.

GOLD.

Production.

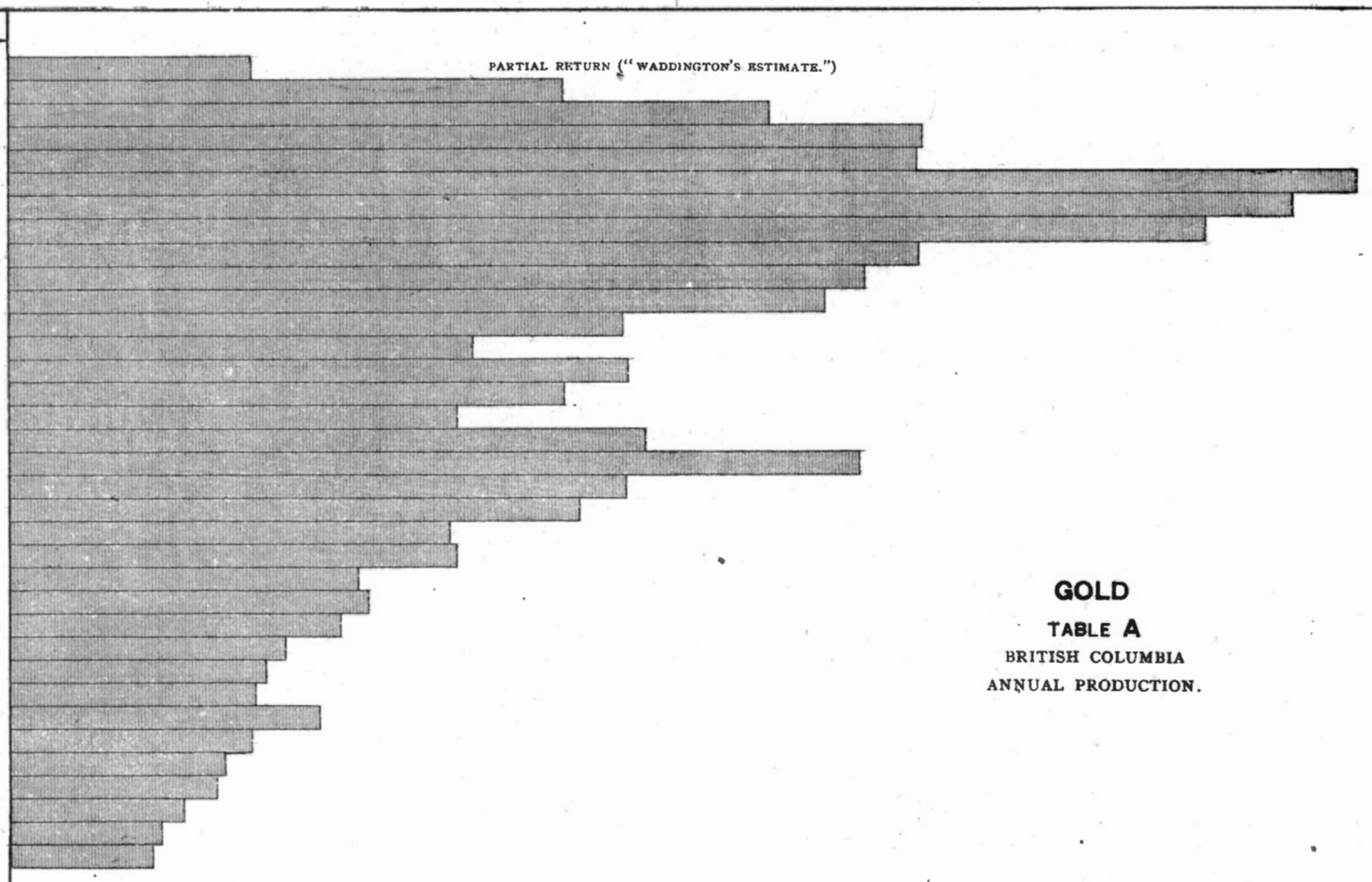
PRODUCTION.

The production of this metal during 1892 amounted to 50,350 oz., valued at $907,601. For last year the figures were 51,303 oz., valued at $930,614, so that there has been a falling off of about two per cent. By reference to table No. 1 below it is seen that Nova Scotia and British Columbia show a considerable falling off, which is partly made up by the increased production of Quebec, Ontario and the North-west Territories and Yukon district.

Nova Scotia from its quartz mining and British Columbia from the working of its alluvial deposits still continue to yield almost the whole amount produced, the other districts contributing under fifteen per cent of the total.

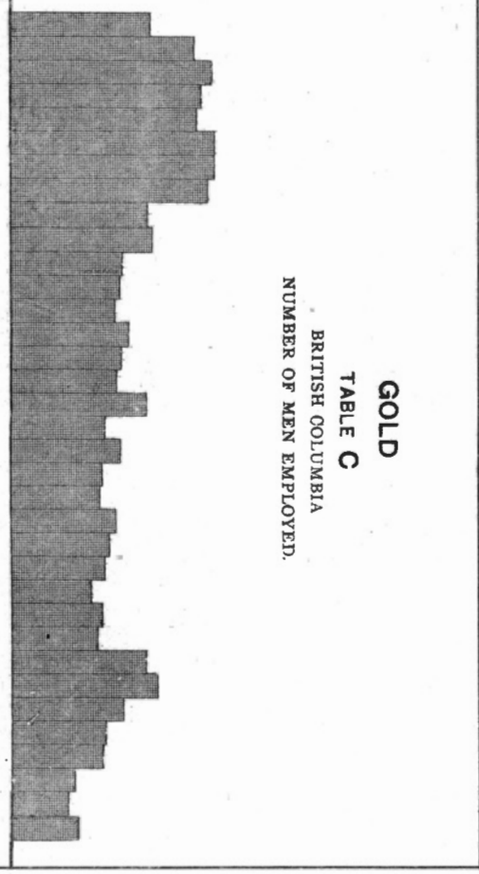
As in former years, the output of Quebec resulted from washing the auriferous gravels of the Chaudière district in Beauce County; that from the North West Territories, etc., from washing on the Saskatchewan and Yukon rivers, and that from Ontario from quartz mining.

Year	Value
1858	$705,000
1859	1,615,072
1860	2,228,543
1861	2,666,118
1862	2,656,903
1863	3,913,563
1864	3,735,850
1865	3,491,205
1866	2,662,106
1867	2,480,868
1868	2,372,972
1869	1,774,978
1870	1,336,956
1871	1,799,440
1872	1,610,972
1873	1,305,749
1874	1,844,618
1875	2,474,904
1876	1,786,648
1877	1,608,182
1878	1,275,204
1879	1,290,058
1880	1,013,827
1881	1,046,737
1882	954,085
1883	794,252
1884	736,165
1885	713,738
1886	903,651
1887	693,709
1888	616,731
1889	588,923
1890	494,436
1891	429,811
1892	399,525



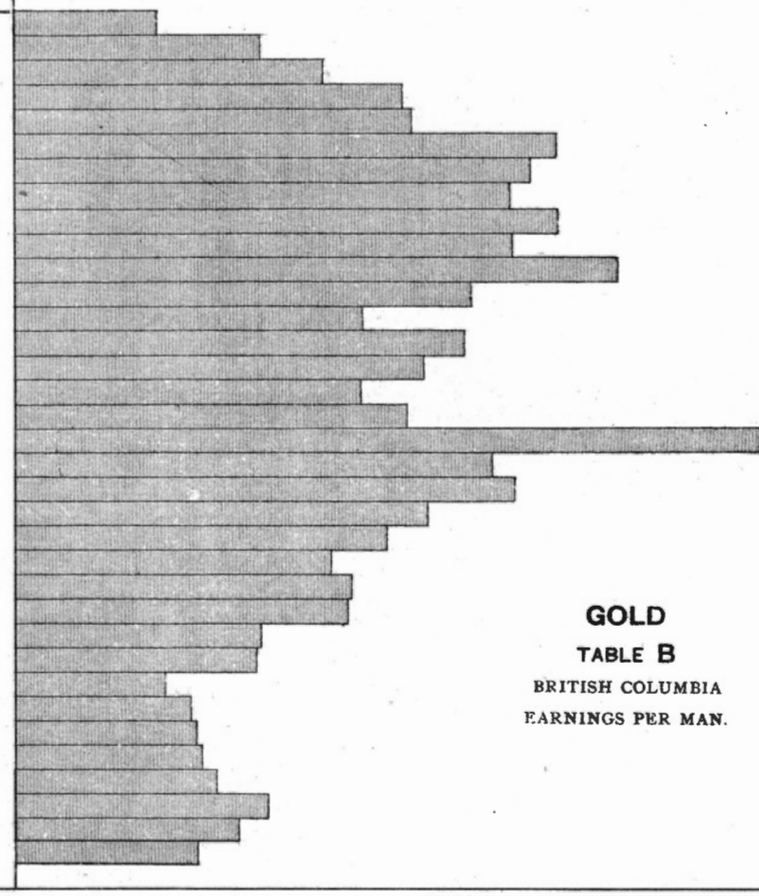
GOLD
TABLE A
BRITISH COLUMBIA
ANNUAL PRODUCTION.

Year	Number
1858	3000
1859	4000
1860	4,400
1861	4,200
1862	4,100
1863	4,400
1864	4,400
1865	4,294
1866	2,982
1867	3,044
1868	2,309
1869	2,369
1870	2,348
1871	2,450
1872	2,400
1873	2,300
1874	2,868
1875	2,024
1876	2,282
1877	1,960
1878	1,883
1879	2,124
1880	1,955
1881	1,898
1882	1,738
1883	1,965
1884	1,858
1885	2,902
1886	3,147
1887	2,342
1888	2,007
1889	1,929
1890	1,342
1891	1.199
1892	1,340



GOLD
TABLE C
BRITISH COLUMBIA
NUMBER OF MEN EMPLOYED.

Year	Value
1858	$235
1859	403
1860	506
1861	634
1862	648
1863	889
1864	849
1865	813
1866	893
1867	814
1868	992
1869	749
1870	569
1871	734
1872	671
1873	567
1874	643
1875	1,223
1876	783
1877	820
1878	677
1879	607
1880	518
1881	551
1882	548
1883	404
1884	396
1885	246
1886	287
1887	296
1888	307
1889	330
1890	423
1891	358
1892	298



GOLD
TABLE B
BRITISH COLUMBIA
EARNINGS PER MAN.

GOLD.

TABLE 1.

PRODUCTION BY PROVINCES.

Provinces.	Ounces.	Value.
Nova Scotia	19,998	$389,965
Quebec	721	12,987
Ontario	365	7,118
North-west Territories (including Yukon District)	5,765	98,006
British Columbia	23,501	399,525
Total	50,350	$907,601

BRITISH COLUMBIA.

The accompanying graphic tables A, B and C show in diagrammatic form the details of the production for this province. They are compiled from the report of the Provincial Department of Mines.

The banks of the province exported the following amount of gold during the year, viz., $332,938. By adding to this one-fifth for the estimated amount taken out of the country in private hands, we get the total amount of gold produced and sold.

Table 2 below is self-explanatory.

PRECIOUS METALS.

GOLD.

TABLE 2.

YIELD, ETC., BY DISTRICTS.

District.	Divisions.	Whites.	Chinese.	Yield of gold by divisions.	Total yield by divisions.
Cariboo.....	Barkerville	84	145	$76,600	
	Lightning Creek....	30	113	41,500	
	Quesnelle Mouth....	3	106	23,500	
	Keithley Creek.....	57	225	52,420	
		174	589		$194,020
Cassiar..... ..	Laketown	16	32	15,200	
	McDame Creek.....	6	22	9,200	
	Liard River.....	.....	.....	3,600	
	Stikine..... ..	9	3	950	
		31	57		28,950
Kootenay.....	Eastern	24	73	29,700	
	Western	.....	.....	10,000	
		24	73		39,700
Lillooet.....	....	25	60	39,763	39,763
Yale...	Osoyoos.....	160	21	9,600	
	Similkameen.....	53	73	21,500	
		213	94		31,100
	Total, Whites.. ...	467			
	" Chinese.	.....	873		
	" employed....	1,340			$333,533

Nova Scotia.

NOVA SCOTIA.

The accompanying tables, graphic, D, E, and Nos. 3 and 4, are compiled from data obtained through the Department of Mines of Nova Scotia.

Table No. 4 on comparison with the similar statement for 1891 shows a falling off in every particular:

Year	Value
1862	$141,871
1863	272,448
1864	390,349
1865	496,357
1866	491,491
1867	532,563
1868	400,555
1869	348,427
1870	387,392
1871	374,972
1872	255,349
1873	231,122
1874	178,244
1875	218,629
1876	233,585
1877	329,205
1878	245,253
1879	268,328
1880	257,823
1881	209,755
1882	275,090
1883	301,207
1884	313,554
1885	432,971
1886	455,564
1887	413,631
1888	436,939
1889	510,022
1890	474,990
1891	451,511
1892	389,965

GOLD

TABLE D

NOVA SCOTIA
ANNUAL PRODUCTION

Year	Quantity
	TONS
1862	6,473
1863	17,000
1864	21,431
1865	24,421
1866	32,157
1867	31,384
1868	32,259
1869	35,144
1870	30,824
1871	30,787
1872	17,089
1873	17,708
1874	13,844
1875	14,810
1876	15,490
1877	17,369
1878	17,989
1879	15,936
1880	13,997
1881	16,556
1882	21,081
1883	25,954
1884	25,186
1885	28,890
1886	29,010
1887	32,280
1888	36,178
1889	39,160
1890	42,749
1891	36,351
1892	32,552

GOLD

TABLE E

NOVA SCOTIA

TONS OF QUARTZ CRUSHED.

Year	Value
1862	$21.91
1863	16.02
1864	18.11
1865	20.32
1866	15.28
1867	16.96
1868	12.41
1869	19,91
1870	12.56
1871	12.17
1872	14.81
1873	13.05
1874	12.87
1875	14.89
1876	15.08
1877	19.01
1878	13.63
1879	16.83
1880	18.42
1881	12.66
1882	13.04
1883	11.60
1884	12.44
1885	14.98
1886	15.70
1887	12.81
1888	12.08
1889	13.02
1890	11.11
1891	12.42
1892	11.98

Average yield of Gold per ton (2,000 lbs.) crushed.

GOLD

TABLE F

QUEBEC
ANNUAL PRODUCTION.

SECOND HALF OF YEAR ONLY.

Year	Value
1877	$12,057
1878	17,937
1879	23,972
1880	33,174
1881	56,661
1882	17,093
1883	17,787
1884	8,720
1885	2,120
1886	3,981
1887	1,604
1888	3,563
1889	1,207
1890	1,350
1891	4,800
1892	12,987

GOLD.

TABLE 3.

NOVA SCOTIA.

PRODUCTION OF THE DIFFERENT DISTRICTS FROM 1862 TO 1891, INCLUSIVE.

Districts.	Tons Crushed.	Total Yield.				Average Yield per Ton.
		Oz.	Dwt.	Grs.	Value.	
Caribou & Moose River	56,949	27,877	13	20	$ 543,615	$ 9 55
Montague	18,771	36,144	2	16	704,810	37 54
Oldham	42,425	47,245	9	18	921,287	21 71
Renfrew	46,071	31,814	13	2	620,385	13 46
Sherbrooke	167,188	119,946	17	22	2,338,964	13 99
Stormont	26,749	26,748	17	11	521,603	19 49
Tangier	29,803	19,301	16	6	376,386	12 63
Uniacke	39,993	27,196	2	22	530,324	13 26
Waverly	97,846	55,382	14	14	1,079,963	11 03
Salmon River	44,005	13,163	14	0	256,693	5 83
Brookfield	5,663	4,858	4	9	94,735	16 73
Whiteburn	5,875	9,281	2	20	180,982	30 82
Lake Catcha	8,926	8,477	17	19	165,318	18 52
Rawdon	11,389	9,060	14	4	176,684	15 51
Wine Harbour	41,798	28,639	6	1	558,467	13 36
Darr's Hill	39,909	18,715	19	19	364,962	9 14
Fifteen Mile Stream	15,775	8,783	19	5	171,288	10 85
Malaga	18,567	15,343	10	8	299,199	16 11
Unproclaimed, etc	54,357	41,717	15	13	813,497	14 96
Totals	772,059	549,700	12	13	$10,719,162	$13 88

GOLD.

TABLE 4.

DISTRICT DETAILS.

District.	No. of Mines.	Days Labour.	Mills.	Tons Crushed.	Yield of Gold per Ton.			Total Yield of Gold.		
					Oz.	Dwt.	Grs.	Oz.	Dwt.	Grs.
Tangier, Mooseland	2	3,172	2	311		6	15	103	8	0
Oldham	2	17,032	2	2,259	1	7	9	3,093	13	2
Caribou, Moose River	4	14,309	4	7,189		6	11	2,335	16	10
Stormont	2	18,094	1	3,625		13	18	2,482	11	12
Salmon River	1	11,702	1	4,220		4	22	1,042	10	0
Sherbrooke	3	4,470	2	893		4	..	179	8	20
Montague	1	6,640	1	1,716	1	5	15	2,201	10	0
Malaga	2	7,772	2	2,720		19	12	2,656	5	14
Waverly	2	9,057	1	3,154		5	17	906	11	0
Uniacke	3	12,006	2	786	2	18	12	2,300	0	14
Lake Catcha	2	5,284	2	2,467		8	11	1,046	18	16
Fifteen Mile Stream	2	7,825	1	2,412		12	13	1,236	17	0
Unproclaimed and other districts	4	3,398	3	800		10	7	412	13	0
Total	30	120,761	24	32,552		12	7	19,998	3	18

PRECIOUS METALS.

Since completion of table, additional returns from Waverly show 1,051 tons of quartz crushed, and 332 oz. of gold for November and December, and returns from Truro Mill, Caribou, show 30 tons yielded 750 oz. for the month of December.

Quebec.

QUEBEC.

Production.

The greater activity in the Chaudière district of Quebec has resulted in a very encouraging increase, the production of this metal being over seven times as great as the annual output for some years back. Graphic table F clearly illustrates this point.

North-west Territories.

NORTH-WEST TERRITORIES, ETC.

Production.

The production of gold credited to the North-west Territories and the Yukon district is over twice that of last year. These figures are apt to vary much year by year, as the variations in the season with regard to water supply affect the river and placer washings very considerably and cause great fluctuations in the success of the operations.

Table 5 below shows the exports of gold as compiled from the reports of the Customs Department.

Gold, exports.

GOLD.

TABLE 5.

EXPORTS.

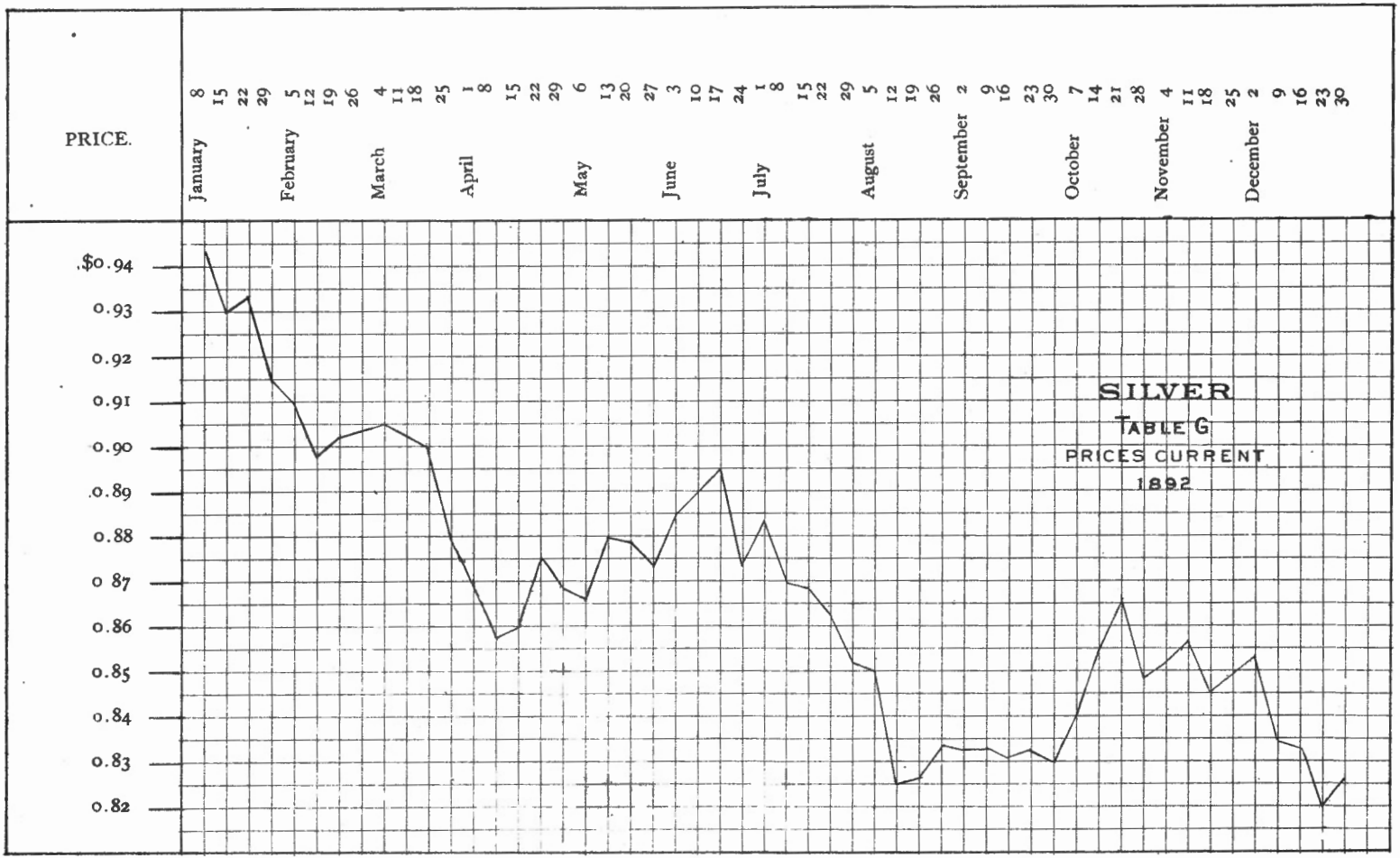
Provinces.	1887.	1888.	1889.	1890.	1891.	1892.
Ontario.....	$6,650	.....	$2,660	....	$1,000	$1,525
Nova Scotia...	321,379	$163,412	191,671	$304,521	.....	.....
Manitoba.....	.....	50	261	. ...	110	....
B. Columbia...	592,300	464,696	414,658	402,271	343,582	276,300
Totals ...	$920,329	$628,158	$609,250	$706,792	$344,692	$277,825

Silver.

SILVER.

Production.

The production of this metal for 1892 shows a decrease in the quantity of 103,872 oz. and in the value of $136,744. The decrease in the quantity of the total production is due to the considerable limitation of the operations of the silver mines of the Thunder Bay district


PRICE.
January 8 15 22 29
February 5 12 19 26
March 4 11 18 25
April 1 8 15 22 29
May 6 13 20 27
June 3 10 17 24
July 1 8 15 22 29
August 5 12 19 26
September 2 9 16 23 30
October 7 14 21 28
November 4 11 18 25
December 2 9 16 23 30
$0.94
0.93
0.92
0.91
0.90
0.89
0.88
0 87
0.86
0.85
0.84
0.83
0.82
SILVER
TABLE G
PRICES CURRENT
1892

of Ontario, which more than offsets the increased output from Quebec and from the new argentiferous galena districts of West Kootenay in British Columbia. For the year the drop in value has been still greater than the decrease in quantity, a fact due to the lower average market price, viz., 86 cts. per ounce as compared with 98 cts. for 1891. PRECIOUS METALS. Silver. Production.

By reference to table 1 below it will be seen that the grand total was contributed to by Ontario, Quebec and British Columbia. The amounts credited to Ontario resulted from the working of the silver mines in the Thunder Bay district, south-west of Port Arthur. As in former years the Quebec output represents the calculated amount of silver contained in the shipments of pyritous copper ores from the Capelton group of mines in the Eastern Townships. The British Columbia figures represent the silver contents of argentiferous galena ores shipped from the various claims in the Kaslo-Slocan and Ainsworth districts of the West Kootenay division of the province.

SILVER.

TABLE 1.

PRODUCTION OF SILVER.

YEAR.	ONTARIO.		QUEBEC.		BRITISH COLUMBIA.		TOTAL.	
	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.
1887.....	190,495	$190,495	146,898	$146,898	11,937	$11,937	349,330	$349,330
1888.....	208,064	208,064	149,388	149,388	37,925	37,925	395,377	395,377
1889.....	181,609	162,309	148,517	133,666	53,192	47,873	383,318	343,848
1890.....	158,715	166,652	171,545	180,122	70,427	73,948	400,687	420,722
1891.....	225,633	221,120	185,584	181,872	3,306	3,241	414,523	406,233
1892.....	41,581	36,072	191,910	166,482	77,160	66,935	310,651	269,489

The accompanying graphic table G shows the fluctuations in price during the year, bringing out clearly the great drop in the average price of this metal.

PRECIOUS METALS.

Silver, exports.

Table 2 below gives the exports of ore of this metal as compiled from data obtained from the books of the Customs Department.

SILVER.

TABLE 2.

EXPORTS OF SILVER ORE.

Province.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
Ontario	$16,505	$184,763	$208,064	$203,871	$203,142	$222,071	$35,992
Quebec	8,000	450	5	2,500	900		
Nova Scotia				50			
Manitoba	1,452	3,741		5			80
British Columbia		17,331	10,939	5,737	100	3,241	20,616
Totals	$25,957	$206,285	$219,008	$212,163	$204,142	$225,312	$56,688

Discovery and development.

DISCOVERY AND DEVELOPMENT.

GOLD AND SILVER.

The progress of discovery and development of deposits of the precious metals are considered together below.

Gold.

Gold.

Nova Scotia.

NOVA SCOTIA.

The mines of Nova Scotia have been worked during the year as in the past upon quartz veins of the province. The report of the Department of Mines of the Provincial Government gives the following details which are here reproduced with some slight alterations to ensure uniformity with the rest of this report.

Deputy Inspector Maddin gives the following notes on the results of his visits to some of the gold districts during 1892 :—

"*Crow's Nest Mine.*—At date of my visit, 30th August, this mine was idle ; the manager, Mr. Duncan Rankin, was on the ground and courteously showed me over the work. He has opened up some new leads which look very well. His ideas, which appear perfectly plain and practicable, would I think if acted upon and carried out, be efficient and considerable saving to the company.

"*Cochrane Hill Mine.*—I was at the mine on the 30th August, and found three men prospecting, and had opened up a new lead which showed gold.

"*Country Harbour Gold Mines.*—31st August. The Copeland mine is down 100 feet. They have a fifteen stamp mill and employ thirty men. This is a new mine and looks very well. Manager, J. C. MacDonald; underground manager, J. C. Mason. PRECIOUS METALS. Discovery and development. Gold.

"*Johnston Mine.*—Manager, R. McNaughton. It was idle at time of visit. Nova Scotia.

"*Isaac's Harbour.*—No. 9, South Mulgrave, has not been worked since my last report.

"*The Modoc Lind.*—Wm. Hughes and others worked this mine up to the 25th August. It is now idle.

"*The North Star Co.*—Manager, Robert McLeod; underground manager, W. Walsh. Were down, at date of visit, 400 feet, on an angle of from 20° to 30° south. There is also a westerly dip, caused by a roll in the measures. Thirty men are employed. A new mill is nearly completed with ten stamps, also a new engine and boiler. The engine is of sufficient strength to run the mill and two or three new hoists. This mine is in good working order. There is another new mine in this district called the Richardson mine. Manager, C. F. Anderson; underground manager, C. Silver. Thirty-one men employed. They are erecting buildings and sinking on the various leads and intend erecting a twenty stamp mill.

"*Wine Harbour.*—September 1st. E. Conroy, underground manager, has sixteen men under him opening up the old plan lead. The manager, H. Harding, was absent at the time of my visit.

"*Goldenville.*—September 2nd. There is a new property being opened up here called the 'Alexander.' About ten men employed at the time of my visit.

"John Williams is opening up the old Wellington mine. He had six men employed, and was engaged taking out the water by means of a syphon.

"*Ecum Secum Mine.*—September 3rd. Mathew McGrath, manager; thirteen men employed, they are working on the south dip, they have an eight stamp mill. Since Mr. McGrath took charge this mine is paying.

"I went in that district to Moose Head, to see a mine which has been idle for the past three or four years; there is a twelve stamp mill, and engine and boiler, all looking fairly well.

"*Hurricane Cove.*—There is an eight stamp mill, with engine and boiler, this property looks very well. I was informed that one R. McMann was going to start work here in a very short time. The last two mentioned mines are parallel cases almost to the Crow's Nest

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mine and Cochran Hill mine, referred to before, and I cannot but say here, it looks very odd to see mining properties well equipped with all necessary plant and very little work done, property not half prospected, and the plant and buildings left to rust and decay.

"*Dufferin Mine.*—Salmon river, September 5th. Manager, H. Archibald; underground manager, R. S. Irving. This mine is working in the second east shaft which is now down to a depth of 200 feet; the other is down 300 feet; they are cross-cutting north. They have a 16-feet belt showing gold, also an 8-inch lead, which in test yielded one ounce to the ton. There are forty men employed. All the milling is done by water power, also the hoisting. They have a twenty stamp mill, which is capable of crushing sixty tons in 24 hours. This is a fine mine in every respect.

"*Tangier.*—September 6. Mining operations have in this place been virtually at a stand-still for some years past, but the operators have at last been rewarded by striking what some think to be a good paying lead.

"*Oxford Gold Mining Company, Chezzetcook.*—Manager, J. M. Reade; underground manager, D. M. Thompson. As stated in last year's report, this mine is worked economically; compressed air being used for pumping, drilling, hoisting, etc., etc. They have a ten stamp mill, and 22 men are employed. A large quantity of surface has been milled, and paid very well; but advantage was taken during the dry season to prospect, and some leads were opened up further west; these leads are giving them all the crushing they want, and the surface remains for slack time. This mine is doing very well; they are now working in what is called the Randolph lead and the Barker lead.

"In the same district John H. Anderson employed twelve men working in the Lake lead and the Baker lead, and one Wm. Carl has three men employed working on the Cogswell or Angler lead.

"This appears to be a very fine looking mining district, and both men and management appear satisfied, a pretty safe indication that prosperity attends their work.

"I might say that the mines I visited were in good order for the workmen, and for ventilation, and for timbering, and loaders are much better pleased, and I think I am safe in saying that gold mining is somewhat ahead of last year. The roads are 50 per cent better around the mines than they were last year, which will undoubtedly prove a help to both miners and prospectors.

"*Mooseland District.*—October 3rd. Visited Gay's river, and found William Todd, with seven men prospecting, and Frank Burnos,

with six men prospecting, and Thomas Bogo, with six or eight men taking water out of an old shaft for some Truro company. PRECIOUS METALS. Discovery and development. Gold. Nova Scotia.

"October 4th. Visited Moose river gold mines, M. D. Touquay, manager, and Thomas, underground manager. Twenty men are employed on the little North lead, and the Copper lead; this mine is in good condition and they appear to be getting a fair share of gold, they have been and are crushing a large amount of surface which pays well.

"William Bruce has eight men at work in the Archibald property, and is doing fairly well. This district is much the same as last year, but the roads are much better.

"October 5. Visited Mooseland and found G. Stemshaw, manager, and E. Magrath, underground manager. Eighteen men employed; eight stamp mill. A very large amount of prospecting has been done on this property previous to sinking the present shaft, and they are now receiving a reward for their labour and perseverance. The present shaft is sunk in a basin, and the river runs only 120 feet away from the shaft. It is, however, the dryest shaft I have yet seen in our gold mines. A large water tank was placed about 20 feet down the shaft, and all the water from surface is caught in, thus leaving the mine where the miners are working comparatively dry, which I consider to be a great saving to machinery, beside the comfort to the men, and the men can do more work than if the water was allowed to go down into the mine.

"There are two men, Gladwin and Hare, working in the Musgrave property, and have six men employed. The work is in good order.

"*Caribou Gold Mines.*—October 6, I visited this district. Manager, H. Dickson; underground manager, Patrick Coffie. Twenty men are employed working on the old Fisher lead. This mine is in a very good condition and appears to be doing very well. There is no change worthy of notice since my last return, but it is very probable Mr. Dickson will do some prospecting shortly.

"George Stewart is beginning to develop the Lake lead again and is showing some very fine metal. He has seven or eight men employed and intends to gradually increase his force.

"R. Wright is prospecting north of the Lake lead and has four men employed. Gold mining appears to be more vigorously and actively prosecuted this year than last.

"*Oldham District.*—The Standard Gold Company, working the Dunbrack Lode, have attained a depth of 490 feet. The mine is well equipped with steam winding and pumping engines, and an air com-

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pressor. The Oldham Gold Company have been running prospecting drifts on the Baker vein, at a depth of 360 feet, and have also done considerable stoping work on the Dunbrack lode. The new mill of this company does all the crushing for the district, and has run steadily during the year. The Napier Mining Company, Limited, have sunk a vertical shaft to the depth of 113 feet on the crown of the anticlinal on area No. 102. This shaft has cut seven new lodes, saddling over the anticlinal axis, and which never cropped to the surface. At a depth of 100 feet, crosscuts have been carried over 100 feet each way, and from these levels have been started on the several veins cut.

"These three companies are under the management of J. E. Hardman, with Wm. MacKintosh, foreman, and produced 2,944 ounces, during 1892.

"The following report of Mr. G. W. Stuart is of interest as showing the success of a short campaign in gold mining in the Caribou district :—

To T. G. McMULLIN, Esq.,
President Truro Gold Mining Company.

"'The following is my report of operations at your mine for quarter ending December 31st, 1892, and suggestions for future operations. The former, I trust, will be satisfactory to you, and the latter meet with your approval :—

"'The tribute lease was purchased and the mine formally taken over on the first day of October. I found the entire plant, machinery in particular, in very bad order, and the most of it inadequate for the work required. To ascertain the prospective value of your mine, I determined to struggle through a month without much extraordinary expense, which I succeeded in doing with much difficulty from numerous breakdowns. I succeeded in getting 246½ days' work underground, and raising twenty-two tons of quartz, which yielded 272½ ounces of gold. This result warranted my conclusion to reconstruct your entire surface plant, for which I made as rapid preparations as possible, continuing mining operations in rather a desultory manner until the 17th of November, when I shut down.

"'After removing the old machinery I set, by plans furnished me by J. E. Hardman, S. B., a 40 h. p. tubular boiler; a new 30 h. p. engine on eight feet of solid masonry; built a new amalgamating room, and reconstructed all amalgamating appliances; put in a new friction hoist pulley; erected a new smithy; built a new shaft house and manager's office building, and other various changes and improvements.

On the 7th of December the new engine and pumps were in motion. On the 14th, the mine was again unwatered and mining resumed. On the 30th, after running 140 hours with five stamps, I cleaned up and smelted 750 ounces of gold from thirty tons of quartz, mined from November 1st until 17th, and from December 14th until 30th, twenty-nine working days of sixteen men under ground, representing 462 days' labour.

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"'I must tell you the chief part of this gold came from the rich strike cut at a depth of 75 feet, in your east shaft, which is 180 feet on the lode from your mill shaft, which is now 115 feet deep. The strike is dipping west toward the mill shaft, at an angle of 45°, the lode below the strike is poor, as far as we have proved it. To continue sinking the east shaft and stoping below the strike, which you will readily understand would require to be done in order to follow would be a waste of money. When by sinking the main shaft 136 feet below its present depth, the strike will be cut, when you will have about 220 feet of it to work upon, the advantage of which I need not mention. I therefore propose to cease work on the strike in the east shaft, and push down the mill shafts. The mill shaft stopes in which the quartz has lately materially improved. This course I shall pursue unless otherwise directed by your board.

"'The early extraordinary severity of the winter, prevented me from erecting a shaft house, and putting in a pump in the open pit on the lode, 200 feet west of the mill shaft, where the lode is large and shows much stronger indications of great richness, than it showed in your east shaft above the rich strike we have in it. Immediately the spring opens I propose putting this shaft in operation.

"'I have contracted for 1,200 cords of hardwood, at $1.50 per cord, and have already delivered at the works over 300 of this.

"'I herewith hand you all the vouchers, receipts, etc., of expenditures and bank returns for gold, all of which I trust you will find correct.

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"'Net mint returns after deducting mint and bank charges :—

1892, Nov. 7th, Gold bar,	272.50 ounces		$ 5,075.05
1893, Jan. 7th do	739.85 do		13,907.01
	1,022.35 ounces.		$18,982.06
Total cost of gold production		$1,935.50	
Stock in hand, viz. :—			
Wood, tools, oils, lumber, etc		697.82	
Expense of new buildings, machinery and construction		2,125.00	
			4,758.32
			$14,223.74
Add wood, etc., on hand as above		$ 697.82	
New buildings, etc., as above		2,125.00	
			2,822.82
Profit since Oct. 1st, 1892			$17,046.56

"'All of which is respectfully submitted.

"'Your faithfully,

"'G. W. STUART,

"'*Manager Truro Gold Mining Co.*

"'Caribou, January 10th, 1893.'"

Faribault on mode of occurrence.

Mr. Faribault of the Geological Survey staff has made some further interesting observations on the mode of occurrence of the gold veins of Nova Scotia, of which he gives the following data: *

"The district surveyed lies westward of that surveyed in 1891 and extends on the north-west side of the Intercolonial railway, from the Nine Mile river to Bedford and as far as the Gore, Central Rawdon, Newport, Mount Uniacke, Lake Pockwock and Hammond's plains; covering an area of 190 square miles in Hants county, and 160 square miles in Halifax county. Besides this, Mr. Laberge surveyed with the odometer 180 miles of roads in Halifax county and thirty-five miles in Lunenburg county, to be used as tie-lines in next year's contemplated work.

"The region examined is occupied entirely by the auriferous Lower Cambrian rocks which are the extension to the south and south-east of the rocks described last year; while on the north they are unconfor-

* Summary Report of the Geological Survey for 1892, p. 37.

mably overlaid by the Lower Carboniferous studied by Mr. H. Fletcher, and on the west come against the most eastern spur of a great mass of granite and granitoid rock, supposed to extend uninterruptedly to the western part of the province.

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"The various east and west plications of these rocks, and more especially their anticlinal axes were minutely examined and traced, as in former years, on account of their close relation to the auriferous belts. Those of Waverley, Oldham and Carroll's Corner, traced last year to the Beaver Bank road, were followed westward. The first crosses the Windsor road half a mile north of its junction with the old Cobequid road, the old Hammond's plains road at the south end of Sandy Lake, and Karney's road at the head of Karney's lake, beyond which it strikes the granite mass. Many quartz veins have been prospected to a small extent along this line, particularly in the vicinity of Karney's lake, where veins showing a little gold have been opened.

"Some five miles and a half further north is the anticlinal fold of the Oldham gold district, which flattens out and disappears three miles east of the mine; while to the westward its axis dips westerly so fast that at the railway bridge on the inlet of Grand lake, the lower auriferous quartzites are entirely covered by the upper graphitic slates. The latter form here a belt nearly three miles wide, crossing the Windsor road between the Upper Sackville post office and the fork of the roads, one mile south of Middle Sackville post office and striking the granite mass at Hammond's plains. Good paving slabs and a little roofing slate were quarried in this belt at Beaver Bank station, where the stratification is horizontal and the cleavage perpendicular to it, making the splitting very easy. Outside the district of Oldham this anticlinal is apparently of no economic importance.

"Two miles north of it is Carroll's Corner anticlinal. It crosses Key's Brook half a mile above the road, where some exploratory work on two or three auriferous leads was done a few years ago, and running westward crosses the Shubenacadie river, along which it is concealed by a narrow basin of Lower Carboniferous rocks, passes about Enfield station, strikes the outlet of Grand lake and its north-western shore at the mouth of Rocky brook, crosses Sandy lake, the north end of Square lake and the Windsor road at Lewis lake and ends at the mass of granite on Pockwock lake. That no prospecting has been done along this anticlinal west of Key's brook is probably due to its being in great part covered by forest and thick soil, but no doubt systematic exploratory work would reveal auriferous veins, especially between Grand lake and Lewis lake.

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"The next folds further north are covered over at their eastern extremities by the Lower Carboniferous basin of the Shubenacadie river and have not been met with to the eastward. It is very probable, however, that the first anticlinal passing through South Uniacke gold district and the black slate belt north of it are the prolongation of the folds already traced immediately south of the Lower Carboniferous basin of the Upper Stewiacke river. The South Uniacke anticlinal, unlike any other fold, has flat dips on its south side for a distance of over a quarter of a mile, while its north side is perpendicular. The rich "Hard lead," worked by Mr. Thompson in this district, lies as much as 900 feet north from the apex of the fold. But it is important to notice here that this lead, like most of the richest leads worked in the province, is situated at the limit of the curvature of the denuded fold, or in other words where the dip of the fold, after having gradually increased from 0° at the apex to an angle varying from 45° to 90°, becomes uniform, and does not change for a certain distance. It is, to a certain degree, for the same reason that in sharp anticlinal folds the richest leads are situated near the apex, as at the districts of Salmon river, Fifteen Mile stream, Killag, Caribou, Mooseland and the west end of Oldham; while in broad anticlinal folds, like those of Renfrew and the east end of Oldham, the richest leads are generally at a considerable distance from the apex. The anticlinal appears to extend only a short distance east of the gold district of South Uniacke, but to the westward a great many quartz leads might be prospected with advantage as far as the Windsor road which it crosses a quarter of a mile north of the county line to come against the granite west of Lacy Mill lake.

"The black slate belt, in the synclinal trough between this anticlinal and the next, is one mile and three-quarters wide where it crosses the Renfrew road about the north end of Grand lake, but further west, at the Eller settlement on the Windsor road, a small anticlinal fold brings up a band of lower 'whin' rocks one mile wide, thus dividing the slate belt into two bands, the south one three-quarters of a mile wide extending but a short distance further west to the granite mass on West lake, while the north band, only a few hundred feet wide, disappears and is replaced by 'whin' before reaching the granite mass.

"North of the slate belt is the Mount Uniacke anticlinal fold. Its eastern end has the form of a broad elliptical dome, on the south side of which are situated the Renfrew gold mines operated for many years, but very little worked at present. Running westward, this anticlinal passes south of McGrath lake, and west of Beaver Bank road it

appears to have been disturbed by a fault with a thrust of a mile or so to the south on the west side. Resuming its course westward, it has all the leads of the gold district of Mount Uniacke, once so extensively worked, on its south dips, and crosses the Windsor road at the middle of the large bog, half way between Mount Uniacke station and Lakeland, beyond which it comes in contact with the granite. This anticlinal, the most important in the region surveyed and the fault above mentioned require further examination. Suffice it to say at present that systematic explorations in the last two mentioned gold districts would certainly bring to light a great many new auriferous leads and that many leads worked to small depths and abandoned in the earlier days of the districts could now be worked with profit by the improved and more economical methods of mining of the last few years.

"The auriferous quartz veins worked to some extent a few years ago at East Rawdon are apparently on a small local fold of the lower 'whin' rocks near the southern edge of the Rawdon slate belt and require further examination.

"Some three miles and three-quarters north of the Mount Uniacke anticlinal is the broad and well-known slate belt of Rawdon Hills. The eastern point of this belt extends as far as the Bar settlement, where it is covered by the Lower Carboniferous. At Upper Rawdon it has a width of five miles and a half, on the Beaver Bank road, between George Wallace's and the Gore; at Central Rawdon, of four miles between South Rawdon post office and Woodville; it extends west a short distance beyond Upper Newport and Ardoise hill, where it is covered by Lower Carboniferous gypsum and limestone. These rocks are lithologically the same as those of the upper graphitic slate group of the Lower Cambrian, like them they rest conformably, along their southern limits, on the lower quartzite rocks and are undoubtedly of the same age. Certain forms from the slate of the Northup mine, Central Rawdon, believed to be of organic origin, have led some to suppose that they were newer; but a large number of specimens collected here by Mr. Fletcher in 1890 and last summer by the writer, have been found on microscopic examination by Mr. T. C. Weston* to be merely dolomitic concretions.

"The Rawdon slate belt is plicated in a synclinal and anticlinal fold. The latter passes a short distance north of Central Rawdon, and at Upper Newport, brings up along its apex a narrow ridge of the lower quartzite group with numerous quartz veins, some of which (one mile

*Summary Report of the Geological Survey, 1890, page 40; Trans. N.S. Inst. Sc., Ser. 2, Vol. 1, page 137.

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west of Upper Newport post office) were prospected and found to be auriferous. Quartz veins of great width and length, cutting these uptilted slates at a right angle, are very numerous, and those worked so successfully a few years ago at Central Rawdon and found to contain such rich pockets, belong to the group of true fissure veins. No doubt these veins were formed by segregation out of the adjacent auriferous slates, but it is not probable that gold is as uniformly distributed through the whole thickness of these slates as it is through the 'whin' series, and moreover as no structural indication is yet known as a guide to the location of the auriferous cross veins, these slates will never be as tempting a field as the 'whin' series, where systematic prospecting along anticlinals directed by experienced mining engineers, well acquainted with the peculiar structure of the Nova Scotia gold districts, is likely to be successful. These Rawdon slates are, on the east, north and west sides unconformably covered by the Lower Carboniferous rocks."

New Brunswick.

NEW BRUNSWICK.

Gold and Silver.

Gold and silver.

Beyond a little prospecting, there is nothing to report. Mr. Brumell visited the province during the summer and gleaned the following information regarding one of the argentiferous galena veins of Gloucester county:

Millstream, Gloucester Co.

"*Millstream, Gloucester County, N.B.*—No work was performed here during the year beyond tracing the vein for about two miles to the eastward and the mining and hauling of ten tons of ore to Bathurst station.

"The owners have kindly furnished us with the following analyses of samples taken out by themselves during the year:—

	No. 1.	No. 2.
Copper.....	0·14 per cent	.....
Gold (per ton 2,000 lbs.)	0·26 oz.	0·24 oz.
Silver "	14·20 oz.	11·00 oz.

No. 1.—By Ricketts and Banks, New York.
No. 2.—By H. O. Hofman, Boston.
From vein further east,
By A. E. Macintyre, St. John:

	No. 1.	No. 2.
Lead.....	12·63 per cent.	6·30 per cent.
Silver (per ton 2,240 lbs)	14·30 oz.	8·10 oz.
Gold.....	0·70 dwt.	less than 0·50 dwt.

QUEBEC.

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Gold.

Discovery and development.

Quebec. Gold.

The gold mining of this province consisted as in former years of the working of the auriferous gravels of the Chaudière district, in the county of Beauce, and of the Ditton district, in Compton county. In the former district an encouraging renewal of activity is apparent, and further attention is being paid to the quartz veins with a view to their receiving a practical mill test.

On this subject Mr. Brumell, who visited the district for the division, furnishes the following notes :—

Chaudière gold region.

"A short visit was paid to the Chaudière gold region where active operations were confined to two points, viz., the Gilbert river and the Du Loup, both in Beauce county.

"On the Gilbert river, Mr. W. P. Lockwood had a force of forty men employed on lot 13, DeLery concession. Here operations were being carried on by means of a slope 200 feet deep to a level connecting with a shaft about 175 feet to the south. The shaft was sunk 80 feet through the following section :—

8 feet surface materials.
13 " quicksand.
43 " blue clay.
1 " gravel.
15 " bed rock, slate.

"From this levels were run 140 feet to the south and 183 feet to the north where connection was made with the slope through which all the gravel and 'dirt' is taken out. From these main levels shorter ones had been run, taking out the gravel throughout the entire width of the old channel. The plant and appliances at the works consist of one steam hoist, one Cornish pump, one 12 horse-power boiler and one horse-whim.

"The pay dirt averages about six feet thick and is said to afford about $75,000 per acre, though in the present workings they are getting only about three ounces to the 'cap' of 8x10 feet; this at the usual price of Quebec gold, $18 per ounce, would be $54 per 'cap.'

"According to Mr. Lockwood, the old river channel has been worked out from lot 21, of DeLery, to lot 11, of St. Charles, as well as through a considerable number of lots in the 1st range N.E., near the Chaudière river.

"On the quartz reefs of the seigniory little has been done beyond the locating of some thirty-five veins which occur between the Gilbert

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river and the village of St. François, on the Chaudière. They are said to average over five feet in width and to afford a free milling ore.

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"On the Du Loup river near its confluence with the Chaudière, Messrs. Gendron and Haycock have undertaken extensive operations for the fluming of the river, and intend erecting a small mill for the treatment of ores from the many reefs upon the river in the township of Jersey and seigniory of Linière.

Ditton.

"In the township of Ditton, Compton county, a small amount of development work was done and sluicing begun on the Little Ditton river, and prospecting carried on upon the Salmon river and tributary creeks, though to what extent is not known, as the district was not visited."

Silver.

Silver.

The only silver ores as yet discovered in this province are found in veins carrying galena, which is more or less argentiferous and is sometimes accompanied by zinc blende and copper sulphurets. These have never been worked very extensively, although more or less exploratory, and development work is always being carried on in this direction.

Lake Temiscamingue Mine.—This mine was not operated during 1892. It has been referred to in past reports.

There was no activity in this direction to report for the year, other than a slight amount of prospecting work.

Ontario.

ONTARIO.

Silver.

Silver.

The officers of the division having been busy in other directions, were unable to visit the silver mines of the Thunder Bay district. However, from information received from reliable correspondents in the district little or nothing was done beyond prospecting and test work on some of the less known properties. All the larger mines were closed during the year, various reasons being given.

It will be useful here to reproduce the notes of the Ontario Government Inspector of Mines as given in the report of the Provincial Bureau of Mines for 1892. This gentleman writes as follows :—

"The Murillo mine as well as the St. Joseph mine on the adjoining lot have been lying idle during the year.

"The Beaver mine suspended operations both in the mine and at the mill shortly after my last visit in July, 1891. A watchman has the care of the property.

"At my visit to the Badger mine in June a few men were employed unwatering one of the shafts and doing a small amount of work by way of refitting some of the dilapidated places. The suspension of work on this mine, so largely productive in former years, as well as the Beaver, I was informed was not for want of rich bodies of ore, but must be attributed to other causes, the chief one being the depreciation of silver.

"In June I examined the Climax mine, which is on mining location T 145, half a mile north of the Porcupine and about one mile and a half from Silver Creek station on the Port Arthur, Duluth and Western railway, to which a good wagon road has been built. The property is owned by capitalists of Minneapolis and Canada, no company having yet been formed. J. H. Sinclair of Minneapolis, who resides at the property, has the entire superintendence of the works. There are two parallel veins on the property, running 30 degrees north of east and 300 feet apart. The mine has been worked constantly since the 1st of December, 1891, with a force varying from six to thirteen men. Previous to the present owners purchasing the property some development work had been done in sinking two shafts to the depth of thirty-four feet each, one on each vein, and also running in a drift on the No. 1 or south vein about eighty feet. Another drift was run in on No. 2 or north vein thirty-five feet.

"Under the present management the level on No. 1 vein has been continued an additional 128 feet, making its total distance 208 feet and following the mineral from the place of its intersection at fifty feet from the mouth of the drift, thus opening the vein 158 feet. At a vertical depth of thirty-one feet from the former drift another level has been driven in 135 feet, exposing the vein for a distance of seventy feet. In the first level, at a point fifty feet from its entrance, a winze has been sunk thirty-one feet to intersect the level below.

"On vein No. 2 the old level was continued a further distance of forty feet, making a total of seventy-five feet from the entrance and following the vein the entire length. At a vertical depth of thirty feet from this level another one was driven in 213 feet, following the lead for 123 feet. There is a valuable showing of ore in this mine.

"These workings are in slate formation, and the gangue consists of calc and fluor spar, quartzite, sulphide of iron and zinc blende, holding leaf and black silver, with a small portion of galena. A force of ten men was employed.

"Captain Rapsey informs me that West Silver Mountain mine has been closed since May 1st on account of the death of Mr. Drake, the owner of the property. It was expected work would be resumed so

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Silver.

soon as the necessary arrangement could be made with the estate of the deceased. At the time work was suspended shaft No. 2 had reached a depth of 142 feet.

"On the second level drifts had been extended to the distance of 364 feet west and 198 feet east. Drifting in the first level, which is thirty-seven feet from the surface, had been continued to the extreme distance of 151 feet west, and at a point 125 feet from the shaft a winze had been sunk to the level below.

"Since my last report but little work has been done in the lowest level. A considerable quantity of valuable ore had been taken out of the mine and shipped. Mr. Rapsey states in a recent letter that 'the mine never looked so well as when shut down.'

"Discovery of the Gopher mine was made about two years ago by I. S. Roberts on the south half of lot 11 in the fourth concession of the township of Strange. The property is owned by a number of capitalists of Minneapolis, and the company formed is known as the Gopher Gold and Silver Mining Company. Capital stock $100,000, all paid up. Mr. Howard of Minneapolis is the managing director; office, 707, Globe Building. Mr. Roberts has the superintendence of the work at the mine.

"Work was begun a year ago last April and continued until Christmas with from six to nine men. One shaft was sunk 104 feet on a vein of ten feet in width, and at fifty feet from the surface a drift was run in fifty-two feet on the vein and a cross-cut of a few feet was made. Assays from these workings show value of the ore running from $5 to $60 per ton. At a distance of 250 feet from the first, a second shaft was put down twenty feet on vein matter. No. 3 test shaft was sunk between the first and second twenty-one feet, in which was found a good showing of native silver.

"The machinery consists of one 20 h. p. boiler, a 10 h. p. engine and a pump; but so far the pump had not been required for use.

"An engine house and good dwelling house, blacksmith's shop and drying room for the men have been put up. It was expected work would be commenced again about the first of August.

"Work on the Augusta mine was suspended in November, 1891. Since the former report about sixty feet of drifting has been done and a shaft twelve feet deep sunk at a distance of 130 feet from the mouth of the last drift opened. In this shaft it is said good ore was found. Mr. Griffis, the manager, informed me that the property would be worked again about the first of September.

"Silver Bluff mine was lying idle. Mr. McEwen, the manager of the Shuniah Weachu or East Silver Mountain mine, informed me that work had been discontinued at this mine October, 1891. No additional work except exploring had been done since last report. Silver Bluff, Crown Point, Silver Centre and Palisades mines were also lying idle. PRECIOUS METALS. Discovery and development. Ontario. Silver.

"Mr. McEwen has charge of a new property known as Guaranty mine, comprising 160 acres, situated on the fourth concession of Strange, six miles east of Silver mountain. It is owned by a company in Minneapolis; capital stock $150,000. I found twelve men employed under Captain James. A vertical shaft has been put down forty-five feet on a quartz vein. Boiler and engine 16 h.p., with suitable hoist. An engine house and comfortable boarding camp have been built.

"The Empire mine location comprises 135 acres, being lot 1 in the second concession of O'Connor, and adjoining the Beaver location. Work was done as early as 1889 by sinking a test shaft fourteen feet on the north part of the property. An opening was also made in the hill side on the south part of the location, opening a promising vein of ore, and a shaft was sunk fourteen feet. North of this opening, 112 feet, a shaft has been sunk sixteen feet deep, exposing good ore, and west of this opening another shaft has been put down twenty-six feet. Work has been retarded on the property on account of inflow of water. This mine gives an exhibit of very rich ore.

"The property known as R20 mine is situated in the township of Scoble, comprising eighty acres. It is about twenty-five miles west of Port Arthur, adjoining Rabbit mountain, and is owned by Joseph Brimson and R. E. Mitchell, both of Port Arthur. This mine, which is due south one and a quarter mile from the famous Beaver, has been worked since November, 1891, and had a force of seven men employed when I was there. T. R. Walker of Port Arthur has the management of the work.

"A vertical shaft seven by ten feet was sunk to the depth of ninety-eight feet, following the vein, which is from three to four feet in width, * * * * The shaft was still in the trap rock, but the slate formation was expected to be reached at an additional depth of from fifteen to twenty feet. Hoisting was done by a whim. A boarding house, sleeping camp, dry house, stabling and a blacksmith's shop have been erected.

"Upon examination of the Lily of the Valley property, which I visited on June 14th, I found that two distinct veins of ore had been opened and traced for a distance of about fifty rods. Their course is east and west.

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"Starting at the farthest point east, the two veins are about 300 feet apart. The north vein runs due west and the south vein north of west, so as to form a junction with the other vein at a point fifty rods west. The first discoveries were made on the two veins nearly opposite each other, and about midway between the two extremities. A shaft was sunk on the south vein a little west of the place of discovery to the depth of twenty feet, showing the vein between well defined walls to be three feet in width. At a distance of 200 feet east of this shaft, on the same vein, another shaft has been put down to the depth of nine feet. The first five feet passed through clay, when rock consisting of spar and quartz was reached. The four feet of sinking in the rock showed the vein to a width of six feet. Work was being done in this shaft at the time of my visit.

"On the north vein, which is now designated the main vein, and nearly opposite the first shaft, a third shaft has been sunk to the depth of thirty feet, exposing the vein to a width of ten feet, but the full width had not yet been determined. The mineral has been followed from the surface to the bottom of this shaft. Work had been suspended on this shaft for two months, and it was partly filled with water. At this time about twenty tons of high grade ore had been taken from the mine.

"Since writing the above, a recent note from Mr. Hugh Munroe, Crown timber agent at Port Arthur, informs me that a shaft has been sunk to a depth of twenty-five feet, with a showing that is really good. He states: 'I saw ore that would assay $7,000 per ton.'

"I have been informed that the main vein has been traced by surface working a distance of three miles east and one and a half mile west."

Apart from prospecting and some little development there is nothing to note regarding the deposits of argentiferous galenas scattered throughout the province.

Gold.

Gold.

The gold-bearing veins of this province continued to receive attention. The mines have so far, however, hardly progressed beyond the development stage, so that the province has as yet remained in the background in the matter of the production of gold.

The chief features were to be found in the renewal of operations in sundry gold-bearing veins in the Madoc and Marmora district in Hastings county; the testing of several veins occurring in the Huronian belt of rocks extending from Sault Ste. Marie to Sudbury and beyond

in Eastern Algoma and in the reopening of some of the chief mines in the same formation around the Lake of the Woods in Western Algoma, at which latter place several mines were erecting new milling plants to treat their ores.

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None of these were visited by any of our officers during the year, but the subjoined interesting details reproduced from the report of the Provincial Mining Bureau will give an idea of the nature of the operations inaugurated.

"The Sultana mine is situated eight miles from Rat Portage, on the Indian reserve, location X42, and is owned by Messrs. John F. Caldwell of Winnipeg, holding fifteen-sixteenths, and H. Henessy of Rat Portage, one-sixteenth. Mr. Caldwell holds the mineral claim X43 Indian reserve and B38½ comprising 40 acres. Mr. W. M. Caldwell has the management of the property. A few men were at work from the beginning of the year, and in March the force was increased to eight, who had been constantly employed up to June, the date of my visit.

"The place of working is near the landing or dock, and the ore is removed from the opening in wheelbarrows to the place of shipment An open cutting has been made to the distance of 250 feet in a north-east direction, following the side of the lake, and has been worked to the depth of fifteen to eighteen feet, showing a width of vein of twenty-seven feet. The lead has been traced between granite and slate, a distance of about twenty chains. The lowest cutting is only five feet above the high-water mark of the lake. About 130 tons of ore had been mined and removed to the dock ready for shipment to the reduction works at Rat Portage. Other openings had been made in the property the fall previous. One which I especially noted is about 500 yards in a southerly direction from the present workings, on a steep elevation, and from which 350 tons of ore had been mined and taken to the mill at Rat Portage. A comfortable boarding house, a blacksmith shop and convenient docks have been built. It was intended to put on additional force and use steam power for drilling and other purposes so soon as the ore could be properly treated at the mill in the town.

"A force of thirty-two men was employed at the mine and mill at the close of the year. Mr. Margach of Rat Portage in a recent letter states that a stamp mill, with rock crusher for pulverizing and Frue vanners for concentrating the ore, is in successful operation at the mine. I note also by a late communication through the papers that a fine gold brick has been turned out of the works as proof of the value of the ore and the successful method of treating it. On Sultana Junior six men were then at work.

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"The Northern Gold Company, formerly known as the Gold Hill Company, are engaged working their prospect, which is situated on the mainland twenty miles south-east of Rat Portage, and contains 906 acres held in fee simple. This discovery was made eight years ago by Mr. George Dulmage, the present superintendent of the work. D. B. Burdette of Belleville is president, and J. R. Wright is the business manager. Ten men had been employed for the past year and their number was increased to thirteen when I visited the property. The workings consist of a shaft sunk to the depth of twenty-eight feet, with other openings following the lead for at least a mile. Shaft No. 2, the present place of working, has reached a depth of forty-five feet at an angle of 45 degrees, following the mineral between well-defined walls. The vein matter is nine feet in width, with about three feet of pay streak.

"A carload of the ore taken from these workings had been sent to Minneapolis to be tested by the Leede process, and so satisfactory was the trial that an order was given for a plant to be put up at the mine, although formerly stamps and other machinery of the ordinary class for a mill had been ordered; these were abandoned. The whole of the plant for the new process was expected to arrive and be placed in position for work in a month or two. The boiler is of 40 horse-power. The ore will be roasted by gas generated from petroleum, using twelve barrels daily. About 150 to 175 tons of ore were ready for treatment, and by the Leede process this ore will be reduced to bullion. A tramway is now being constructed from the mine to Moon bay, a distance of one and a half mile, which will be in use shortly. Through a reliable correspondent I am informed that twenty-four men were working on this property at the end of the year.

"The Homestake mine is on a strip of the mainland at Yellow Girl bay, about 25 miles in a southerly direction from Rat Portage, and is owned by the Homestake Company of Algoma, with capital stock of $300,000, in shares of $1 each. About 65,000 shares have been disposed of, and the proceeds are to be used for development purposes and constructing a mill at the mine.

"Mr. Heldrith, a member of the company, is manager of the works, and at the time of my visit had mined about fifty tons of ore, twenty-five of which had been taken to the reduction works at Rat Portage. He had a contract to deliver 1,000 tons at Rat Portage, which he expected to accomplish at the rate of thirty tons daily. The proceeds are to be used for the further exploring and developing of the property.

"A letter in January, 1893, from William Margach, Crown timber agent, states that 'ten men are at work on the mine, and Messrs.

Heldrith & Chadwick have a stamp mill which they propose putting in operation.'

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"The Dead Broke mine is located on P64, Red Rock island, about twenty-two miles in a southerly direction from Rat Portage, and is owned by Jeff Heldrith.

"Work on this mine was commenced in April last with ten men, and the vein has been stripped fifty feet in length and nearly the same in width. A open cut has been made twenty feet in length and twelve feet in width and a few feet in depth, from which about seventy-five tons of ore have been removed, and showing by frequent assays from $7 to $133 per ton; twenty-five tons of the ore have been taken to the reduction works to obtain a mill run. The work was interfered with by the inflow of water, and a new opening has been made at the distance of 130 feet from the former one and the tunnel has been driven in twenty-five feet. It is intended, I was informed, to put on an increased force and work the property on an extensive scale.

"The Gold Creek mine is situated near Pine Portage bay, one mile from the point at the head of the bay. The location comprises 180 acres P 347, and is owned by Messrs. E. H. Kendell, Samuel Whiting and Joseph Thompson, all of Rat Portage. The discovery was made in 1890; work was commenced with a force of seven men in the fall of 1891, and has been continually carried on under the direction of G. F. Ernst, who has had large experience as a miner and who now holds the property under lease. A vertical shaft has been sunk to the depth of fifty feet, following a vein with average width of nine feet from the surface to the bottom of the shaft. The shaft is well timbered to a depth of fifteen feet through the clay and sand, where a firm slate formation has been reached with well defined walls requiring no supports. Two test pits have been sunk, one eight feet on a vein of ten feet in width, and the other sixteen feet deep on vein matter of fourteen feet width. The vein has been followed on the surface by openings at intervals for the distance of 500 feet west, and in a southerly direction for 2,000 feet. A force of seven men was employed at the date of my visit in June.

"About 300 tons of ore had been taken out and was being conveyed by tug to the reduction works at Rat Portage for treatment. The place of shipment is at Heenan's point, a distance of one-third of a mile from the mine, where a convenient dock has been built. The ore which was being shipped had been taken to the dock in the winter season. A good roadway was being constructed from the mine to this dock.

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"A good boarding house and shaft house have been built, and the whole of the work in and about this mine has been done in an exceedingly neat and substantial manner.

"Eight miles from Rat Portage, and near Sultana island, the Ontario Mining Company own a location on which a shaft has been sunk to the depth of fifty feet, from which excellent samples of ore have been taken. The property is owned chiefly by Winnipeg capitalists.

"The Winnipeg Consolidated Gold and Smelting Company own a property on Big Stone bay, eighteen miles out from Rat Portage. Several years ago this property was worked for one year. A shaft was put down 120 feet and drifts run in with such excellent results that a stamp mill was put up. The ore was of good grade.

"The Pine Portage mine is situated one mile inland from Pine Portage bay, and about eleven miles from Rat Portage. A shaft has been sunk 120 feet and about fifty feet of drifting done. The property is regarded as valuable, and a watchman resides upon it. Mr. Dobie, one of its chief owners, stated that it was probable work would be resumed during the present year.

"The Climax mine, owned by A. Egan of Winnipeg, is situated on Big Stone bay, about ten miles from Rat Portage. From an open cut in the side of the hill 600 or 700 tons of ore have been raised, most of which has been taken to the reduction works at Rat Portage for treatment; thirty-six assays showed the average value of ore to be $19 per ton.

"The Keewatin mine is situated on Hay island, ten miles from Rat Portage, one of the largest islands of Lake of the Woods, which may be regarded as a lake of islands. It is owned by Good & Jones, of Winnipeg.

"On the Heenan mine, which is one mile south of the Keewatin, a fifty foot shaft has been sunk; it is the property of the owners of the Keewatin mine.

"On Boulder island, containing twelve or fourteen acres, a discovery was made a few years ago, a considerable amount of development work done, and a mill put up, which was afterwards moved to the Consolidated mine. The property is owned by William Gibbons and others of Winnipeg.

"On Fish island, near to Boulder, a promising discovery was made seven years ago, and the property was obtained by a company of capitalists from California and worked to a limited extent. One shaft was put down thirty feet, when the work was suspended for the same cause as on the Boulder and other properties—a disputed title.

"The El Diver mine is on location P351, which comprises eighty acres and is situated two and a quarter miles north from Rossland station, Canadian Pacific railway, eight miles east from Rat Portage. The property is owned by Messrs. J. W. Webster and E. W. Gaylord of Cleveland, Ohio. Mr. Gaylord has charge of the works of the mine. PRECIOUS METALS. Discovery and development. Ontario. Gold.

"Work was commenced in October, 1891, with a force of five men, which was increased to seven during the winter. Ten men were employed in June at the time of my inspection. The principal shaft has been sunk to a depth of sixty feet, following the vein matter from the surface with an average of two feet of pay ore. The work was being done by contract, and about 200 tons of ore were on the dump.

"A mill for concentrating the ore has been erected, and the machinery would be in place and all running in about a month. The concentrates were to be treated at the reduction works in Rat Portage. It was intended to continue operations both at the mine and mill with a sufficient force to fully test the value of the mine, and to increase the work as the development would warrant. The owners hold the property with a view of working it, rather than as a speculation. A dwelling house with office was being constructed, and a good boarding house and blacksmith shop have been completed. Other prospecting was being done on the property. I directed the attention of the manager to some necessary work to be done for the protection of the workmen in walling off the ladder-way in the shaft and timbering near the surface.

"Mr. Webster also owns P288, comprising eighty acres, known as the Caribou, about half a mile from the station, upon which some development work has been done with excellent showing of mineral.

"The last of October I received a communication from Mr. Gaylord stating that the necessary work for the safety of the mine had been properly done, also that the shaft had been continued to the depth of seventy-five feet, and a shaft house was being built. A friction power hoist has been purchased from the Jenckes Machine Company, Sherbrooke, Que., which will be run by rope belt from the mill. The mill building has been increased to double its size and the mill dam raised, greatly increasing the supply of water for power. The dwelling house with office have been finished, an ice-house built, and also an additional barn and stabling accommodation.

"The pulverizer which was on hand when I was there has not proved a success, and a Crawford mill has been put in in its place. It was intended, Mr. Gaylord writes, to push the work forward throughout the winter both in mine and mill if water supply and weather should permit. He also writes: "We have purchased a property two miles

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south of Rossland (eighty acres) known as the Treasure. The ore there carries free gold in abundance at the surface ; we are down about twenty-eight feet. The showing at the bottom is not as good as at the top. The vein measures from two feet to six inches wide. We have erected several log buildings, such as boarding house, blacksmith shop, ice-house, barn, magazine, etc. We intend to push the work on the shaft this winter, but shall not erect a mill before spring."

"About the middle of June I visited the Gold and Silver Reduction Works in the town of Rat Portage. The capital stock of the company is $200,000, with about one-half this amount paid in and used for the construction and outfit of the mill. Charles Brent has the superintendence of the work and J. P. Larkins of Rat Portage is the secretary of the company. Through the courtesy of these gentlemen I had an opportunity of carefully examining the works, and obtained through the superintendent a full explanation of the process being adopted in the extraction of the precious metal from the ore. The mill had just started up and about nine tons of ore were running through daily with the exception of being treated in the chlorination department, which was not yet fully completed. A large quantity of ore was being delivered on the dock at the mill for treatment, and it was expected a full supply would be obtained from the mines operated in the vicinity to keep the works constantly running. I forego giving an account of the mill taken at the time of my visit, as by the favour of Mr. Brent the following note has been recently received describing the process, results, changes and prospects of the reduction works and other mills, and the condition of several of the mines, which may be permitted insertion here as a matter of much information and interest. Mr. Brent writes :—

"'As to the reduction works, I regret to say that we shut down in August of last year owing to the fact that the pulverizing machinery proved useless. Our plan in brief was as follows : The ore (gold) is crushed wet to forty mesh, the free gold extracted on plates and by pans and settlers ; the tailings from these were concentrated. The concentrates were roasted in a reverberatory furnace and treated by chlorination.

"'I am glad to be able to inform you that a wealthy American syndicate has purchased the reduction works and will put in new and suitable machinery to properly reduce the ores of this district.

"'As to the mines : things look very favourable at present, and if appearances are to be trusted a boom in mining will take place in the spring.

"'During the fall I put in a ten stamp mill at the Sultana, which is in successful operation and is a dividend payer. I am sorry to say, however, that very little has been done in the shape of mining development. The machinery consists of a hoist to bring the ore to the mill; a seven by ten Blake crusher; ten stamps of 850 pounds each in two batteries of five stamps each, with inside copper plates and twelve-foot electro-silvered copper tables. The tailings are treated by concentration over two improved Frue vanners.

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"'I am at present in charge of the mill at the Bulldog. We are putting in two ten-ton Crawford mills. The company is pursuing a policy of vigorous underground work and at present (fifty feet) the mine looks well.

"'Our next neighbours at Gold Hill have completed a new mill to be operated by the Leede process. This is a process of roasting by gas manufactured from crude petroleum, followed by amalgamation in pans, gold plates and Cook amalgamators.

"'At the Treasure, south of the C. P. R. at Rossland, they are sinking with good prospects, and will put in a mill in the spring.

"'At the El Diver a Crawford mill has been put in place, but they are tied up for water. They are sinking with fair prospects of success.

"'The Rajah Mining Co., an English syndicate, is operating on a piece of property five miles from Rat Portage, in a north-east direction.

"'The Bullion Mining Co. is sinking a shaft about five miles north of town.

"'The Homestake Co. is sinking a shaft on Middle island with good showing.

"'A large amount of prospecting will be done as soon as spring opens."

"The Ogema mine is situated in the new township of Dorion, about eight miles from Ouimet siding, C. P. R., forty miles east of Port Arthur and seven miles east of Pearl River station, which is the post and express office for the company.

"The Ogema Mining and Smelting Company was organized under the laws of New Jersey and Ontario, with a paid-up capital of $150,000. The property comprises 400 acres. Mr. John C. Smith, one of the shareholders, is manager for the company and has charge of the works at the mine. Work has been continued since September, 1891, when it was begun with a force of five men, but increased to ten at the date of my visit, June 25th. A good team is used by the company in assisting to build the government road leading out in the direction of the mine, and hauling in machinery and supplies for the mine.

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"In addition to considerable surface workings, a shaft of eight by ten feet has reached a depth of fifty feet, following the lead of galena and gold ores from the surface to the bottom. The vein is the full width of the shaft at the place of working." According to the same authority pockets of richer ore are said to occur at places in the vein yielding by assay as high as $668 in gold with $8 in silver. This richer ore is barrelled. A large amount of lower grade ore is also to be found in the dumps and workings assaying about 65 per cent of lead and $7.50 in silver.

"The mine is provided with a good outfit for convenient and rapid working, consisting of one 15 h. p. boiler and one 12 h. p. engine, a Copeland & Bacon hoist machine, machine drills, steam pumps, etc. A pony saw-mill has also been erected to cut the lumber and fuel required at the mine.

"Suitable buildings have been constructed; shaft-house, engine-house, blacksmith's shop, cooking and sleeping camps; also a superintendent's residence with office attached, a warehouse and stabling sheds for horses and implements, and a magazine. The mine was in a good and safe condition.

"In a communication received from the manager of the mine since the close of the year he informs me that the mine is still being vigorously developed, although work has been suspended for a short time on account of the extreme cold. Two shifts of men were to be put on almost immediately. In reference to the Crawford mill he writes: 'Owing to the immense amount of oxide in our ores, the Crawford mill did not give good results. It is a well-known fact that amalgamation is prevented by oxides, particularly that of iron. The Crawford mill, however, is the most perfect pulverizer and amalgamator I know of, and I believe is doing a grand work on the free milling ores at Rat Portage.' He also states: 'We have increasingly strong indications of a rich deposit of gold and silver.'

"A large amount of prospect work has been done on the property known as the Ophir mine, north of Thessalon, and very excellent results obtained. Specimens of nuggets have been widely distributed among mining men. Rare specimens, I learn, have been forwarded for the Columbian Exposition at Chicago. The property has been acquired by a syndicate of Duluth capitalists.

"The Creighton gold mine is situated three-quarters of a mile from the Vermilion river, in the township of Creighton. It is being worked by an Ottawa syndicate, of which Mr. Seybold is president, and the work on the property is under the direction of J. R. Gordon, C.E. Two lots, 11 in the fourth and 11 in the fifth concession, have been

located and development work has been done on both. When at the mine the last of June a shaft had been sunk fifty feet at an incline of forty degrees, following the vein from the surface. The outcropping quartz, bearing gold, could easily be traced for 500 or 600 yards south. * * * * The vein matter at the place of working is about fifteen feet wide and contains gold of the value of $12 to $20 per ton. A 20 h. p. boiler and a 15 h. p. engine are used for running the steam drill, and a pulsometer pump, discharging when operated a 2½-inch volume of water. Six or eight men were employed when I was there.

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"A good road has been built from the mine to the river, down which the chief supplies for the mine are brought, and a comfortable log building has been put up for boarding and lodging the men.

"I visited the property of George Bennett of Chelmsford on May 30th, which is four and a half miles from Chelmsford station on the main line of the C. P. R., west of Sudbury twelve miles.

"This property is on lot 6 of the first concession of the township of Balfour, and was being worked for gold and silver by a few men. A shaft had been put down thirteen feet and drilling thirty-five feet from the bottom of the shaft. About 200 feet from this place another boring has been made to the depth of twenty-five feet. The surface formation is slate, with quartz underlying.

"Assays have been made of ore taken from the surface and from the bottom of the shaft, and also from the deeper borings, showing from $2 to $8 of gold and from $1 to $5 of silver per ton. A good level road has been built from the station to the mine.

"A gold property was located in the fall of 1891 about twenty miles east of Sudbury, thirteen miles north-east of Wahnapitae station on the Canadian Pacific railway, and six miles east of Wahnapitae lake, near lake Kookogaming or Rabbit lake. The discovery was made in a swale, where in drift boulders free gold was found in the form of small nuggets. The property was obtained by Colonel Shaw, A. McArthur and others of Toronto, who engaged Peter McKellar of Fort William to examine and report upon the property. Mr. McKellar traced the boulders to their place of origin, a distance of only 200 feet, where several segregrated veins where found. An assay test made from one of these veins by Mr. McKellar showed as high as $2,400 per ton of coarse free gold. Frequent assays showed quantity, from traces to the amount named. Other large well defined veins are found upon the same property which show free gold at the point of exposure, but are chiefly covered.

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"It is intended to prosecute further work at an early date to test the value of the property and, if satisfactory, operations will be commenced on a large scale and suitable machinery introduced for efficiently working the mine.

"From the present indications Mr. McKellar, who gave me the foregoing description, regards the property as one of encouraging promise.

"A mine containing some gold and silver was discovered in 1891 by A. D. Cummings of Nipissing on the south shore of Lake Nipissing, about two miles west of the mouth of South river. A limited amount of prospecting work was done in the early part of the year by John McAree, P.L.S., at the instance of A. A. Wright, 273, Chestnut street, New York. The work done was in making excavations at several points on the vein and in sinking a shaft six by eight feet to a depth of thirty-five feet. The vein is about twenty feet wide, and the gangue consists of quartz, country rock and gneiss.

"To fully test the value of the property Mr. McAree writes that the shaft will have to be sunk much deeper; 'that there is a good strong fissure vein admits of no doubt.'

Belmont gold mine.

"In May six men were engaged in working in the Carscallen shaft of the Belmont mine, in the township of that name, which had reached the depth of 100 feet, being twenty-five feet additional since my last report. The gangue matter contained about 15 per cent of sulphurets. At seventy feet a level has been run a short distance, and a cross-cut shows the vein to be fifteen feet in width. In the O'Neil shaft additional sinking of ten feet has been done, making this shaft thirty-four feet and showing a similar grade of ore as that taken out previously. A few additional feet in depth has also been made in the Strickland shaft. The four Crawford mills set up in the village of Marmora had been run at the date mentioned to the extent of treating 220 tons of ore taken from the mine, which ore was found to be highly refractory, carrying iron and copper pyrites. The results as given to me showed a saving of ninety-eight per cent, the assays indicating but traces of gold in the tailings not to exceed two per cent.

"In the process of treatment the ore is passed through a Gates crusher and then introduced to the top of the mill by an automatic feeder in a continuous stream. It is there pulverized by nine balls of about seventy-five pounds each, which are constantly kept in rapid motion by a revolving disc which produces both a circular and lateral revolution, and by which the ore is ground to an impalpable mass, completely disintegrating the gold from the rock which then settles into the trough or sink at the bottom of the mill and forms an amalgam with the quicksilver, which has been

supplied to each mill to the extent of 125 lbs. There is a constant stream of water injected into the mass at the bottom of the mill, which flowing over the disc serves the double purpose of keeping the quicksilver pure and causing an overflow about two feet above, carrying with it the pulverized silica or quartz and other impurities and leaving below the precious metal. The ore is reduced to a fineness to allow of 60 per cent to pass through a 200 mesh, 80 per cent to pass through a 120 mesh, and all to pass through an 80 mesh screen. The loss of quicksilver in the test run was 2 lbs., the entire quantity used being 500 lbs. for the four mills. By the ordinary process of retort the gold was run into a brick and the standard reached 92½ per cent of gold and a small percentage of silver.

"In August, at the time of my second visit, the mine was not being operated. In a letter recently received from A. W. Carscallen, M.P., he says: 'The Belmont mine is in full blast with a large Crawford mill running night and day, and a second one to be added shortly. They have about thirty men employed and everything is moving lively. The vein as it increases in depth is increasing in richness, and the outlook for this property is very bright indeed. I think the shaft is down about 120 feet, and they have started levels at thirty and seventy feet. The property is being worked by Middleton Crawford, the inventor of the mill, * * * * There are no other properties being worked in this section just now.'

"T. D. Ledyard of Toronto, dealer in mines and mineral lands, writes that 'gold has been found in several places on the east half of lot 19 in the first concession of Belmont. This lot is adjoining the one on which the new Belmont gold mine is situated.'

"I have been informed that the Hastings Mining and Reduction Company have six men at work on surface ore of the Galting mine; also that a mill is under construction at Marmora village for the treatment of ore by the Carter-Walker process, which consists in crushing and roasting the ore and forcing vaporized mercury through the pulp, which is afterwards treated in settlers.

"The Crescent mine was lying idle throughout the winter, but reopened early in June. At the date of my inspection, August 10th, forty men were employed at the mine and mill. George McDougall had the management, with Wm. McDougall as assayer. J. N. Baker of Nova Scotia had the charge of the mill.

"Work was continued on the Mackenzie shaft, which had reached a total depth of sixty-five feet in barren rock, crossing a vein of ore however at the depth of fifty feet.

PRECIOUS METALS.

Discovery and development.

Ontario.

Gold.

"The shaft now known as the A shaft was being worked with a few men, in contact with good ore. A considerable quantity of ore was being taken from the large open pit, where the principal work was being done.

"The mine is being worked with care, and apparently it is in a safe condition for the workmen. An open pit near the mill required fencing, which the manager said would be immediately attended to. The mill had been running for only eight or ten days previous, and was treating about twenty tons of ore in twenty-four hours. For description of mine see former report.

"A few tons of ore had just been treated in one of the Crawford mills, but the cleaning up had not been finished, and the results were not known when I was at the mine.

British Columbia.

BRITISH COLUMBIA.

During 1892 the mining for the precious metals showed some interesting features due to the discovery of many veins carrying rich argentiferous galena ores in the West Kootenay district, details of which are given below.

The extraction of gold from the placer deposits of the province was continued on the usual lines. As previously mentioned this industry, however, continued to decrease as in past years.

Mr. Ingall spent the greater part of three months in examining numerous veins in the Illecillewaet and Kaslo-Slocan subdivisions of West Kootenay district. In reporting to the director, Mr. Ingall summarizes the results as follows :—*

Silver.

Silver.

Notes by E. D. Ingall.

"It may not be amiss to summarize the conclusions arrived at as a result of the studies prosecuted in the new mining camps of West Kootenay.

"As it was, of course, impossible to properly examine all the mineral deposits known to exist in any of these districts in the time at disposal, selections were made which should, as far as possible, be illustrative of the different districts and varieties of deposits. The local features of these, as far as exposed by the developments made, were carefully studied and illustrative specimens for the museum were collected, together with samples for assay. In the camps tributary to Illecillewaet, on the Canadian Pacific railway, visits were made to the older claims in the immediate vicinity of that place, as well as to

*Summary Report of the Geological Survey of Canada for 1892.

the newer discoveries in the Fish River valley and around Copper hill. These comprise the following claims, viz. : The Lanark, Maple Leaf, Isabella, Bluebell, Jumbo, Sanquahar and Cariboo, near Illecillewaet, and the Gold Hill and Copper Hill group of claims. In the Fish River valley the chief points examined were the Elizabeth, Edinburgh, King Solomon, Herringback and Fishburn claims.

PRECIOUS METALS. Discovery and development in British Columbia. Silver.

"In the Illecillewaet district proper, beyond some prospecting and assessment work little was being done at the time of my visit; but development work was being conducted by Messrs. Ryckman, M.P., and Scott, and by Messrs. Fishburn & Co., in the Fish River valley. The general description of the Slocan veins given below will serve equally for those of the Illecillewaet and tributary districts.

"The Slocan district on the west side of Kootenay lake was visited during September and October.

"These new discoveries, made in the fall of 1891 and spring of 1892, are situated about the headwaters of the Kaslo river, and between there and Kaslo City on the west shore of Kootenay lake. A number of discoveries were made later in the year on the shores of Slocan lake between the Columbia river and Kootenay lake. These could not, however, be visited, owing to lack of time; and for the same reason it was found impossible to visit other discoveries in the Lardo River country and at various other points in the valleys of the Lower Kootenay and Columbia rivers about which very glowing accounts came to hand.

"Kaslo was reached in the beginning of September, and after all necessary arrangements were made the trail up the valley of the Kaslo river was followed to Bear lake, on the divide between that valley and the watershed of Slocan lake and river, and trips were here made to the various groups of claims distributed along the route.

"Bear lake was reached on the 19th of September, and an attempt made to reach the important group of mines on the surrounding mountains, but this purpose had to be temporarily abandoned, owing to the early advent of snow which effectually hid everything at that elevation. Whilst waiting for the melting of the snow, a short examination was made of the Ainsworth camp for the purpose of comparing the conditions there with those of the Kaslo-Slocan camps, and thus connecting the work with that done by Dr. G. M. Dawson in 1890.

"The snow having melted sufficiently, the examination of the Kaslo-Slocan group was continued and most of the chief discoveries were visited. The return of the snow on the 10th of October, however, again prevented the study of the surface showings at the Bonanza King claim, of which nothing could be seen but the tunnel. This

PRECIOUS METALS.

Discovery and development in British Columbia.

Silver.

was much to be regretted as it was the chief claim in the Noble Five Group, the discovery of which has led to the rush to the district, and indirectly to all subsequent discoveries. It was, however, yet found possible to see the Freddy Lee and Slocan Star mines on Carpenter creek, owing to their being on a slightly lower level.

"In returning it was intended to visit the Wellington and White Water claims, but the snow having reached the lower levels no further work could be attempted, and the return to Kaslo was made on the 15th of October.

"Much hopeful activity in the direction of prospecting and development work was manifest in this district, and not without foundation, high hopes were prevalent regarding its future.

"Towns were started at Nakusp and New Denver on the proposed wagon route for providing the Slocan claims with an outlet via the Columbia river line of steamers and also to Kaslo which is the terminus of the now completed wagon road, connecting with the Kootenay lake steamers by which ore can be shipped to the smelting works in process of construction at Pilot bay or to any point in the United States via Bonner's ferry on the Northern Pacific railway.

"In a preliminary report such as this it would be impossible to give the results of these investigations, other than in very general terms, and all the detail of the evidence upon which these conclusions are based will be left for the complete report that it is intended to issue later.

"However, of the geological conditions of occurrence of the deposits visited and of their visible extent, etc., the main features are given below.

"Proceeding west from Kaslo, the rocks noticed seemed to belong to two distinct series. A belt of green dioritic schistose and serpentinous rocks, following west north-west along the northern side of the valley of the Kaslo river, whilst south of these the rocks are for the most part black shales and slates with gray interbedded bands, which evidently consist for the most part of carbonate of lime. The general dark colour of this series of rocks, varying from dark gray to black, would seem to be due to the presence of carbonaceous matter, and is in striking contrast, both in colour and structure, with the general green colour and more metamorphic characters of the adjacent rocks to the north. The black shaly series are tilted, in places much folded and also at times indurated. They frequently show local metamorphism, which latter phenomena will probably be found in all places, as it evidently is in some, to be due to the action of the intrusive igneous

Discovery and development in British Columbia.

Silver.

rocks which are visible as dikes and masses or areas, cutting both the before-mentioned series.

"The veins examined show in general the character of fissures cutting the formation, although sometimes conforming along the strike with the inclosing rocks for considerable distances. Where occurring in connection with the calcareous bands of rock, there would seem to be a tendency to make large pockets in connection with the vein, or towards widenings of the vein itself. Strippings on some of these present surfaces of considerable extent, which, however, on further development have proved not to belong to the veins proper. The veins whilst usually found to be more persistent, are generally comparatively much narrower.

"Although they show variations in structure these fissures in general carry galena in ribs, nodules, etc., associated with an ochrey gangue locally termed *carbonates*. This ochrey material is said to assay well in silver in many instances, it being doubtless enriched by the presence of more or less argentiferous carbonate of lead, or, as was plainly visible in some cases, by the presence of disseminated native silver and argentite, doubtless resulting as secondary products from the alteration of the argentiferous galena.

"The galena varies much in texture from a fine blue ore of steely grain up to coarse cube and sometimes shows a ribbed structure. With it in many cases are associated various arsenical and antimonial minerals of silver disseminated through the ore proper. The occasional presence of a certain amount of copper is evidenced by the stains of malachite and azurite, which probably orginate from the weathering of the tetrahedrite as well as from copper sulphurets, which occur in slight degree. The general run of the reported assays of specimens from the district is high, averaging in the hundreds of ounces, and occasionally even reaching to the thousands, the latter results being quite possible for separate specimens when the presence of the richer silver minerals is borne in mind. At one mine which has made considerable shipments, it is claimed that these have averaged $200 per ton, and the conclusions based on the general evidence obtainable would seem to justify the expectation that the yield of the district will be found to average high in silver.

"The galena-bearing veins which cut the green schistose and serpentinous rocks, present to the eye a generally similar appearance to those found in the shale and argillite series, except of course for the absence of the associated pockets of ore mentioned in connection with the calcareous bands.

PRECIOUS METALS.

Discovery and development in British Columbia.

Silver.

"What may prove an interesting discovery was reported late in the season from the Whitewater basin, some prospectors having brought in specimens of quartz which, according to local assayers, averaged very high in gold. No further particulars are, however, available, as the intended visit to the place was prevented by the advent of the snow.

"Assuming then that, in actual working, the ores should be found in shipping lots to maintain their high content of silver, which would seem probable in most cases, a bright future may be predicted for this district if those interested will only observe and act on the financial and economic principles necessary to success.

"The completion of the wagon road from Kaslo into the centre of the district will be of great value in the working of the mines and the existence of smelters in Canadian territory at Pilot bay, Revelstoke and Golden will doubtless prove of great assistance when a continuous supply of ore shall be forthcoming.

"The projected railroads to give connection with the Canadian Pacific railway at Revelstoke, and from the Slocan divide to Kaslo, will doubtless be constructed when the veins are worked on a more extensive scale.

"The assays made of the selected specimens collected during the season show the following general results :—

"In the Illecillewaet district four assays of galena from different points varied between 18 oz. and 73 oz. of silver per ton, the pyritous ores of copper being found, in the one sample assayed, to carry silver also.

"The galenas of the Fish river sub-district gave results running from 39 to 318 oz. of silver per ton. A sample of the 'ochreous' material locally called 'carbonates' showed 692 oz., and some of the zinz-blende nearly 6 oz. of silver per ton.

"The assays of galena from the various veins in the Kaslo-Slocan district resulted as below :—For those occurring in green schistose and dioritic series of rocks, six assays gave results ranging from 38 to 146 oz. per ton, averaging over 90 oz. One assay of a specimen of zinc-blende showed silver to the extent of 26 oz. In the same district the galenas from veins occurring in the black argillite series of rocks averaged in some thirty-one assays, 150 oz. per ton, ranging from 30 oz. to 520 oz. per ton. Assays of zinc-blende returned from 26 oz. to 73 oz. per ton. The ochreous 'carbonates' occurring with the galena yielded very variable amounts of silver, the lowest return being 20 oz., the highest 1,630 oz. per ton. This great discrepancy is due to this ore being a mechanical mixture only, which is often enriched by secon-

dary deposition of native silver and the richer silver minerals. In the whole series of assays made, numbering some sixty-five in all, gold was absent, except for mere traces found in three cases.

"The ton referred to is that of 2,000 lbs. For further details see the forthcoming report of the Chemical Branch of the Department."

PRECIOUS METALS.

Discovery and development in British Columbia.

Silver.

For the sake of completeness the part of the report of the Minister of Mines for this province giving details of discovery and of development work done throughout the province are here reproduced.

Notes from Reports of Minister of Mines for B.C.

They are given by the government agents in the different districts and deal with workings both on placer deposits and veins.

Gold.

Gold.

Cariboo—(Mr. Bowron's Report).

Cariboo placer mining.

Placer deposits.—"It will be satisfactory to observe that, while a large number of miners have been engaged during the season in constructing ditches and other non-productive work, the returns show an increase in the gold product over that of last year; and in taking a comprehensive view of the operations throughout the district, there is abundant evidence to inspire confidence in the future.

"As in all enterprises of an experimental character, the introduction of new appliances in works of unusual magnitude, is frequently accompanied by disappointment, inasmuch as unforeseen obstacles arise which have not been provided for by the projectors; hence a longer period of time is often required to place a claim on a paying basis than was at first estimated. These remarks apply to a large number of enterprises in the district, among which might be mentioned the hydraulic claims now being opened on the South Fork of the Quesnel river. The owners of these claims have every evidence of the value of their property, as developments made this season further prove the correctness of their previous opinion, but they were disappointed in not getting their appliances in position so as to have had a 'wash up.' Next season, however, two companies, at least, viz., the South Fork Company and the Victoria Hydraulic Company, will undoubtedly contribute their quota to the general output of the district, as their pipes will be in position, and they will be able to commence operations as soon as the spring opens. The absorption by these two companies of a considerable amount of the available labour of that section has had the effect of reducing the output of Keithley division.

"The *Barkerville division* shows a material increase in its output, and there are at the same time several enterprises in various stages of development, which are not yet productive.

PRECIOUS METALS.

Discovery and development in British Columbia.

Gold.

"The *Slough Creek Mining Co.*, using the hydraulic jetting process of boring, after sinking several holes, finally succeeded in locating the deep channel at 245 feet. The pipes used by this company varied from three and a half to six inches in diameter, the smaller pipe being used as greater depth was obtained. While using the larger pipe, the value of the ground was in a measure tested, but when it became necessary to use the smaller pipe it was impossible to do so. Upon satisfying himself that the deepest part of the channel had been reached, the manager, Mr. Chas. Ramos, at once engaged a force of men, who are now sinking a working shaft, which is at present about thirty feet down.

"Considering the extent of undeveloped ground in Cariboo, similarly situated to that of the valley of Slough creek, such as Williams creek meadows, Willow river, Lower Lightning creek, Lower Antler creek, Bear river, and many other streams, known to have deep channels, which have never been exploited, we are impressed with the fact that the boring machine will become an important factor in the development of the district. In using such means to prospect deep ground, it would be advisable that a larger hole be bored, so that the value of the gravel on the bottom might be tested without the great expense of sinking a working shaft.

"The *Nason Co.*, of Antler creek, having purchased a steam pump and placed it in position, are now starting again to pump out their diggings, and with this addition to their former pumping machinery, the company will doubtless be able to keep the water out, and so finally determine the value of their claim.

"The *Waverley Co.*, of Grouse creek, continue to improve their output, although the shareholders have been somewhat disappointed that the claim did not pay expenses this season.

"The *Clear Grit Co.*, of Canadian creek, have discovered what they suppose to be a large river channel, entirely independent of present watercourses, and parallel to that in which they have been working with varying success for the past twenty years. The new found channel, which is about forty feet to the west of the old channel, contains paying gravel thirty feet in depth, but the width is not yet ascertained.

"Mr. George Ferguson has formed a company, and is now sinking in the hill on the ground adjoining. Should he succeed in finding similar pay gravel to that discovered in the Clear Grit ground, he considers the find of more importance than the discovery of Williams creek.

"The only discovery made in the district this season, which may be regarded as entirely new, was that of Mr. E. C. Shepherd and partner

on a small stream which flows into Antler creek, and is now known as *Shepherd creek*. The discovery was made near the source of the creek in Downie pass, two and a half miles east of Williams creek meadows. As the gold is of a coarse character and well washed, hopes are entertained that the discovery may lead to something of importance.

PRECIOUS METALS. Discovery and development in British Columbia. Gold.

"The *Forest Rose* claim, of Williams creek, continues to maintain its reputation of being one of the most productive in the district.

"The accompanying statistics also show that the placer mines on *Mosquito creek* have somewhat exceeded the usual output.

"The company which obtained a concession of one mile of the valley of *Willow river* have not as yet commenced operations; but, I learn, have recently interested English capitalists in their enterprise, and expect shortly to proceed with the work. This is one of the most promising enterprises ever offered to capital as a mining investment.

"Mr. Whittier, who obtained a lease of ground on the meadows of *Williams creek* has apparently failed to induce London capitalists to take hold of his undertaking.

"The *Lightning creek division* shows quite a falling off in the product of its mines. A company, which applied for and obtained a lease of a portion of the old *South Wales* ground, have been working continuously for the past two years, endeavouring to find benches upon which auriferous gravel was supposed to exist, have at last been rewarded and are now taking out fairly good pay. This company will continue working during the winter.

"The *Big Bonanza* claim, prospecting the deep ground on *Lower Lightning creek*, were unfortunate in having a portion of their dam washed away during the spring freshet. A contract to repair the break is now let, upon completion of which the company will pump out their diggings and resume work underground.

"In the *Quesnel division* there has been a slight decrease in the gold product. The *Blue Lead Company*, of Hixon creek, although continuing operations during the season, have not as yet succeeded in developing pay in the hill channel.

"Another branch of our mining industry, and one which hitherto seems to have been quite overlooked, or at least has attracted but little attention, is destined in the near future to add much to our resources. I refer to the gravel bars in our rivers and large creeks. In 1891 a Mr. L. Sampson visited Cariboo, claiming to be the patentee of a gold saving apparatus, which being immersed in the bottom of a stream caught every particle of gold passing over it. Although having the plant with him, and spending much time in examining various streams

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Gold.

for the purpose, Mr. Sampson gave no practical test of his ability to do what he claimed. He again visited Cariboo in the spring of 1892, and applied for a concession on certain streams, but suddenly left the district again without making a trial. His advent among us has had the effect, however, of directing the attention of some of our old miners and practical men to the fact that the gravel bars in our rivers, which are now worked exclusively by Chinese during low water by means of the old-fashioned rocker, may, by the appliance of proper machinery, be made to yield thousands where now but dollars are produced.

"Chinamen have been known to work over the same surface ten years in succession with profit, fresh deposits of auriferous sand and gravel being washed down during each year's high water.

"A few persons of undoubted mechanical invention, associated with old Fraser River miners, adepts at saving fine gold, have the matter in hand, with every prospect of producing machinery which will cause the working of these bars to become a profitable investment for capital.

"A large number of mining leases have been applied for during the year, mostly by non-residents. I regret to say, many of the applicants, after obtaining the option, have failed to complete their title. I would, therefore, suggest that applicants for leases be required to make a deposit of the amount of rent proposed to be paid for the first year, upon filing their application with the gold commissioner, the same to be forfeited in case of failure to complete their title.

"Mr. Hobson, one of California's most skilled and experienced placer miners, visited the district this summer, and expressed much surprise at observing the almost unlimited extent of what he regards as auriferous gravel, which, worked with the modern and approved appliances now in use in California, must, he believes, contribute greatly to the wealth of the province. But he is of the opinion that railway connection—providing cheaper labour, cheaper supplies, and cheaper transportation —will be essential to carry on the work on a sufficiently large scale to ensure paying investments.

Cariboo quartz mining.

Quartz.—"Our quartz mines, which, for the past three years, have not received the attention which their importance would seem to merit, attracted some little notice recently, in consequence of a visit of Mr. A. J. Colquhoun, a representative of the Gold and Silver Recovery Syndicate of Glasgow, Scotland. This company are the patentees of what is known as the McArthur-Forest process of treating refractory ores, which entirely does away with the expense of roasting, which forms a part of all other known processes. The successful working of 300 pounds of ore from the Black Jack, and a similar amount from the Island Mountain mine, sent to Glasgow about two years ago, induced

this company to send Mr. Colquhoun to Cariboo, who, before leaving here, bonded a number of mineral claims. That gentleman informed us that his company will probable erect a plant for the reduction of ore in Cariboo next season; and after visiting the government reduction works, stated that the chlorinating plant there could be easily utilized in working his process. PRECIOUS METALS. Discovery and development in British Columbia. Gold.

"The *Black Jack* is the only company which has done anything worthy of mention in the way of mineral development during the past season. This company baled out their shaft to the 64-foot level, and commenced taking out and milling ore with their one stamp mill. The concentrates were sent to the reduction works for treatment, but after producing a small $425 gold bar, it was found that, with their present crude manner of working, the claim could not be made to pay; and therefore the works were shut down. I am informed by the secretary of the company that it cost over $50 per ton to mine and mill the ore worked, which under favourable circumstances should not exceed one-fourth that sum. This is but one instance, in perhaps hundreds in Cariboo, where valuable mining properties lie unworked or undeveloped, awaiting railway construction to render them profitable investments.

"I estimate the gold product of the district for the year (exclusive of Omineca) will exceed $200,000, basing such conclusion upon the following actual and approximate figures :—

Barkerville	Division, to 15th Nov., 1892	..	$76,600
Lightning Creek	" "	..	41,500
Quesnellemouth	" "	..	23,500
Keithley Creek	" "	..	52,400
Estimated output, from 15th Nov. to 31st Dec		..	10,000
			$204,000

Mr. Stephenson's report of the Keithley, Alexandria, and Williams Lake polling divisions of the Cariboo district: Keithley, Alexandria, Williams Lake.

"The season has been favourable for mining operations all through this section of Cariboo, as the water supply held out well during the season; still the estimated amount of gold falls short of last year, which I think is owing to a steadily decreasing mining population, especially as regards Chinese miners. The reason for which is, that they, the Chinese, have pretty well worked out the shallow benches and small streams where gold was easily obtained, often by the individual miner, and always by small companies of from four to eight men, who by doing their own labour, could at a small outlay for material, open such claims by one season's work. Such claims of course were

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Gold.

soon worked out; but it is mining of this nature that the Chinese engage in, and now that the opportunity for such mining is growing less the Chinese are leaving this part of Cariboo. But this does not mean that mining is generally finished in this section, as, I believe, we are only just beginning to find out that we have plenty of good mining ground in hill channels along the Quesnel, and both on the South and North Forks of this river; also, on other streams in this vicinity. With the continuance of work now being carried on by three different companies, another season will probably see the development of some of the claims, if not of all three; then, should the results be satisfactory, capital will be easily found for other works of the same kind.

"The result of mining operations on the *Snowshoe creek* has not answered expectations. The *Golden Gate Company*, which went to a heavy expense to sink a shaft in bed-rock near the lower end of the creek, effected their object, and drove into the deep ground; at times very good prospects were met with, but upon the whole, the return has not proved satisfactory to the owners. The two hydraulic claims up near the head of the creek have paid in excess of expenses for the season, but the dividends were lighter than usual; while the company of Chinese working their claim by an open cut in the bed of the creek, will not admit that they are making much, still they seem quite satisfied with what they are getting.

" On *Keithley creek*, three out of the four hydraulic claims working have done fairly well, while the fourth has not yet reached ground where they expect to find pay. The creek claims which are worked by open cuts in the bed of the creek, have not done very well, as the unusually high stage of water in the creek has caused trouble in the endeavour to keep the wing-dams in good condition. On the *North Fork of Quesnel river* there is not much doing, beyond desultory mining; one white miner still continues to drive a tunnel into the hill, looking for a back channel, but it is slow work, single handed. The company of whites on *Spanish creek* still keep on with their work, drifting up stream and into the hill; they have mined a little gold with prospects of better pay ahead.

"The two Chinese hydraulic companies on the *South Fork of the Quesnel river*, have made about an average season's work, while some desultory mining has also been going on as usual. Both the *Victoria* and *South Fork Hydraulic Mining Companies* have been pushing their work ahead as fast as possible; the former with an average gang of eight white men on the claim and about twenty-five Chinamen on ditch work, by contract; the latter, with ten white men on the claim, and about twenty-five Chinese on ditch work, by contract; and

still there is work to be done by both companies before any returns can be looked for.

"The *Horsefly section* is again receiving attention, and it is likely that there will be quite a number of men working there the coming season, as a company of capitalists have obtained the *Discovery Company's ground*, with their water right and other privileges; they are also about obtaining some ground by lease adjoining the Discovery Company's ground. Although the expense of bringing on a good supply of water will be heavy, still there is every reason to believe that with plenty of water the ground will pay for hydraulic mining. The company is working a gang of ten men during the winter to thoroughly prospect the ground before going to the expense of bringing on water. The *Harper claim* (lease), on *Horsefly*, has done very little during the season, as the Horsefly river has kept very high nearly all the season, which was very much against the working of the ground, in fact, making it almost impossible, owing to the nature of the work to be done.

"Along the *Fraser river*, the regularly organized companies that have water for hydraulic mining, have done about the usual amount of work, while the desultory mining has been less than that of last season.

Cassiar—(Mr. Porter's Report).

"The returns for the present season, as will be observed, show a considerable falling off in the yield of gold when compared with last year.

"During the season some sixteen miners, who would have been working on *Dease* or *Thibert creeks*, and taking out gold, were employed by a mining company from California that acquired leases of mining ground on Thibert creek, and have been during the summer engaged building a ditch and doing other work pertaining to their claims.

"A rumour of the existence of rich ore on the *Hyland river* and its tributaries induced certain miners to visit that section of country. On their return they reported the discovery of a ledge, and duly recorded a claim under the "Mineral Act," with the intention of thoroughly testing the same next spring.

"The mining carried on now in the old creeks is chiefly by Chinese, who keep working the old claims over, some of which have been worked many times.

"One or two tunnel claims on *Thibert creek* are doing fairly well.

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Gold.

"The mining prosecuted both on the *Stickeen* and *Liard rivers*, with one or two exceptions, is chiefly on the bars below high water mark, and of a desultory nature.

"As closely as can be estimated, the number of miners and others in the district this year, exclusive of Indians, amounted to about 120, of these sixty-five were Chinese.

"The following returns are as correct as it is possible to have them, owing to the many difficulties in the way of obtaining accurate information:

Dease creek	$ 8,700
Thibert creek	6,500
McDame's creek	9,200
Liard river	3,600
Stickeen river	950
Total	$28,950

"Next year it is generally expected that our population will exceed the present, and the returns, it is confidently believed, cannot be less than the figures given above.

Gold and Silver.

West Kootenay.

West Kootenay—(Mr. Fitzstubb's Report).

Revelstoke.

Revelstoke Division.

"*Lardeau District.*—In this district there have been seventy-one mineral locations recorded during the present year, and seven transfers of interest in claims. Assessment work will be done on the majority of the locations taken up, and the work recorded during the twelve-month limit. This division shows signs of becoming a very rich one, the lowest assay of ore taken from various claims being forty ounces in silver, and ranging as high as 200 ounces, and in some cases showing a good percentage of gold.

"*Big Bend District.*—Very little prospecting has been done in this district, only four claims having been recorded during the present year, and on those no work has yet been recorded. There is a little placer mining going on, and I am informed that in this enterprise about eight men are steadily employed.

Illecillewaet.

Illecillewaet Division.

"In this district ninety-eight claims have been recorded, on the greater part of which assessment work will be done. Forty transfers and agreements for sale have also been filed, amounting to over $47,000. Between $25,000 and $30,000 have been expended in development work during the current year.

Slocan Division.

Discovery and development in British Columbia.

"In this district, during the current year, 750 locations have been recorded, on the greater part of which assessment work will be duly recorded.

Gold and Silver.

"Three hundred and forty transfers and bills of sale have also been recorded, aggregating $550,000, and it is estimated that the sum of $201,000 in cash has changed hands by reason of transfers up to date.

Slocan.

"To illustrate the activity in mining in this district, the following statistics, which have been kindly furnished by Mr. J. L. Retallack (whose accuracy and sources of information may be safely relied upon), may be of interest :—

"On the *Noble Five* group of claims, situated on Carpenter creek, the sum of $6,000 has been expended, principally in driving a tunnel 150 feet, and a trail seven miles long. Only samples of ore have been shipped from this camp, but a large body of ore has been exposed.

"On the *Slocan Star* claims, situated on Sandon creek, development work, consisting of 180 feet of tunnelling has been done, and a trail of two miles has been built. Extensive machinery will be put on this group during the spring, when the output is expected to reach 300 tons of concentrates per month.

"On the *Payne* group of claims, situated on Carpenter creek, upwards of $4,000 have been expended in development work and trails. No ore has been shipped at present.

"On the *Blue Bird* claim upwards of $10,000 have been expended on 600 feet of tunnelling, and also six miles of trail. One hundred tons of ore from this mine have been shipped via the Kaslo wagon road.

"On the *Freddy Lee*, situated on Cody creek, upwards of $20,000 have been expended in development work, and $4,500 on trails, etc. Over 400 tons of ore have been shipped from this mine.

"On the *Washington*, situated on Carpenter creek, 200 feet of tunnels have been driven, and good mountain trails have been built. It is estimated that 1,500 tons of ore will be shipped from this claim during the present winter.

"On the *Dardanelles* group, situated on McGuigan creek, about $4,500 have been expended on development work, and a trail four miles long has been built. About ten tons of ore have been shipped from this camp, showing satisfactory returns.

"On the *Best* claim, situated adjacent to the Dardanelles, over $10,000 have been expended on development work, and a trail three miles long has been built. About fifteen tons of ore have been shipped from this claim.

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"On the *Idaho* claim, situated between Four-Mile creek and Hansen creek, about $2,400 have been expended on development work, and a trail, costing about $1,000, has also been built. About fifteen tons of ore have been shipped from this claim.

"On the *Great Western* group, situated about one mile east of the Washington, 200 feet of tunnels have been driven, and three miles of trail have been built. No ore has been shipped from this group.

"On the *Queen Bess*, situated on Cody creek, the sum of $5,000 is at present being expended on development work, and a trail, costing $500, has been built. No ore has been shipped from this claim.

"On the *Lucky Jim* and *Roadley* group, situated on Seaton creek, about $10,000 have been expended on development work and trails. No ore has been shipped from this group.

"Of other claims in this district, on which considerable development work has been done, may be mentioned:—

"The *Northern Belle*, on Jackson creek. This claim has been bonded for $45,000.

"The *Slocan Boy*, adjoining the Washington. On this claim there is a large quantity of ore in sight.

"The *Reco* and *Wonderful*, situated between the Noble Five and Blue Bird. There is a large amount of ore in sight on these claims. Thirteen men are steadily employed developing.

"The *Silver Glance* group, situated two miles north-west from the town of Watson. Development work has been going on all summer, and the claims have been bonded for $45,000.

"The *Sunset* claim, near the Blue Bird, has been bonded for $20,000.

"The *R. E. Lee*, situated about three-quarters of a mile south of the Washington, has been bonded for $20,000.

"The *Chambers* group, situated on Cody creek, has been bonded for $50,000.

"The *Big Bertha*, an extension of the Dardanelles, has been bonded for $45,000

"The *Utica*, on the same creek, has been bonded for $30,000.

Ainsworth.

Ainsworth Division.

"During the current year in this district there have been 470 mining claims recorded, and 274 transfers have been filed. Of the 470 claims recorded, assessment work will be done on the greater part.

"Immediately in the vicinity of Ainsworth, rich strikes have been made, among which may notably be mentioned the *Mile Point* claim, assaying as high as 400 ounces in silver per ton.

"On the *Skyline* silver claim it is the intention of the owners to erect a stamp mill during the coming spring.

"On the *Highlander* claim considerable development work has been done.

"On the *Lady of the Lake* group of claims, it is estimated that $25,000 will be expended during the coming season on development work and general improvements.

"*Kaslo portion.*—On the *Solo* group, situated on Lyle creek, extensive development work has been done, and good trails built. There is a large body of ore in sight.

"On the *Wellington* claim, situated on Whitewater creek, steady work has been done, exposing large bodies of ore. It is the intention of the owners to put extensive machinery on this property in the spring. Ten tons of ore have been shipped from this mine, showing good returns.

"On the claims of the *Brennand* group, situated on Lyle creek, about $2,000 have been expended on development work and a good trail has been made.

"On the *Whitewater* claim, situated on Whitewater creek, about $2,500 have been expended on development work. About eight tons of ore have been shipped from this claim.

"The *Beaver* group of claims, situated fifteen miles north of Kaslo, have been bonded for $75,000.

"On the *Montesuma* and *Mexico* claims about $3,000 have been expended in getting in supplies and erecting buildings preparatory to developing the property, which is now bonded for the sum of $20,000.

"The *Twilight*, situated on Twelve-Mile creek, has been bonded for the sum of $20,000.

"The *Fourth of July* and *Viola* claims, situated on Spring creek, have been bonded for the sum of $50,000.

"The *Yosemite*, *Homestake* and *Eureka*, in the Brennand camp, have been bonded for the sum of $65,000.

"The aggregate sum of the above, and bonds given for smaller amounts on other claims, amount to nearly $334,000.

"A wagon road has been built from Kaslo to Bear Lake by private subscription, costing in the neighbourhood of $20,000.

"*Lardeau and Duncan portions.*—Late in the season several good prospects were discovered, assays ranging very high, and on the Duncan slope, near Upper Kootenay lake, a gold strike has been made, showing free milling ore, assays of which have been made as high as $1,000 per ton.

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"Good placer ground has been reported on the bars of the Duncan river. It is expected that a big rush will be made into this part of the district during the coming summer.

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"On *La France creek* about fifty locations have been made. The ledges are very strong, being composed chiefly of galena and copper, with a fair percentage of gold.

Smelters at Pilot bay.

"On *Pilot bay, Kootenay lake*, a smelter is in the course of construction, attached to which will be a refinery. It is estimated that the cost of these extensive works (which will be completed early next summer) will be not less than $250,000.

"The buildings are built of brick, and roofed with corrugated iron.

"The following dimensions of the buildings may be of interest:—

Concentrator building	85x100
Sampling works	100x108
Roaster	100x170
Smelter	58x 98
Refinery	120x245
Assay office	20x 80
Boiler house	40x 48
Blacksmith shop	20x 40
Machine shop	20x 40
Office	30x 45
Boarding house	25x 60

Goat River.

Goat River Division.

"Several claims have been taken up and recorded, and assessment work done on most of them.

"The quality of the ore assayed from this district is good, being composed of galena, copper, and a percentage of gold. It promises to be a rich district.

Trail Creek.

Trail Creek Division.

"In thsi district sixty-seven mining claims have been recorded, and eighty-eight transfers and bills of sale filed. Assessment work will be done on nearly all claims taken up.

"The principal claims are as follows:—

"The *Le Roi* and *Centre Star*. On these claims work has been prosecuted continuously, and development work has exposed large bodies of ore. The ore assays $40 in gold, four ounces in silver, and eight per cent copper per ton.

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"On the *O. K.* claim a fair amount of work has been done, showing up a large body of ore, composed of iron pyrites and galena, assays varying from $200 per ton upwards.

"Twelve miles of wagon road from the Le Roi mine, the centre of the Trail creek group, have, by private subscription, been built to the international boundary. Over this road $4,000 worth of ore has been taken from the O. K. mine, and supplies shipped in. A refund of $2,025, the cost of this undertaking, is asked.

"On the *Pend'Oreille river* valuable placer ground has been discovered. It is estimated that $50,000 is being expended on this river in building saw-mills, ditches, etc., so as to work this ground on a very large scale.

Nelson.

Nelson Division.

"In this district 244 locations have been recorded, and 197 transfers filed. On the majority of locations assessment work will be done and recorded in due course. To illustrate the mining enterprise in this division, the following may suffice:—

"On the *Whitewater* and *Snow-water* gold claims, situated on Rover creek, tunnels to further develop the properties have been driven. Work on the latter is being prosecuted all the present winter.

"On the *Poorman* gold mine, situated on Eagle creek, there has been a large amount of work done. This mine has a ten-stamp mill on it, and it is estimated that $10,000 has been taken out of this mine in free gold during the last summer.

"On the *Silver King* mine, situated on Toad mountain, the main tunnel has been extended 150 feet, and other development work, aggregating 912 feet. This mine stands at the head of all discoveries so far made in West Kootenay, and is now bonded to a Scotch syndicate for nearly $2,000,000.

"On the *Grizzly Bear* claim, situated on the same mountain, about $14,000 have been expended on development work. No ore has been shipped.

"On the *Silver Queen*, adjacent to the Silver King mine, $9,000 have been expended during the past summer.

"On the *Dandy* mine, also adjacent to the Silver King, a large amount of development has been done, and large bodies of ore exposed. The Dandy, as regards value, ranks next to the Silver King.

"On *Morning mountain* several claims have been located, and show great promise of future richness.

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"On Mineral mountain, the *Lizzie C.* claim shows a great deal of development, but no ore has as yet been shipped from this claim.

"Between Mineral and Toad mountains several good gold claims have been discovered, showing returns of 40 per cent copper, and $30 in gold per ton.

"*Placer Claims.*—The following records have been made:—

Locations	15
Transfers	8
Leases	4

"On *Forty-Nine creek* some very good ground is being worked.

"On *Hall creek*, about twelve miles south of the town of Nelson, good prospects have been found, yielding from $4 to $8 per day to the man.

"On this creek also a strong ledge of gold-bearing quartz has been discovered, showing returns of $10 to $30 per ton.

"On *Salmon river* extremely good prospects have been found, and leases have been granted to parties who intend working their properties on a large scale next summer.

"Owing to the very rich finds in the Slocan district, prospectors have been naturally attracted to that part of the country, who would otherwise have stayed round Nelson and further prospected and developed claims in the immediate vicinity, and this also applies to other recording divisions outside of Slocan.

"The following is a recapitulation of claims, etc., taken up in West Kootenay district during the current year:—

	Claims Recorded.	Transfers Recorded.
Revelstoke	75	7
Illecillewaet	98	40
Slocan	750	340
Ainsworth	470	274
Goat river	No report.	
Trail creek	67	88
Nelson	244	197
Totals	1,704	946

East Kootenay—(Mr. Cummins's Report.)

"*Placer Mining.*—The accompanying statement shows the estimated yield of placer gold from the various creeks to be as follows:—

Wild Horse creek	$25,000
Perry creek	3,000
Moyie river	1,500
Weaver creek	200
Total	$29,700

being an advance of $12,000 on the production of last year. It should be stated that owing to the unusually early advent of winter, one of the Chinese companies on Wild Horse creek did not finish cleaning up. Mr. Griffith's hydraulic property has also been unworked during the summer, pending negotiations for a transfer to an English company, which are now understood to have been satisfactorily concluded. The company is entitled *The East Kootenay Exploration Syndicate, Ltd.*, of London. Mr. McVittie, the manager, informs me that his company has purchased and will put in next spring an additional pipe line, fourteen inches diameter, which, with the pipe already in position will enable him to use three giants. The property consists of 2,100 feet of patented ground and 1,700 feet of recorded ground, all bench claims. The company holds 1,900 inches of water, with a working head of over 300 feet.

"The operations being carried on to test the deep ground on *Wild Horse creek*, about eight miles from its mouth, alluded to in last year's report, met with a check, owing to trouble experienced in dealing with the surface water. It has, however, been determined to continue operations by sinking a shaft in a more favourable situation. The company built a road about three miles in length last summer, to enable them to bring in pumping machinery.

"About two miles from the mouth of the creek, where it leaves the foot-hills, Mr. M. Phillips, of Fort Steele, and associates, is sinking a shaft to reach the bed-rock. The shaft is being sunk in the rim rock, with the idea, I presume, of avoiding surface water. It is the intention to drift across the channel when sufficient depth has been reached. This ground is being worked at present under record as an ordinary claim. A lease has, however, been applied for.

"Some excitement was caused during the early part of the season by the discovery of deposits of black sand on the *St. Mary's river*, near the St. Eugène mission. Samples of the sands on being assayed gave results as high as $4,000 gold to the ton of black sand. I am not in a posi-

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tion to state if the sands underwent concentration by panning before the samples were selected. I assume that the gold was principally placer gold in the free state. It is, however, contended that the magnetic oxide of iron (black sand) in itself also contained a considerable quantity of gold.* The discoverers are satisfied that with modern gold saving plant these sands can be profitably worked, and four leases have been applied for. It is stated that large deposits of black sand also exist on *Gold creek*, which runs into the Kootenay river about five miles north of the international boundary.

"To the north of *Donald* some promising placer prospects have been reported to have been found late in the season, and a number of applications for leases have been made on the *Blue Water river*. I am not in a position to report on the importance of these discoveries. The discoverers claim in each case to have obtained good prospects.

"The intended hydraulic operations on *Quartz creek* were stopped by an injunction of the Supreme Court, forbidding the company from turning their tailings into the creek, to the prejudice of the interests of the Columbia Lumber Company.

Quartz mining

Quartz Mining.

"Prospecting for quartz leads has, during the past season, not been as active as could have been desired, especially in the northern portion of the district. The southern portion has received more attention, with some most important results, a number of new discoveries having been made in the Fort Steele recording division of the district. The most important of these is the *'North Star'* claim, situated on the St. Mary's river, about twenty miles' travel from Fort Steele, a more particular description of which will be found further on.

"Mining operations in the McMurdo district have been confined to the Vermont creek locality and to the neighbourhood of the "Bobby Burns Basin," on the left bank of the Middle Fork of the Spillemechene river, whilst the most important and extensive work has been in progress on the Thunder Hill Mining Company's property on Thunder hill, near the Columbia lake, both as regards development of the property and its exploitation as a mine.

"A very handsome and representative collection of minerals, considering the stage of mining development in the district, has been collected to be forwarded to the World's Fair, Chicago.

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*The following analysis of a sample of the black sand may be of interest: Iron 52 per cent; oxygen, 21·80 per cent; silver and gold, 0·75 per cent; lead, 3·50 per cent; insoluble, 21 per cent. The gold was in the form of brilla, or colours.

"*McMurdo District.*—The '*Bobby Burns*' claim. It is to be regretted that the expectations of an immediate output, looked forward to this season, have not yet been realized with respect to this property. There is, however, not any reason to retract the favourable notice in last year's report, as to the probable paying qualities of the claim, under competent and experienced management. A road has been built for a distance of about three-quarters of a mile from the mine to the five stamp mill. About thirty tons of rock were crushed, and a considerably larger quantity taken out. From some accidental cause, apparently in connection with the working of the mill, the quantity of gold saved does not seem to have realized expectations, nor corresponded with the samplings of the ore. It is stated that since the shutting down of the mill, negotiations have been on foot for the sale of the property.

"There are several promising gold quartz claims, similar in character to the 'Bobby Burns,' in the immediate vicinity; notably, the *International*, formerly known as the 'Chief of the Selkirks,' the *Flying Dutchman* claim, and others. The ore in these leads is free milling, as far as seen on the surface. Where depth has been reached, sulphurets become more abundant. With the recent advances which have been made in the treatment of gold ores under these conditions, this locality should contain some valuable gold properties. Many things point to the existence of a gold belt, of as yet unknown extent, in the neighbourhood of the backbone of the range, of which these outcrops are a part. The formation in which the claims lie may be stated to consist mainly of chlorite slates and schists, the latter assuming in many cases such a granular form as to be characterized locally as granites.

"*Carbonate Mountain and Cariboo Basin.*—Nothing but assessment work has been done on Carbonate mountain this season. Crown grants have been applied for in respect of four claims owned by Messrs. Rand Bros'. Syndicate.

"In *Cariboo basin*, an aggregate of 350 feet of tunnelling has been done, in various places. It is to be regretted that this work could not have been done in one place, and one of the leads thereby tested. One of the most promising claims at the present time in this locality is the *Ellen D.* The development work has exposed a vein from three to four feet in width, well mineralized with galena, gray copper, and iron sulphurets. Assays of 1,755 ounces in silver and about $20 in gold have been obtained.

"Only assessment work has been done on *Copper creek.*

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"*Vermont Creek.*—A tunnel has been run on the claims bonded by the *Golden Smelting Company*, on the north side of this creek. I am informed that it is intended to cross-cut to the right to reach the lead.

"The *Vermont* claim, on the southern side of Vermont creek (mentioned on page 568 of last year's report), which was bonded to Mr. H. C. Hammond last year, has been released by him. The owners, on resuming possession, took out a car-load of ore, which they shipped to Tacoma smelter, in September last, as a practical test of their ore, with the intention of making larger shipments during the coming season*.

"The result, as evidenced by the statement in foot-note, must be considered to be very satisfactory, considering that the ore was packed for a distance of twenty-one miles on horses, and that the charges for freight and duty were so high, the facilities for local treatment not having yet been in operation. With respect to the cost of mining, it may be mentioned that the ore was taken out of tunnels at a low depth, with a view to development, leaving the ore above to be stoped out in the future at much smaller expense.

"No development work of importance has been done on the creeks between the *South Fork of the Spillemechene* and *Toby creek*, though, as mentioned in former reports, promising prospects exist in this region.

"*Jubilee and Spillemechene Mountain.*—There is no important progress to be reported regarding the claims on *Jubilee mountain*. Some very fine specimens of copper ore were contributed from this mountain to the World's Fair collection.

"Work was again resumed on the large lead on *Spillemechene mountain*, a tunnel about 150 feet in length being driven on the lowest point on the lead at which any work has yet been done. It is supposed that the tunnel will have to go some distance further before ore is reached, at this point.

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*Cost of mining 20¾ tons of ore		$ 492 00
Packing to Columbia river	$615 00	
Freight by steamboat to Golden	31 15	
Freight to Tacoma	177 20	
Duty	368 31	
Sacks	31 00	
		1,212 66
		$1,704 66
Net returns from smelter	$2,060 87	
Total cost	1,704 66	
Profit	$ 356 21	

Lead quoted at $3.80; silver, 84⅞ cents.

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"*Thunder Hill.*—As stated above, work has been active this summer on and in connection with the *Thunder Hill mine.* Two Ingersoll steam drills have been in use, which have worked to great advantage. Large quantities of concentrating ore have been taken out and stored in the bins, ready to be transported to the concentrating works on the shore of the Columbia lake, a distance of about one and three-quarter mile, as soon as the erecting of the machinery is completed and the tramway leading from the mine to the works in running order. The concentrating plant, manufactured by the Chicago Iron Works Company, is of a capacity of fifty tons a day.

"The ore passes from the crushers to the rolls, then to the screens, and descending to the jigs. The concentrates resulting from this treatment are here withdrawn, whilst the slimes undergo fine concentration on double revolving buddles or slime tables of approved type. The buildings are roomy and substantial, everything being laid out in a most convenient yet compact manner. I understand that the works will be in running order about June next. The tramway is on a descending grade from the mine, and will be worked by gravity in bringing down the ore; whilst for the present the trucks will be returned to the mine by horse power. The immense bodies of quartz which are exposed by the workings at the mine, are of increasing size as greater depth is attained, and would appear to be more heavily mineralized. Several careful samplings of the ore body thus far exposed have been made during the past summer, as the work progressed, which are stated to have furnished favourable results.

"It is understood that the company contemplates working the mine on a much larger scale, with a 250-ton plant, when the present plant shall have proved itself an established success in dealing with the ores from the mine.

"A force of about forty-five men has been engaged in connection with this mine during the past season.

"It is hardly necessary to point out the vast importance of this undertaking, and the results which would follow its success, when it is stated that the lead extends for several miles and is covered by claims owned by this company and others, and that there are many outcrops on it, which are stated to be similar on the surface to those on the Thunder hill claim.

"No important advance has been made at the Copper claims on *Windermere mountain.*

"The *Canal claim* on the east side of Columbia lake, about opposite Thunder hill, alluded to in last report as having been sold for $3,000

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cash, has received but little work this year, the attention of the owners being taken up with their other ventures in the district.

"*Hughes Range.*—A number of discoveries have been made in the Hughes range of the Rockies, on the eastern side of the Kootenay river. A lead of large size runs along this first range, and has been traced almost continuously for about ten miles in the Cambrian slate formation, which as described in the report for 1890, crosses the valley from the Selkirk or western side of the Columbia lakes, into the Rockies, forming the front range along tbe eastern side of the Kootenay valley. Portions of this lead are found to be almost barren quartz, whilst in other places it is found mineralized with gray and antimonial copper ores, containing both silver and gold. A sample of gray copper from the lead near where it cuts *Rock creek*, assayed 119 oz. in silver, $9.27 gold, and 29·45% copper.

"Claims have been staked almost continuously along this lead for over five or six miles. The lead varies in width from two feet to twenty feet. A small amount of work done on one of the claims north of Rock creek did not give favourable results.

"It would be premature to estimate the importance of these discoveries, as but little work has yet been done anywhere on the lead.

"*Lost Creek.*—Some work done on this creek has led to the discovery of a vein of larger size than those heretofore found on what is known as the '*Dibble*' claim. It is proposed to make a shipment early next season.

"*North Star Mine.*—During the past summer a most important discovery of an immense body of 'steel' galena was made near *St. Mary's river*, about twenty miles north-west of Fort Steele. The lode occurs on the eastern slope, near the ridge of a mountain, or butte, about 2,000 feet above the river, in the foot-hill range of the Selkirks, near the extreme western end of the St. Mary's prairie. The mountains in this locality show but little exposed rock, being generally covered with several feet of wash and soil, and are to a great extent timbered. The lode is covered with six or eight feet of wash material. Its trend, as evidenced by the portion which has been uncovered, and by the float and boulders of iron ore and galena on the surface, appears to be north and south. The discoverers commenced by making a cross-cut in an easterly and westerly direction, at a place where a quantity of boulders and nodules of ore lay on the surface. After sinking through six or eight feet of wash material and decomposed mineral they bared and sunk into an immense body of pure 'steel' galena, showing no gangue whatever, and being perfectly solid, without the

least sign of cracks or displacement, measuring twenty-three feet across, no distinct wall being discoverable at this stage. On the eastern side, decomposed lead matter is found, seven or eight feet in width, consisting of lead carbonates, iron and antimony, making the total width of the lead, or deposit, about thirty feet at this place. Since the date of my examination of the discovery, I am informed that a shaft, thirty-six feet in depth, has been sunk in the soft portion of the lead mentioned above, and to that depth no change in character of the ore body had taken place; the wall, found to be the foot wall, was more defined, and was dipping to the west. The hanging wall has, apparently, not yet been uncovered. The country rock, where cropping to the east of the lead, is siliceous in character, carrying little if any carbonate of lime, and would probably be termed quartzite. The foot wall of the lead where recently bared in the shaft is, however, stated to be limestone. It is also stated that outcrops of granitic dykes exist to the west of the lead. I did not, however, see any of the outcrops, nor would the greenstone float, found in the locality, appear to be of local origin. Iron outcrops occur at various places on the mountain, which may possibly be cappings to deposits of galena.

"A sampling of the galena body, taken from the open cut, gave the following assay results: Silver, 47·31 oz.; gold, nil lead, 67·50%; iron, 6·63%; zinc, 1·90%.

"It would be premature to make any statements as to the precise character and permanence of this lode, or in what degree the portion so far uncovered represents the permanent width.

"Towards the end of September last the discoverers, Messrs. Bourgeois and Langill, bonded the property to Messrs. Woods Bros., of Quebec, who have since transfered four-fifths of their interest to Mr. D. D. Mann, of Montreal. The bond expires on the 1st July next. The development of the property is now being prosecuted under the superintendence of Mr. Leslie Hill, M.E. I am informed that it is intended to continue sinking the present shaft to a depth of 100 feet, and to cross-cut westward to the west wall of the lead without delay.

"With regard to the future exploitation of this mine, it may be assumed that at first shipments of the ore would be made via Kootenay river and Jennings on the Great Northern railway, to smelters in the United States. It might, if favourable terms are obtained, for a time be shipped north to the smelter at Golden, as the duty would thus be saved, as a set-off against the extra freight in reaching a market. It is, however, manifest that before long, if the mine realizes expectations, it must be opened up on a very large scale, the ore being smelted on

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the spot. The natural outlet for the bullion would probably be to the States, or to the English market, shipped through the States in bond.

"Timber suitable for a supply of charcoal for smelting would be available in the locality for some years, but coke, manufactured from the Crow's Nest coal, will ultimately have to be relied on. It is a matter for congratulation that this property has, at such an early stage, got into the hands of men with sufficient capital to do it justice.

"*East Kootenay, North of the C.P.R.*—As mentioned in former reports, the portion of the district north of Donald has not yet received much attention from the prospector, owing principally to difficulty of access, from want of practicable trails beyond Bush river.

"There are no new developments to report from the Ottertail and Field locations.

"Some trials were made at Golden by an agent of the Gold Recovery Syndicate of Glasgow, to test the suitableness of the McArthur-Forrest, or cyanide, process for the extraction of the precious metals from the ores of the district. The process was found eminently successful as regards gold ores. The silver extraction was not attended with such good results. Ores containing even a small percentage of copper cannot, at present, be successfully treated by this process.

"There were 295 free miners' certificates issued, and 134 mineral claims recorded in the district during the year 1892."

Lillooet.

Lillooet (Mr. Soues's Report).

"The total yield of gold for the year (ascertained from reliable sources only) is $39,763.

"This return, as compared with that of last year shows a decrease of upwards of $12,000.

"I regret that I have to report the mining industry during the year at lower ebb than any time during the past decade. Miners—principally Chinese—have deserted the district; there have not been any new discoveries, and prospecting has been entirely neglected.

"Mr. Phair, Mining Recorder at *Lillooet*, reports to me to date: "I regret to say the gold taken out of this part of the district for 1892 is about $15,000 less than for the previous year.

"The desultory mining on the *Fraser river* by Chinese has almost ceased, and they have nearly all left the district.

"The *Vancouver Company*, on Cayoosh creek, have completed their tunnel for hydraulic mining, costing $25,000, and will commence active work as soon as the season opens.

"The *Lillooet Hydraulic Mining Company's* claim, employing five men, has yielded about the same as the previous year, viz., $6,000. This company have again had the misfortune of losing their dam on the South Fork of Bridge river. It is a serious loss, the company having expended $11,000 in its construction without the slightest benefit. They intend to replace it next year, having found excellent prospects. PRECIOUS METALS. Discovery and development in British Columbia. Gold and Silver.

"On account of the want of water, very little mining has been done on the *North American hydraulic* claim in the past year.

"The *Victor Hydraulic Mining Company*, on Cadwallader creek, have finished their ditch and placed on the ground a good hydraulic outfit. Mr. Jensen, the manager, informed me that he worked it for about a month, and found good pay.

"The *Mina Company*, on Tyaughton creek, have worked during the season with good results.

"The work done on mineral claims on *Cayoosh creek* has been almost nil.

"Leases for hydraulic mining purposes have been issued to sixteen different parties in this district, from which, so far, there are no returns, other than those referred to by Mr. Phair.

"*Quartz.*—In this class of mining I have nothing to report. No new discoveries; no locations during the year; and, with the exception of two or three claims on the *North Thompson*, there has been practically no work done on any of the mineral claims in this district in the past year."

Yale—(Mr. Tunstall's Report).

Yale.

Kamloops Division.—Besides giving information relating to coal, iron, copper and mercury deposits, Mr. Tunstall furnishes the following notes as to the precious metals:—

"Four applications for leases of bench lands, situated on the west bank of *Tranquille river*, have been lately filed at this office, for a term of five years. Some good prospects were obtained on a bench forty or fifty yards from the river. The gold was found on the surface, but the lateness of the season precluded the possibility of ascertaining whether it exists in the gravel at any depth.

"On *Six-Mile creek*, a tributary of Salmon river, thirteen mineral locations have been made on an argentiferous lode, stated to be from fifty to one hundred feet wide. Little or no work has been done on any of them, and the assays indicate that the vein is of a very low grade.

PRECIOUS METALS.

* * * *

Discovery and development in British Columbia.

Gold and Silver.

"In the reports of the mining recorders for the Similkameen and Yale divisions, you will notice the progress made in the application of hydraulic mining to the alluvial benches of the *Tulameen* and *Fraser rivers*. Operations were begun on the Tulameen last summer, but not sufficient progress was made to prove the value of the ground for the gold and platinum deposits. This next season will afford a more satisfactory and conclusive test.

"These metals were found in considerable quantities in the present bed of the river, which was mined in 1861 and succeeding years, and every indication points to their existence in the ancient channel at one time occupied by the stream.

"The number of applications granted, and still in abeyance, for leases of mining ground on the Fraser river conveys but a limited idea of the extent of country capable of being worked. This river offers a wide field for the investment of capital, assisted with good management and economy.

"Messrs. deWolf, Munro, Tatlow, and others intend to consolidate their interests, and operate their locations on a scale only equalled by the most extensive companies in California and Nevada.

"Work on the other leases will be commenced in the spring, and many localities which have been abandoned since the early days of gold mining, when the bars were mined by means of rockers and sluices, will become once more remunerative under the changed condition of affairs."

Yale division.

Yale—Yale Division—(Mr. Dodd's Report).

"The desultory mining by the Chinese in this division has declined very much, and more interest has been taken by white prospectors. Numerous placer and mineral claims have been located by capitalists of both this province and the state of Washington this year, and in some instances considerable money has been expended in development. The extensive undertaking of placer mining at Lytton has been the feature of the year; however, following is the year's record in detail.

Placer mining.

"*Placer—Siwash Creek.*—There are three placer claims being worked, one is that of the *Siwash Creek Syndicate*, which have leased four and a half miles, from the mouth of the creek up stream. This company has expended about $9,000 in laying a substantial bed-rock flume of about 600 feet, sluicing to a depth of twenty-two feet, with the intention of further extending their flume. Some good work has been accomplished, although pay gravel has not yet rewarded the efforts made.

PRECIOUS METALS.

Discovery and development in British Columbia.

Gold and Silver.

Quartz mining.

"*Rodney & Co.* have done a great deal of sluicing this year, but without reaching bed-rock. They have laid about 400 feet of flume on their claim.

"*Roddick & Co.* have sluiced considerably too, with encouraging prospects.

"*Quartz.*—The assessment work done by *Dunn & Co.* on the *Montrose* and *Montrose Extension* has rewarded them with fair prospects in free milling ore, carrying both gold and silver.

"The *Gold Queen Mining Company*, composed of Whatcom capitalists has expended about $4,000 in developing their several locations. Reports made by this company state that traces of platinum have been found. This is a quartz ledge of about twelve feet wide, and the principal work has been tunnelling and running cross-cuts, and it is now the intention of this company to erect a small Huntington quartz mill to thoroughly test their locations early in the season.

"*Vautier, Stenger & Co.* have done a great deal of development work, and purpose doing more.

"The *Yale Mining Company* have found very encouraging prospects from their claims. Assays from the rock have been made, showing gold running from $20 to $98 per ton.

"*Placer—North Bend.—Stewart & Co.*, of Tacoma, have applied for two placer mining leases, with the intention of pushing work vigorously in the spring.

"*Boston Bar.*—Four mining leases have been applied for by parties in Ottawa and Seattle ; doubtless operations will be commenced when the spring opens.

"*Lytton.*—The *Van Winkle Bar Hydraulic Company*, of Vancouver, has spent $17,000 in labour, machinery, steel pipes, and other material in opening of their extensive placer area. It comprises about 800 acres. They have laid about 3,000 feet of steel pipes, varying from 16 to 18 inches, together with all other modern improvements, under the superintendence of Mr. J. L. Holland, an experienced Californian, highly recommended to successfully carry on the work, with every hope of making handsome returns for the shareholders in the approaching season.

"*Dougherty & Co.* have applied for a lease at the mouth of the Thompson river, and have sunk several prospect shafts, finding good indications of pay dirt.

"In concluding this report, I am pleased to say that my returns from free miners' certificates and mining receipts have increased from $872.50, in 1891, to $1,440.75, in 1892.

PRECIOUS METALS.
Discovery and development in British Columbia.

"I wish also further to state that the expenditure by the government of $500 on the trail leading to Siwash creek has been highly appreciated by the miners."

Gold and Silver.

Yale—Okanagan Division—(Mr. Lumbey's Report).

Okanagan division.

"A very little mining has been done throughout the northern part of the district. On the east side of *Swan lake* seventeen quartz claims have been located, and six on *Harris creek*, but at present only a little prospecting has been done on them.

"*Cherry Creek.*—There are five whites and six Chinese working, the latter making about $2 per diem. The *Cherry Creek Mining Company* have run their main tunnel a distance of 1,500 feet, but have not yet bottomed the channel.

"*Siwash Creek.*—Very little mining has been done this year, and not more than $1,200 taken out.

"In the *Rock creek mining division* the yield of gold derived from placer mining amounted to $5,800. The gold was taken from *Rock creek* and *Boundary creek*. The workings of the *Laura Hydraulic Company* yielded about $1,800. The company could work only three months, owing to scarcity of water.

"*Fairview Camp.*—Work has been carried on in this camp during the past summer with more energy than formerly. English and American capital has been largely invested, and a number of claims have changed hands at prices ranging from $3,000 to $25,000. A five stamp quartz mill was erected by the *Rattler Company* on their mill site last winter, and tests made from the ore from a number of claims, notably, the *Brown Bear*, *Stem-winder*, *Wyn M.*, *Silver Crown*, *Morning Star*, *Wide West*, *Joe Dandy*, and *Rattler*, milled from $8 to $50 per ton in free gold.

"Mr. E. D. Reynolds, who represents an English syndicate, has invested largely, and has already done considerable development work on his property, and intends erecting extensive mining works at or near the mines. He has twenty hands employed, which force will be largely increased on the arrival of Mr. Attwood, engineer of the company.

"Work is being prosecuted on a number of other claims with greater energy, the possibility of disposing of them being an incentive.

"*Osoyoos.*—A number of locations have been made during the summer on the mountain about three miles west of the lake, but sufficient work has not been done to determine the value of the claims.

PRECIOUS METALS.

Discovery and development in British Columbia.

Gold and Silver.

"*Keremeos.*—Several small, but rich, ledges have been located on *Keremeos* and *Indian creek*, the owners doing merely enough work to represent their claims.

"*Camp McKinney.*—Nothing more than assessment work has been done in this camp during the season. Crown grants have been obtained for a number of the principal claims, and the owners are awaiting the construction of a wagon road across the mountain to *Kettle river*, when machinery can be brought into the camp and work commenced at once.

"*Boundary Creek.*—This section of country has been extensively prospected, and a number of promising locations have been recorded. At *Central camp*, Messrs. White and Palmerston have been actively engaged on their claims, and have employed on an average six men since the spring. On the *City of Paris*, they have sunk two shafts, No. 1 to a depth of fifty-five feet, at the bottom running a drift twenty-five feet on the ledge; No. 2 down twenty-five feet, and a drift of twenty-five feet. On the *Lincoln* an open cut has been run on the ledge for a distance of one hundred feet, and fifteen feet deep, also a shaft sunk fifty feet at the bottom of the cut. No. 2 shaft is down eighteen feet, with a drift at bottom of shaft of ten feet. The ore from these claims is a high grade copper sulphide, carrying gold and silver, an average of the ore from the bottom of the shaft assaying as high as $700 to the ton.

"On the *No. 7*, *Big 4*, and *Lone Star*, the property of Messrs. Attwood, Lefevre and Schofield, a considerable amount of development has been done. The No. 7 is bonded for $20,000 to American capitalists.

"Mr. John Douglas, who represents a New York syndicate, has secured a number of claims in this camp, and has expended a large sum in developing. On the *New York*, a forty-foot shaft has been sunk, and a drift of eighty feet from the bottom has been run. On the *Mabel* three shafts have been sunk on the ledge, forty, twenty and eighty feet, respectively, and a number of surface cross-cuts have been run. On the *Oro* a shaft is down forty feet, and Mr. Douglas has erected on this claim a substantial dwelling house and assaying office, which is fitted with all requirements for general assaying.

"The *Spokane and Great Northern Mining Company* have a number of very promising locations in the vicinity of this camp, on which they have expended during the summer nearly $400, and have also erected a small stamp mill at the falls on Boundary creek, for the purpose of testing their ore.

PRECIOUS METALS.

Discovery and development in British Columbia.

Gold and Silver.

"The claims further up the creek have not been developed to any extent, beyond assessment work. Some very promising prospects at *Deadwood*, *Greenwood* and *Summit camps* are attracting considerable attention, and if the ventures at *Central Camp* and *Boundary Falls* prove successful, I understand that capital will be forthcoming for their development.

"In the *Rock creek* mining division 312 free miners' certificates have been issued from January 1st to date, and the following records entered, viz :—

Mineral claims	225
Assessment certificates	96
Transfers	140
Placer claims	5
Transfers of placer claims	1

Similkameen.

Yale—Similkameen Division—(Mr. Hunter's Report.)

"The yield of gold remains about the same as last year, and the yield of platinum has decreased, principally owing to the low price offered for it.

"On *Granite creek* very little work has been done this season and consequently the yield of gold has been small.

"On *Newton creek* four men have been working and obtained good wages. A considerable number of Indians were engaged in mining on this creek.

"On *Slate creek* very little has been done, owing to the ground being deep and the want of sufficient capital.

"On *Boulder creek* one Chinese company has been working and obtained fair wages.

"On the upper portion of the *Tulameen river* five companies of Chinese have been working, but as far as I can learn they made very small wages.

"The *Tulameen Improvement and Hydraulic Company's* ground situate on this portion of the river, has been prospected this season, but with what results I am unable to learn. They obtained a lay-over in October, pending a transfer of their property to an English company.

"Considerable work has been done on the lower end of the *Tulameen river*, and good results have been obtained. The *Ah Jack Company* of four Chinese, washed up six hundred dollars in one week, and made good wages during the season.

"On the *Similkameen* mining has been brisk, but the yield was small. PRECIOUS METALS.

"On *Whipsaw creek*, a tributary of the South Fork of the Similkameen, one company obtained a lease of one mile and a half. They have done considerable work on it, and will be ready to start sluicing early next season. Discovery and development in British Columbia. Gold and Silver.

"On the *Allison bench* at Princeton very little work has been done on account of the scarcity of labour.

"Considerable prospecting has been done this year in quartz, but owing to the country being so thickly covered with brush and timber the work has been slow and tedious. Quantities of float have been found, but no new discoveries have been brought under my notice so far.

"The *Victoria Copper Co.*, on Friday creek, a tributary of the South Fork of the Similkameen river, are still prospecting their claims. The tunnel is 142 feet.

"The *Roany* and the *Spur* mineral claims, situate on the Tulameen river, below Granite creek, are being opened up by the owners, but I am not in a position at present to say more about them.

"On the *Nevada* and *Bonanza Queen* mineral claims, situate on the Tulameen, about fifteen miles above Granite creek, the owners have satisfied themselves with merely performing the necessary work to hold their locations."

PYRITES.

PYRITES.

PRODUCTION.

Production.

According to returns received there were 59,770 tons of pyrites produced during 1892, representing a value of $179,310. The figures for last year were 67,731 tons, valued at $203,193, so that there was a slight falling off.

This was all used in making acid and does not include other metallic sulphurets mined in Canada, but whose sulphur contents were not utilized. As the ore carries from 36 to 40 per cent of sulphur the above mentioned pyrites would represent about 26,000 tons of that element.

EXPORTS AND IMPORTS.

Exports and imports.

An inspection of the following table will show the home market for crude sulphur with which material the sulphur ores of the country must compete :—

PYRITES.

Exports and imports.

PYRITES.

TABLE 1.

IMPORTS: BRIMSTONE OR CRUDE SULPHUR.

Fiscal Year.	Pounds.	Value.
1880	1,775,489	$27,401
1881	2,118,720	33,956
1882	2,375,821	40,329
1883	2,336.085	36,737
1884	2,195,735	37,463
1885	2,248,986	35,043
1886	2,922,043	43,651
1887	3,103,644	38,750
1888	2,048,812	25,318
1889	2,427,510	34,006
1890	4,440.799	44,276
1891	3,601,748	46,351
1892	4,769,759	67,095

Discovery and development. Quebec.

DISCOVERY AND DEVELOPMENT.

QUEBEC.

The whole of the pyrites represented by the figures given above is the product of the Capelton group of mines near Sherbrooke, which have already been spoken of under the heading of copper both in this and previous reports.

Only about 15 per cent of the above amount is utilized in Canada, the rest being shipped to acid works in the United States.

Ontario.

ONTARIO.

No pyrites deposits are at present worked in this province, but the addition made to the plant of the Brodie Chemical and Superphosphate works at Smith's Falls of a furnace for pyrites burning is an interesting feature. These works formerly used only imported sulphur, but with the change made they are now able to use either that or pyrites for making their acid.

SALT.

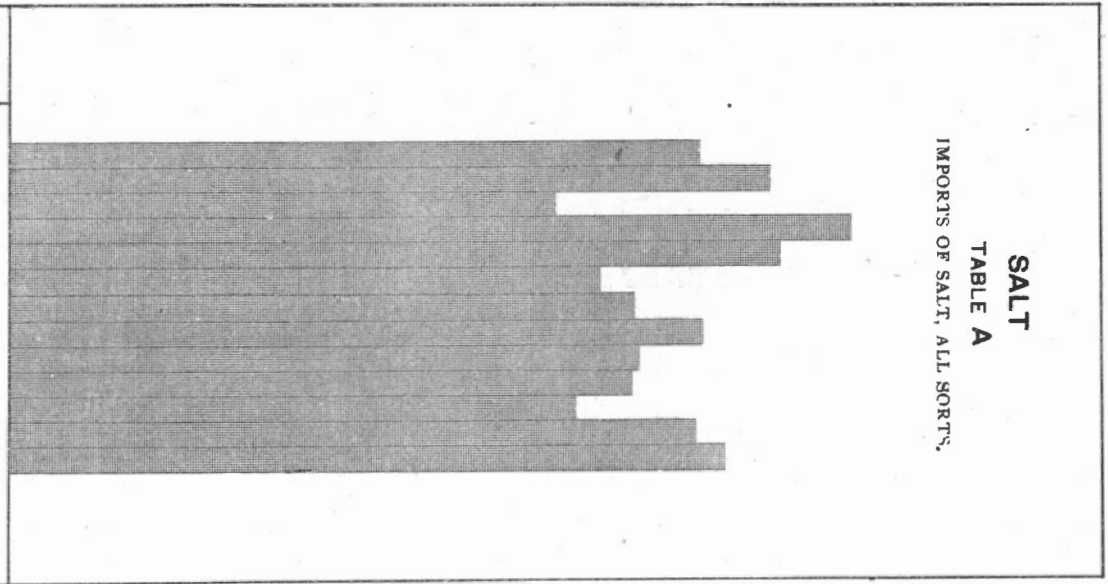
SALT.

Production.

PRODUCTION.

The production of salt for 1892 was 45,486 tons valued at $162,041, which figures on comparison are found to be almost identical with those of last year. The figures below give the production for the past

Fiscal Year	Tons
1880	106,720
1881	117,115
1882	84,932
1883	129,442
1884	119,081
1885	90,984
1886	96,236
1887	106,728
1888	97,338
1889	96,019
1890	86,813
1891	105,316
1892	110,240



SALT
TABLE A
IMPORTS OF SALT, ALL SORTS.

years from which a comparison can be made with the present condition of the industry. SALT.

1886	62,359 tons,	valued at	$227,195
1887	60,173 "	"	166,394
1888	59,070 "	"	185,460
1889	32,832 "	"	128,547
1890	43,754 "	"	198,897

EXPORTS AND IMPORTS.

Exports and imports.

The following tables, Nos. 1, 2 and 3, with graphic table A, give details of the exports and imports :—

SALT.

TABLE 1.

EXPORTS.

Year.	Bushels.	Value.
1880	467,641	$46,211
1881	343,208	44,627
1882	181,758	18,350
1883	199,733	19,492
1884	167,029	15,291
1885	246,794	18,756
1886	224,943	16,886
1887	154,045	11,526
1888	15,251	3,987
1889	8,557	2,390
1890	6,605	1,667
1891	5,290	1,277
1892	2,000	504

SALT.

TABLE 2.

IMPORTS: SALT PAYING DUTY.

Fiscal Year.	Pounds.	Value.
1880	726,640	$ 3,916
1881	2,588,465	6,355
1882	3,679,415	12,318
1883	12,136,968	36,223
1884	12,770,950	38,949
1885	10,397,761	31,726
1886	12,266,021	39,181
1887	10,413,258	35,670
1888	10,509,799	32,136
1889	11,190,088	38,968
1890	15,135,109	57,549
1891	15,140,827	59,311
1892	18,648,191	65,963

SALT.

SALT.

TABLE 3.

IMPORTS: SALT NOT PAYING DUTY.

Fiscal Year.	Pounds.	Value.
1880	212,714,747	$400,167
1881	231,640,610	488,278
1882	166,183,962	311,489
1883	246,747,113	386,144
1884	225,390,121	321,243
1885	171,571,209	255,719
1886	180,205,949	255,359
1887	203,042,332	285,455
1888	184,166,986	220,975
1889	180,847,800	253,009
1890	158,490,075	252,291
1891	195,491,410	321,239
1892	201,831,217	314,995

Discovery and development.

DISCOVERY AND DEVELOPMENT.

The greater proportion of the above production is to be credited as in former years to the province of Ontario, a small amount only being produced in New Brunswick. Most of the producers in Ontario worked this year as members of the Canada Salt Association.

Regarding boring for salt in the Ontario district, Mr. Brumell makes the following statement :—

Mooretown.

"Two wells were begun in Lambton county during the year, one of which was successfully carried through to the salt-bed which was found at 1,643 feet and penetrated fifty feet. This well was sunk for Messrs. Brown and Armstrong at Mooretown, the driller being Major John Savage of Petrolea, to whom we are indebted for the following record :—

	Feet.
Clay and hardpan	145
Black and gray shale	355
Limestone	40
Shale with limestone	235
Limestone	250
Gypsum	65
Limestone and dolomite	210
Salt	3
"Sandstone" (?)	30
Limestone or dolomite (gas)	187
Dolomite	73
Gypsum, red shale and salt	42
"Black rock"	8
Salt	50
Total depth	1,693

"The boring finished in salt which is of good quality, salt water was encountered at 868 feet and mineral water with gas at 1,125 feet. A small flow of gas was also found at 1,420 feet. Casing was carried to a depth of 902 feet. SALT. Discovery and development.

"The well is located on the east side of the road, about sixty feet from the St. Clair river, the water from which will be used in the production of brine.

"The second well spoken of above was being sunk by Messrs. Webster Brothers, and is located about one-quarter of a mile to the north of that just described. Boring operations, at the time of my visit to the district, were at a standstill owing to the tools having become stuck at a depth of 900 feet.

"In Essex county, at the Canadian Pacific Railway station in Windsor, a well was begun on the 28th July and finished 1st December, when it had been carried to a depth of 1,272 feet. No record of the rocks traversed is at hand, the only data available being the following, supplied by the driller, Mr. John J. Mason of Bay City, Mich. Windsor.

"The surface deposits measured 128 feet in thickness and in the first rock at a depth of 142 feet from the surface a small show of oil is said to have been found; no gas was noted. Sulphurous water was struck at 350 and 480 feet, and at 1,125 feet a small quantity of salt water was found. Casing was carried to a depth of 685 feet. The first salt bed was found at 1,127 feet and consisted of forty feet of solid salt, while the second bed was struck at 1,188 feet or twenty-one feet below the first. This was penetrated for seventy-nine feet, the boring ceasing in salt."

STRUCTURAL MATERIALS.

STRUCTURAL MATERIALS.

Building Stone.—During the year 1892 the value of the production of building stone fell off considerably, the output being 219,747 cubic yards, valued at $609,827, which shows a decrease in value of $98,909, while there was an increase in quantity of 32,062 cubic yards. The comparatively low price obtained during the year is accounted for by the fact that there were large quantities of low priced stone and much less high-priced building stone used than in former years, as a result of this many of the quarries producing a finer quality of sandstone and large dimension stone were closed down for a greater part of the year. Building stone.

STRUCTURAL MATERIALS.

The production, by provinces, during the year, as reported to this office, was as follows :—

STRUCTURAL MATERIALS.

TABLE 1.

PRODUCTION OF BUILDING STONE.

Province.	No. of Returns.	Cub. Yds.	Value.
Ontario	48	147,264	$378,574
Quebec	19	43,412	150,926
Nova Scotia	18	9,534	25,460
New Brunswick	6	2,024	12,481
Prince Edward Island	1	280	336
Manitoba	6	14,353	34,700
North-west Territories	3	2,400	2,800
British Columbia	1	480	4,550
Totals	102	219,747	$609,827

The production during the past six years, compiled from direct returns made to this office, was as follows :—

1886	165,777	cubic yards, valued at	$642,509
1887	262,592	" "	552,267
1888	411,570	" "	641,712
1889	341,337	" "	913,691
1890	382,563	" "	964,783
1891	187,685	" "	708,736

It must, however, be borne in mind that these amounts are not complete, as it has been found impossible to obtain returns from all the many small quarries opened for local use. They represent, however, about four-fifths of the total production.

The following tables are of exports and imports and explain themselves :—

Exports and imports.

STRUCTURAL MATERIALS.

TABLE 2.

EXPORTS OF STONE AND MARBLE, WROUGHT AND UNWROUGHT.

Province.	Wrought.		Unwrought.	
	1891.	1892.	1891.	1892.
Ontario	$ 1,804	$ 19	$23,311	$18,365
Quebec	.....	1,660	.....	2,010
Nova Scotia	300	208	12,793	15,485
New Brunswick	9,105	5,811	9,323	11,275
British Columbia	2,189	.....	735	289
Totals	$13,398	$7,698	$46,162	$47,424

STRUCTURAL MATERIALS.

STRUCTURAL MATERIALS.

Exports and imports.

TABLE 3.

IMPORTS OF BUILDING STONE.

Fiscal Year.	Value.
1880	$ 35,970
1881	58,149
1882	33,623
1883	35,061
1884	51,088
1885	30,491
1886	41,675
1887	54,368
1888	86,373
1889	100,314
1890	132,155
1891	170,890
1892	95,550

STRUCTURAL MATERIALS.

TABLE 4.

IMPORTS OF MANUFACTURES OF STONE OR GRANITE, N.E.S.

Fiscal Year.	Value.
1880	$29,408
1881	36,877
1882	37,267
1883	45,636
1884	45,290
1885	39,867
1886	41,984
1887	41,829
1888	47,487
1889	61,341
1890	84,396
1891	61,051
1892	39,479

As may be seen on reference to the foregoing tables, there was an approximate market in Canada for building stone as follows:

Production	$609,827	
Imports, building stone	95,550	
Imports, stone and granite	39,497	
		$744,874
Less—Exports wrought stone	7,698	
" unwrought stone	47,424	
		55,122
		$689,752

STRUCTURAL MATERIALS.

Marble.

Marble.—The production of marble during the past year is altogether that of Ontario and amounted to 340 tons, valued at $3,600, an increase over the previous year of 100 tons and $1,848.

During the previous six years the production was as follows :—

1886	501 tons,	valued at	$9,900
1887	242 "	"	6,224
1888	191 "	"	3,100
1889	83 "	"	980
1890	780 "	"	10,776
1891	240 "	"	1,752

In the following table will be found the imports since 1880 :—

STRUCTURAL MATERIALS.

TABLE 5.

Imports.

IMPORTS OF MARBLE.

Fiscal Year.	Value.
1880	$ 63,015
1881	85,977
1882	109,505
1883	128,520
1884	108,771
1885	102,835
1886	117,752
1887	104,250
1888	94,681
1889	118,421
1890	99,353
1891	107,661
1892	106,268

Regarding operations in Cape Breton, N.S., where there are extensive crystalline limestone beds, Mr. H. P. Brumell reports as follows :—

Marble Mountain, N.S.

" *Marble Mountain, Inverness County, N.S.*—The Bras d'Or Marble Company own and intend operating a property immediately to the north of the Bras d'Or Lime Company's property on the west side of West Bay, Bras d'Or lake.

" The measures naturally exposed and those uncovered by trenching and stripping consist of alternate bands of different thicknesses of white to dark gray, dark and light blue, yellow, pink and green crystalline limestones, very free from pyrites and mud spots, the whole striking east and west and dipping vertically. Small quantities only have been shipped and polished as samples. No regular work has yet been undertaken in the matter of quarrying though the company have on the ground a full equipment for operations on a small scale. The plant and material available consist of one channelling

machine, one set of gang saws, and material for the construction of a mill." STRUCTURAL MATERIALS.

Granite.—The production of granite during the year was 24,302 tons, valued at $89,326, showing an increase over the year previous of 10,665 tons, valued at $19,270. Granite.

By provinces the production was as follows :—

Ontario	2,642	tons, valued at	$ 4,951
Quebec	7,324	" "	29,775
Nova Scotia	4,235	" "	27,600
New Brunswick	2,800	" "	16,900
British Columbia	7,301	" "	10,100

During the past six years the annual production was as follows :—

1886	6,062	tons, valued at	$ 63,309
1887	21,217	" "	142,506
1888	21,352	" "	147,305
1889	10,197	" "	79,624
1890	13,307	" "	65,985
1891	13,637	" "	70,056

Slate.—During the year there was a production of slate of 5,180 tons, valued at $69,070, an increase over that of last year owing to the opening of several new quarries. This production is that of British Columbia and Quebec, wherein operations were carried on by several companies. A considerable amount of development work was done in the province of Quebec from which, during next year, an increased production may be looked for. Slate.

The figures of exports and imports during past years are given below and explain themselves :—

STRUCTURAL MATERIALS.

TABLE 6.

EXPORTS OF SLATE.

Year.	Tons.	Value.
1884	539	$6,845
1885	346	5,274
1886	34	495
1887	27	373
1888	22	475
1889	26	3,303
1890	12	153
1891	15	195
1892	87	2,038

STRUCTURAL MATERIALS.

Imports.

STRUCTURAL MATERIALS.

TABLE 7.

IMPORTS OF SLATE.

Fiscal Year.	Value.
1880	$21,431
1881	22,184
1882	24,543
1883	24,968
1884	28,816
1885	28,169
1886	27,852
1887	27,845
1888	23,151
1889	41,370
1890	22,871
1891	46,104
1892	50,441

Flagstones.

Flagstones.—The production of flagstones for 1892 amounted to 13,700 square feet, valued at $1,869, a decrease compared with the previous year of 13,600 square feet and in value of $852. This production is altogether that of Quebec, in the vicinity of Dudswell, and of Cape Breton, in Nova Scotia. It is, however, known that a certain quantity was produced in Ontario although no returns were received from that province.

During the past six years the annual production has been as follows :—

1886	70,000	feet,	valued at	$ 7,895
1887	116,000	"	"	11,600
1888	64,800	"	"	6,580
1889	14,000	"	"	1,400
1890	17,865	"	"	1,643
1891	27,300	"	"	2,721

No exports of flagstones are reported; the imports are given in the following table :— Structural Materials.

Structural Materials.

Table 8.

Imports of Flagstones. Imports.

Fiscal Year.	Tons.	Value.
1881	23	$ 241
1882	90	848
1883	10	99
1884	137	1,158
1885	205	1,756
1886	1,602	9,443
1887	1,316	10,966
1888	2,642	21,077
1889	1,669	15,451
1890	5,665	48,995
1891	3,770	36,348
1892	1,571	15,048

Cement.—During the year there was a production of cement of 107,408 barrels valued at $147,663, an increase over the previous year of 13,935 brls. and $39,102. This production is that of twelve operators, all of the provinces of Quebec and Ontario, wherein the greater part of the output was consumed. The Portland cement manufactured in Canada is to a large extent replacing that of foreign make, as may be seen in reference to table 11 following. Cement.

During the past five years the annual production was as follows :—

1887	69,843	barrels, valued at	$ 81,909
1888	50,668	" "	35,593
1889	90,474	" "	69,790
1890	102,216	" "	92,405
1891	93,473	" "	108,561

In 1892 the production of both natural and Portland cement was :—

Natural cement	88,187	barrels, valued at	$99,912
Portland "	29,221	" "	52,751

Of the state of the industry but little can be said beyond the fact that there was a very considerable growth in the production of Portland cement, of which a large quantity now enters into the home market.

STRUCTURAL MATERIALS.

The following tables illustrate the imports of building cements of all kinds; the exports will be found grouped with those of lime.

STRUCTURAL MATERIALS.

TABLE 9.

Imports.

IMPORTS OF CEMENT IN BULK OR BAGS.

Fiscal Year.	Bushels.	Value.
1880	65	$ 28
1881	579	298
1882	386	86
1883	1,759	548
1884	4,626	1,236
1885	4,598	1,315
1886	6,808	1,851
1887	5,421	1,419
1888	23,919	5,787
1889	32,818	10,668
1890	21,055	5,443
1891	11,281	2,890
1892	14,351	3,394

STRUCTURAL MATERIALS.

TABLE 10.

IMPORTS OF HYDRAULIC CEMENT.

Fiscal Year.	Barrels.	Value.
1880	10,034	$ 10,306
1881	7,812	7,821
1882	11,945	13,410
1883	11,659	13,755
1884	8,606	9,514
1885	5,613	5,396
1886	6,164	6,028
1887	6,160	8,784
1888	5,636	7,522
1889	5,835	7,467
1890	5,440	9,048
1891	3,515	6,152
1892	2,214	2,782

STRUCTURAL MATERIALS.

STRUCTURAL MATERIALS.

TABLE 11.

IMPORTS OF PORTLAND CEMENT.

Fiscal Year.	Barrels.	Value.
1880		$ 55,774
1881		45,646
1882		66,579
1883		102,537
1884		102,857
1885		111,521
1886		120,398
1887	102,750	148,054
1888	122,402	177,158
1889	122,273	179,406
1890	192,322	313,572
1891	183,728	304,648
1892	187,233	281,553

Roofing Cement.—Of roofing cement there was during the year a production of 800 tons, valued at $12,000, an increase in value over the previous year of $7,190. Roofing cement.

Lime.—There was a very marked increase in the production of lime during the past year, the quantity being 2,260,640 bushels, valued at $411,270. Full returns are not, however, possible to obtain, though all the largest and more important producers' outputs are included here. The production by provinces and the annual production for the past six years are given in the following tables:— Lime.

STRUCTURAL MATERIALS.

TABLE 12.

PRODUCTION OF LIME.

Province.	No. of Returns	Bushels.	Value.
Ontario	56	850,474	$110,156
Quebec	11	530,505	116,347
Nova Scotia	5	70,775	20,540
New Brunswick	12	491,050	98,359
Prince Edward Island	3	13,575	3,413
Manitoba	11	210,046	39,372
British Columbia	4	88,915	20,363
North-west Territories	3	5,300	2,720
Totals	105	2,260,640	$411,270

STRUCTURAL MATERIALS.

STRUCTURAL MATERIALS.

TABLE 13.

ANNUAL PRODUCTION OF LIME.

Year.	No. of Returns	Bushels.	Value.
1886	87	1,535,950	$283,755
1887	133	2,269,087	394,859
1888	93	2,216,764	339,951
1889	106	2,948,249	362,848
1890	93	2,501,079	412,308
1891	83	1,829,894	251,215

Exports and imports.

The exports of lime and cement and the imports of lime are given in the following tables:—

STRUCTURAL MATERIALS.

TABLE 14.

EXPORTS OF LIME AND CEMENT.

Province.	Lime and Cement.		1891.		1892.	
	1889.	1890.	Lime.	Cement.	Lime.	Cement.
Ontario	$ 12,877	$ 17,341	$ 19,390	$2,534	$ 19,383	$399
Quebec	71		25,446	283	26,586	539
Nova Scotia	11,017	17,137	15,387	64	644	
New Brunswick	135,222	130,180	59,318		74,912	
Prince Edward Isl'd	2	5	12			
Manitoba	2,060					
British Columbia		4,141	300		10	
Totals	$161,249	$168,804	$119,853	$2,881	$121,535	$938

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TABLE 15.

IMPORTS OF LIME.

Fiscal Year.	Barrels.	Value.
1880	6,100	$ 6,013
1881	5,796	4,177
1882	5,064	5,365
1883	7,623	9,224
1884	10,804	11,200
1885	12,072	11,503
1886	11,021	9,347
1887	10,835	8,524
1888	10,142	7,537
1889	13,079	9,363
1890	8,149	5,360
1891	6,259	4,273
1892	6,132	4,241

Regarding recent operations in Nova Scotia, Mr. H. P. Brumell reports as follows :—

Cape Breton County.

" *Marble Mountain.*"—" The Bras d'Or Lime Company have extensive works at Clark's cove, Marble mountain, West bay, where large quantities of a very superior quality of lime are annually produced. The works have a capacity of two hundred and forty barrels per day, with trams running from the three quarries opened by the company. The rock used in the manufacture of lime is a dark blue-gray banded crystalline limestone, which is found to make a much stronger and more lumpy material than the many lighter coloured varieties of limestone in the district. Marble Mountain, N.S.

" Shipments are made altogether by water, the works being located on the north-west side of West bay. During the summer months raw stone is shipped to Halifax where during the winter it is burnt for local supply and export.

" The works at West bay are probably the most complete and largest in Canada and consist of :

Two draw kilns ;

One saw-mill containing one 55 horse-power boiler, one 45 horse power engine, one circular saw, one cylinder saw, one head turner, one head cutter, two stave jointers, one bolter saw, one dowelling machine ;

One cooper shop ;

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One lime storehouse, three stories, 100 x 120 feet;
One store;
One manager's house, barns, sheds, etc.;
Three tenement houses;
One steam lighter."

Bricks.

Building Brick.—During the year, 1892, there was a production of building brick of 202,147 thousands, valued at $1,251,934, showing a marked increase over the production of the year previous, as may be seen on reference to the following figures of annual production during the past six years :—

1886	139,345 M	valued at $	873,600
1887	181,581 "	"	986,689
1888	165,818 "	"	1,036,746
1889	200,561 "	"	1,273,884
1890	211,727 "	"	1,266,982
1891	176,533 "	"	1,061,536

These figures, as also are those in the following tables, are not considered actually correct and are supposed to represent about four-fifths of the total production. The following table represents the production by provinces :—

STRUCTURAL MATERIALS.

TABLE 16.

PRODUCTION OF BRICKS DURING 1892.

Province.	No. of Returns.	Thousands.	Value.
Ontario	235	129,702	$778,212
Quebec	27	34,797	191,383
Nova Scotia	20	13,761	89,446
New Brunswick	8	4,649	32,543
Prince Edward Island	3	442	3,536
Manitoba	5	7,700	65,450
North-west Territories	6	2,375	24,937
British Columbia	7	8,721	66,427
Totals	311	202,147	$1,251,934

There was a small exportation of bricks during the year, as follows :—

Ontario	1,347 M	$ 8,784
Quebec	353 "	1,566
Nova Scotia	252 "	1,662
New Brunswick	10 "	170
Prince Edward Island	1 "	10
Total	1,963 M	$12,192

The imports since 1880 are shown in the following table :— Structural Materials.

Structural Materials.

Table 17.

Imports of Building Brick. Imports.

Fiscal Year.	Value.
1880	$ 2,067
1881	4,281
1882	24,572
1883	14,234
1884	20,258
1885	14,632
1886	5,929
1887	2,440
1888	20,720
1889	24,585
1890	12,500
1891	9,744
1892	5,075

Terra Cotta.—The value of terra cotta produced during 1892 was $97,239, a decrease in comparison with the year previous of $15,864. Terra Cotta.

Drain Tile.—The production of drain tiles during the year, according to returns made to this office, was 15,689 thousands, valued at $190,857, These figures are not, however, supposed to represent over two-thirds of the total production, which, owing to the scattered position of the works, it was found impossible to obtain. The following table illustrates the production by provinces :— Drain Tile.

Structural Materials.

Table 18.

Production of Tiles during 1892.

Province.	No. of Returns.	Thousands.	Value.
Ontario	106	15,303	$183,636
Quebec	1	63	756
Nova Scotia	3	61	915
New Brunswick	3	154	2,310
British Columbia	2	108	3,240
Totals	115	15,689	$190,857

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During the past six years the annual production was as follows :—

1886	12,416 M,	valued at	$142,617
1887	14,658 "	"	230,068
1888	7;518 "	"	114,057
1889	10,526 "	"	134,265
1890	10,521 "	"	140,877
1891	11,839 "	"	141,399

The imports, if any, are included with those of sewer pipes in the following table. No exports are reported.

Sewer Pipe.—The production of sewer pipe during 1892 was valued at $367,660, an increase over the year previous of $140,360. No further statistics beyond those of imports given below are available.

STRUCTURAL MATERIALS.

TABLE 19.

Imports.

IMPORTS OF DRAIN TILES AND SEWER PIPE.

Fiscal Year.	Value.
1880	$ 33,796
1881	37,368
1882	70,065
1883	70,699
1884	71,755
1885	69,589
1886	57,953
1887	71,203
1888	101,257
1889	83,215
1890	77,434
1891	87,195
1892	59,537

Pottery.

Pottery.—According to returns received at this office, there was a production during 1892 of pottery to the value of $265,811, an increase compared with the previous year of $6,967. The production by provinces is given as follows :—

Ontario	$ 91,160
Quebec	148,251
Nova Scotia	3,200
New Brunswick	18,000
Prince Edward Island	3,000
Manitoba	2,000
British Columbia	200
Total	$265,811

No exports, as such, are reported, the only trade statistics being those of imports given below :— Structural Materials.

Structural Materials.

Table 20.

Imports of Earthenware. Imports.

Fiscal Year.	Value.
1880	$322,333
1881	439,029
1882	646,734
1883	657,886
1884	544,586
1885	511,853
1886	599,269
1887	750,691
1888	697,082
1889	697,949
1890	695,206
1891	634,907
1892	748,810

Sand and Gravel.—No returns were asked for nor received bearing on the production of sand and gravel in Canada during the year 1892. The only statistics available are those of exports, as follows :— Sand and Gravel.

Structural Materials.

Table 21.

Exports of Sand and Gravel. Exports.

Province.	1891.		1892.	
	Tons.	Value.	Tons.	Value.
Ontario	243,294	$58,283	297,406	$84,311
Quebec			25	30
Nova Scotia	230	805	175	703
New Brunswick	200	400	150	150
Manitoba			72	42
British Columbia		13	50	93
Totals	243,724	$59,501	297,878	$85,329

STRUCTURAL MATERIALS.

TABLE 22.

EXPORTS OF SAND AND GRAVEL.

Year.	Tons.	Value.	Year.	Tons.	Value.
1877	11,998	$ 2,151	1885	110,661	$22,878
1878	50,140	8,381	1886	124,865	24,226
1879	46,999	9,438	1887	180,860	30,307
1880	53,951	11,177	1888	260,929	38,398
1881	58,693	15,129	1889	283,044	52,647
1882	60,158	16,218	1890	342,158	65,518
1883	55,346	14,065	1891	243,724	59,501
1884	73,741	19,978	1892	297,878	85,329